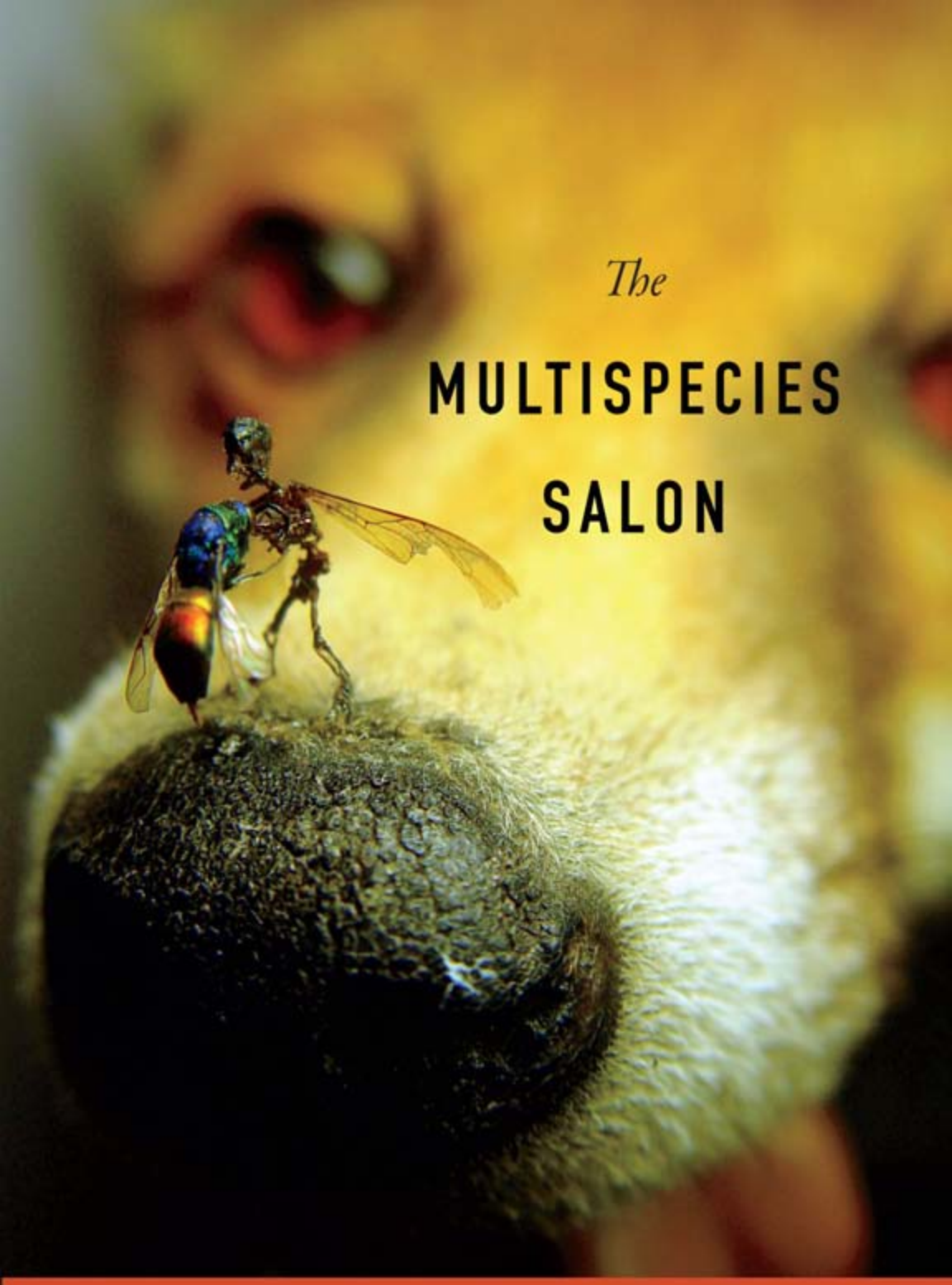

The MULTISPECIES SALON

EBEN KIRKSEY, EDITOR

THE MULTISPECIES SALON

Many visitors to the Multispecies Salon in San Francisco became visibly unsettled as they walked past pictures of two gatekeepers—a menacing "Bodyguard" (page i) and a benevolent "Surrogate" (opposite)—photographs of silicone sculptures by the Australian artist, Patricia Piccinini. The Bodyguard was a poster child for the Multispecies Salon. This fantastic creature was invented by Piccinini to protect a real organism—the Golden Helmeted Honeyeater, a small colorful bird from the suburbs of Melbourne, Australia, whose breeding population reached a bottleneck of just fifteen pairs. Piccinini says that her Bodyguard was "genetically engineered" with large teeth that have a dual function: "He will protect [the honeyeater] from exotic predators, and he has powerful jaws that allow him to bite into trees, to provide the birds with sap." These teeth are also a reminder that other species are not only good to think with, nor only to play with, but that they just might bite. More than a few gallery goers wondered aloud: Are these animals real?

FRONTIS.1–2 (*page i and opposite*) Patricia Piccinini, *Bodyguard (for the Golden Helmeted Honeyeater)*, silicone, fiberglass, leather, human hair, 151 × 76 × 60 cm, 2004, and *Surrogate* (*for the Northern Hairynosed Wombat*), silicone, fiberglass, leather, plywood, human hair, 103 × 180 × 306 cm, 2005. Photographs courtesy of Patricia Piccinini, Haunch of Venison, Tolarno Galleries, and Roslyn Oxley9 Gallery. See multispecies-salon.org/piccinini.

The

MULTISPECIES SALON

EBEN KIRKSEY, EDITOR

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Cover art: Tessa Farmer, *Little Savages* (detail),
2007. Taxidermy fox, insects, plant roots.
Photo: Tessa Farmer. Courtesy of the artist.

TO THE SPIRIT OF BEATRIZ DA COSTA

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INTRODUCTION

TACTICS OF MULTISPECIES ETHNOGRAPHY

Eben Kirksey, Craig Schuetze, and Stefan Helmreich

A swarm of creative agents animated the Multispecies Salon, an art exhibit that traveled from San Francisco to New Orleans and then to New York City. Artists, anthropologists, and allied intellectuals explored three interrelated questions at the Salon: Which beings flourish, and which fail, when natural and cultural worlds intermingle and collide?[1] What happens when the bodies of organisms, and even entire ecosystems, are enlisted in the schemes of biotechnology and the dreams of biocapitalism? And, finally, in the aftermath of disasters—in blasted landscapes that have been transformed by multiple catastrophes—what are the possibilities of biocultural hope? As we began to answer these questions, the divisions separating anthropologists and informants, culture and nature, subject and object began to break down. Collaborative research and writing projects emerged from the Salon that helped spawn a new mode of interdisciplinary inquiry: multispecies ethnography.

Ethnography, commonly glossed as "people writing" (*ethno-graphy*), is the signature method of cultural anthropology. In conventional ethnographies, "all actors are human," to paraphrase Timothy Mitchell. "Human beings are the agents around whose actions and intentions the story is written."[2] Lately, ethnographers have begun to expand the purview of anthropology. Experimenting with different modes of storytelling, anthropologists are rediscovering the Greek root of the word *ethnos* (ἔθνος) "a multitude (whether of men or of beasts) associated or living together; a company, troop, or swarm of individuals of the same nature or genus."[3] Ethnographers are now exploring how "the human" has been formed and transformed amid encounters with

multiple species of plants, animals, fungi, and microbes. Rather than simply celebrate multispecies mingling, ethnographers have begun to explore a central question: Who benefits, cui bono, when species meet?[4]

To answer this question, multispecies ethnographers are collaborating with artists and biological scientists to illuminate how diverse organisms are entangled in political, economic, and cultural systems. Collaborative methods and tactics are being used to study questions opened up by Anna Tsing, who recently suggested that "human nature is an interspecies relationship." Social conservatives with autocratic and militaristic ideologies have long dominated discussions of human nature, according to Tsing. Stories about primates, about the genes and behaviors we share with apes and monkeys, have been used to assert that dominance hierarchies, patriarchy, and violence are fixed in our own nature.[5] Rather than just consider our genetic nature, Tsing suggests that we adopt "an interspecies frame" to open "possibilities for biological as well as cultural research trajectories."[6]

Exploring ways to bring other species (and ways of thinking) back into anthropology, multispecies ethnographers have found inspiration in the work of scholars who helped found the discipline. Studies of animals have a long lineage in anthropology, going back to canonical texts such as Lewis Henry Morgan's *The American Beaver and His Works* (1868). Morgan studied the "acquired knowledge" of lodge, dam, and canal building transmitted among beavers. Drawing parallels between this knowledge and the engineering of people, he described beavers as one among many species of what he thought of as clever animal "mutes." The book also contained an argument for animal rights: "The present attitude of man toward the mutes is not such, in all respects, as befits his superior wisdom. We deny them all rights, and ravage their ranks with wanton and unmerciful cruelty."[7] In the late nineteenth century, at a moment when anthropology was a field of natural history, the primary theoretical aim of such comparative studies was to better understand the dynamics of evolution.[8]

As the theoretical concerns of anthropology broadened in the early twentieth century, diverse forms of life appeared alongside humans in studies of symbolism, religion, economic systems, and meaning. Animals proved to be "good to think" (as Claude Lévi-Strauss wrote in 1962), and also more instrumentally, "good to eat" (as Marvin Harris countered in 1985). Early ethnobotanists also studied the instrumental use of plants and their role in human belief systems. Later in the twentieth century, plants and animals began appearing in studies of marginality and mimesis, landscape and place, as well as agriculture and bioprospecting. With critical assessments of biodiversity

discourse emerging from political ecology and social studies of science in the 1990s, scholars began venturing away from animals and plants and toward microbiota that rarely figure in discussions of biodiversity.[9]

As cultural anthropologists became focused on issues of representation and interpretation, ethnographers interested in plants, animals, and microbes began asking: Who should be speaking for other species? Arjun Appadurai has raised similar questions about the ability of anthropologists to represent other people. "The problem of voice ('speaking for' and 'speaking to')," he writes, "intersects with the problem of place (speaking 'from' and speaking 'of'). . . . Anthropology survives by its claim to capture other places (and other voices) through its special brand of ventriloquism. It is this claim that needs constant examination."[10] Such critical scrutiny should be redoubled when anthropologists speak with biologists, nature lovers, or land managers about the creatures they represent.

As multispecies ethnographers speak for members of other species—or even attempt to speak with them, in some cases—we certainly still run the risk of becoming ventriloquists.[11] Bruno Latour seems unaware of this risk with his playful call for scholars in the humanities and social sciences to build new *speech prosthetics*: "subtle mechanisms capable of adding new voices to the chorus." Echoing Lewis Henry Morgan's early writing about clever animal mutes, Latour suggests that "nonhumans" have "speech impedimenta" that must be overcome so that they might more fully participate in human society. In *Politics of Nature*, he proposes bringing democracy to nonhumans by drawing them into parliamentary assemblies, where they will be represented by human "spokespeople."[12] Questioning the ability of other organisms to hold their human representatives accountable initially led us to ask, rhetorically, "Can the nonhuman speak?"[13] But after further reflection, we realized that this question was not quite right. "Nonhuman is like non-white," says Susan Leigh Star. "It implies a lack of something."[14] While lacking speech should not be the defining characteristic of a broad category of beings, Latour's notion of the nonhuman has another problem: It assumes too much about the very thing it opposes—that is, the human.

Moving past questions about representation, Donna Haraway has argued that animals are not just "good to think" or "good to eat" but are also beings that are good "to live with."[15] Other species are being regarded by anthropologists "as *parts* of human society," in the words of John Knight, "rather than just *symbols* of it."[16] Many anthropologists have begun to chart an "ontological turn" in the discipline, focusing not just on how humans and their worlds are portrayed but on how they are thought to be.[17] Ontology traditionally refers

to a branch of philosophy that examines modes and structures of being, such as essence and existence. Matei Candea, a British social anthropologist, associates the ontological turn with a move away from foundational distinctions in European thought between nature and culture, humans and nonhumans.[18] Recent provocations within anthropology suggest that human beings, seen ontologically, are multispecies beings.

Anna Tsing's suggestion that "human nature is an interspecies relationship" can best be understood with these debates in mind.[19] "Multispecies ethnography is less focused on delimiting and defining the boundaries of the human," according to Aimee Placas and Jennifer Hamilton.[20] Rather than "What is the essence of the human?" a key question that is orienting multispecies ethnography is, "What is the human becoming?" Ethnographers have long been studying how humans have been refashioned by the modern sciences of biology, political economy, and linguistics.[21] Ever since Haraway issued her influential "Manifesto for Cyborgs" in 1985, cultural anthropologists have been studying how we are becoming cybernetic organisms, hybrids of machine and organism, creatures of social reality as well as of science fiction.[22] Bringing other forms of life into this conversation, Cary Wolfe suggests that we have *become post-human*, since our mode of being is dependent on complex entanglements with animals, ecosystems, and technology.[23]

At the Multispecies Salon, the art exhibit where we started testing these ideas out, ethnographers began to push humans from center stage to study the lives and deaths of critters who abide with us in multispecies worlds. The gallery served as an experimental arena for reworking the relationship of anthropology to the natural sciences.[24] While philosophy was offering us critical theoretical resources, we found that bringing art interventions together with empirically rich ethnography could produce unexpected ruptures in dominant thinking about nature and culture.

Visitors to the 2008 Multispecies Salon, which debuted in San Francisco, could hear the twitter of live cockroaches mingling with recorded sounds of chimpanzees screeching for meat. A video installation juxtaposed images of whooping cranes following ultralight aircraft on annual migrations with footage of humans playing with dolphins in captivity. Collages of naked human and animal bodies, including a photograph of a fish head on a human torso, competed for space on the walls with a painting of two men riding a shark with its mouth agape. Laboratory organisms—fruit flies and pictures of transgenic *E. coli* bacteria—shared the gallery with apparently everyday household artifacts. One installation contained milk cartons and junk mail

featuring missing amphibians in the place of missing children. A carton featuring the golden toad of Monte Verde, Costa Rica, an animal now presumed extinct, asked, "Have You Seen Me?"[25]

Creative interventions at the Multispecies Salon set the stage for research collaborations where artists, ethnographers, and biological scientists came together to explore issues of common interest and concern. Bioartists, who grew art for the show using living matter as their medium, and ecoartists, who created aesthetic interventions to "help the worms and watersheds," offered ethnographers new tools for grappling with multispecies worlds.[26] Following Joseph Beuys's 1973 decree, "Everyone is an artist," ethnographers and biologists brought organisms and artifacts into the gallery, tentatively venturing together into an opening in the art world created by the Salon.[27]

Interdisciplinary contacts and encounters at the Multispecies Salon facilitated new ways of thinking and speaking about critters that normally inhabit the realm of *zoe*, or "bare life," creatures that usually are deemed killable: hermit crabs slated for "disposal" because they were covered with oil following BP's Deepwater Horizon disaster, lab rats who had outlived their usefulness in experiments, and common weeds growing in sidewalk cracks. Amid apocalyptic tales about environmental destruction, we discussed modest examples of biocultural hope—delectable mushrooms flourishing in the aftermath of ecological disturbance, microbial cultures enlivening the politics and value of food, multispecies communities being cultivated by guerrilla gardeners in clear-cut forests. We also began to discuss the best methods for the emerging field of multispecies ethnography—how artistic tactics and equipment from biological laboratories might augment existing ethnographic practices. These discussions also prompted us to experiment with new collaborative approaches to writing ethnography.

POACHING

Trespassing beyond the art gallery further into the domain of biology, multispecies ethnographers began stealing organisms—such as bacteria, acorns, and vultures—and claiming them for their own. These transgressions were inspired by Michel de Certeau, who describes "reading as poaching," a form of intellectual trespassing in *The Practice of Everyday Life*. Reading as poaching allows one to "convert the text through reading," to trespass on the "private hunting reserves" cultivated by elite literati, who alone claim rights to ascribe meanings to texts or landscapes.[28] The tactic of poaching fits within

FIGURE I.1. The Multispecies Salon picked up new elements, like new infectious spores, as the exhibit moved around the United States. Initially the show followed the routes of anthropologists as they travelled from San Francisco (2008) to New Orleans (2010) for a conference: the annual meetings of the American Anthropological Association. In New York City the exhibit alighted in midtown Manhattan at the CUNY Graduate Center before migrating across the East River into Brooklyn. There the Salon took up residence at Proteus Gowanus, an art gallery that was probing how "movements are affecting our future on the planet, bringing crisis and calamity aplenty." A piece illustrating one crisis, called *Multispecies Migrations*, involved living African Clawed Frogs in mason jars. These frogs were first exported from South Africa in the 1930s for use in human pregnancy tests. Unbeknownst to anyone at the time, this frog species can be an asymptomatic carrier of infectious spores from a deadly fungus that has begun to drive thousands of amphibian species extinct. *Multispecies Migrations* (2012) was a collaborative performance art piece involving Eben Kirksey, Mike Khadavi, Krista Dragomer. Photograph courtesy of Rashin Fahandej. See multispecies-salon.org/migrations.

de Certeau's larger argument that consumption is not a passive act determined by systems of production. He suggests that reading is a primary activity of modern consumers and, therefore, of everyday life.

The Matsutake Worlds Research Group, a collective of multispecies ethnographers formed by Anna Tsing, brought the tactic of poaching to the Multispecies Salon. Following the supply chain of matsutake mushrooms around the globe, the group is illuminating the workings of capital and power, nature and culture. "Thoughts for a World of Poaching," a short essay published by Lieba Faier on behalf of the group, describes how they went about collaborative writing. "What does it mean to "poach" another person's paper, especially an unpublished one?" asks Faier. The English word "poach" is related to the Middle French word *pocher* (to thrust, poke), and the Old French *pochier* (to poke out, gouge, prod, jab).[29] "Poaching is a way of pushing or poking pieces of one's research towards that of another," suggests Faier, "something of an offering; not an encroachment but a gift."[30]

Conventionally, a Call for Papers (CFP) is issued by editors of books to enlist the participation of authors. We issued a different sort of CFP to lay the groundwork for this book: a Call for Poachers.[31] A multitude of creative agents, a swarm, responded to our call. Biological anthropologists, multispecies ethnographers, and scholars from kindred interdisciplinary fields attended a special event at the Multispecies Salon in New Orleans. Rather than give conventional fifteen-minute conference presentations about their own work, participants came to the event with texts they had borrowed from others. A spirited discussion erupted as authors met authors. Reports from the field about the latest research were "poached" with fresh theory. Infusing papers with inventive ideas, participants enhanced one another's papers as one might poach a pear, using red wine and honey to intensify and transform the flavor of the fruit.

Shiho Satsuka, a member of the Matsutake Worlds Research Group, told fellow panelists and the assembled audience that "eating is a nodal point of life and death." She was poaching insights from the original work of Thom van Dooren, whose article "Vultures and Their People in India" describes how the mass death of carrion birds generated piles of dead bodies and an anthrax outbreak.[32] The vultures had been indirectly poisoned with diclofenac, a drug used as an anti-inflammatory for cows. Vultures once gathered along riverbanks of India, consuming the dead bodies of cattle and other animals, sometimes including people. Satsuka framed this ethnographic anecdote as a problem of situated action with other agents in the world, concluding, "As

humans, we are making choices about what multispecies worlds we most want to live in—in this case, whether we should live with anthrax or with vultures."[33]

Thom van Dooren's study of entanglements among birds, anthrax viruses, and dead mammals prompted Satsuka to rethink her research on the intimate associations of matsutake mushrooms with other fungi, plants, and microbes.[34] "When we think of multispecies connectivities," she said, "eating is central. One's eating and living also means killing other species, directly or indirectly." Satsuka described her ethnographic fieldwork with a group of "Matsutake Crusaders" in Kyoto, Japan, who systematically "clean" the forest of dead wood, fallen leaves, and grasses to create a niche for red pines, a species of tree that forms symbiotic associations with matsutake mushrooms. The Matsutake Crusaders intensively modify forest ecosystems, uprooting broadleaf trees and other competitors of pines. Rather than preserve pristine natural ecosystems outside cultural influences, Satsuka found that the crusaders were selectively killing some species of trees and disturbing ecosystem dynamics to "contribute to the flourishing and health of the land and its critters" (see chapter 3: Blasted Landscapes).[35]

Panelists pushed and poked at biopolitics, a concept introduced by Michel Foucault in 1975 to understand how life has been optimized and controlled. Foucault was largely concerned with the regulation of human life—how populations of certain human groups were "allowed to die" (*laissez mourir*) while others were "made to live" (*faire vivre*). Our discussions brought these ideas to bear on plants, animals, and mushrooms living together in ecosystems.[36] A freshly published paper by Heather Paxson, describing her ethnographic research on the biology and politics of raw-milk cheese, was on the table for poaching. A diversity of microorganisms figured into Paxson's paper: some good for making tasty cheese; others bad for human digestive systems. Drawing on Foucault, Paxson illustrated her own idea of *microbiopolitics*.[37] Talking about microbiopolitical heroes and villains, she made it clear that such designations are not absolute but must be judged on the basis of situated, contingent action and effect. Dissent over how to live with microorganisms, Paxson suggested, reflects disagreement about how humans ought to live with one other.[38]

Illustrating her ideas with a fact of life that made some feel squeamish, Paxson reminded us of an often cited biological finding: that 90 percent of the genetic material in "us" is "not us." Instead, it belongs to "our" microbiome. "No matter how many times I hear this I still experience a little ontological whiplash," said Jake Metcalf, the poacher of Paxson's essay.[39] The physical presence of microbes within our bodies thus grounds the claim

FIGURE I.2 Marnia Johnston, *Paranoia Bugs*, ceramic sculptures, 2005. This artwork by Johnston, one of the curators of the Multispecies Salon, invoked the contagious fears that are often triggered when bioartists make tactical interventions (see chapter 5: Life in the Age of Biotechnology). Photograph by Eben Kirksey. See multispecies-salon.org/johnston.

that "human nature is an interspecies relationship."[40] These beings literally and figuratively make us who we are. *Tactical Biopolitics*, an influential book about bioart edited by Beatriz da Costa and Kavita Philip, begins with a microbiopolitical dictum: "Never think you know all of the species involved in a decision. Corollary: Never think you speak for all of yourself."[41]

Poaching is just one of the many *tactics* and clever ruses described by de Certeau. "A tactic insinuates itself into the other's place," he writes. "It is always on the watch for opportunities that must be seized 'on the wing.'"[42] Drawing on the tradition of "tactical media," which combines cheap devices and diverse apparatuses with a do-it-yourself (DIY) ethos, some artists who exhibited their work at the Multispecies Salon reconfigured biopolitical relations by tinkering with technoscience.[43] Working with some of the same theoretical ideas animating discussions among anthropologists at the Salon, the artists began to catalyze new insights by reconfiguring matter and meaning with their own creative research practices. Some showcased artworks

made with kitchenware and readily accessible household tools, cooking up genre-bending recipes, bringing our attention to practices of interspecies care and responsibility.[44] Other artists insinuated themselves into the place of ethnographers as they deliberately messed with the lines that conventionally separate anthropologists and natives, experts and informants.[45]

ARTISTS BECOMING ETHNOGRAPHERS

Performance artists tested out clever tricks for generating productive insights at the Multispecies Salon. These artists might be understood as "para-ethnographers," to borrow a term coined by George Marcus. Para-ethnography involves collaborations among anthropologists and "other sorts of experts with shared, discovered, and negotiated critical sensibilities." The root of "para" means "alteration, perversion, or simulation." It also means "auxiliary"—as in paramedics, professional staff who perform critical medical functions in ambulances and on the front lines, or paralegals, who are qualified to perform legal work through their knowledge of the law gained through education or work experience. Rather than relegate para-ethnographers to a subservient role to bona fide anthropologists, fully embracing their work can destabilize power hierarchies based on expertise.[46] As artists and anthropologists experimented with different tactics and methods, the Multispecies Salon became a "para-site," or an auxiliary ethnographic field site.

When the Salon opened in New York City, one performance artist who called herself the Reverend of Nano Bio Info Cogno brought critical attention to biotechnology dreams and schemes. While blessing the gallery opening, she lampooned popular beliefs about the capacity of technology to save humanity from medical and environmental disasters. The Reverend of Nano Bio Info Cogno offered prophecy of technologically mediated rapture. After leading sing-along hymns for scholars at the City University of New York Graduate Center in midtown Manhattan, she ministered to the masses outside on Fifth Avenue. Some anthropologists at the Salon maintained their distance from the Reverend—perhaps wary of being caught up in a performance by a fellow cultural critic who was using unfamiliar methods and tactics. Many passersby were simply perplexed or amused by her presence. Others let the artist do her work. She turned ethnographers into informants, drawing out ambivalent insights about biology and technology.[47] Cornering an ethnomusicologist who was wandering down Fifth Avenue, she initiated a lively dialogue by inviting him to commune with his mobile phone:

"Put it to your forehead for the third eye experience. You are connected to that device, you can't live without it."

"I want to," replied the obliging ethnomusicologist with a wan smile. "I'm trying to put it away, to keep it in the bag, to not have it on my body."

"But why, son? Don't fight it. Join the Church of Nano Bio Info Cogno."

(see a video of this exchange at multispecies-salon.org/pilar)

Praba Pilar, the Colombian performance artist who masquerades as the Reverend, has long been critical of emerging technologies that are entrenching divides marked by geography, race, and class.[48] She insists that we think critically about how technologies are always entangled with systems of resource extraction, industrial production, and labor.[49] But before she began dressing up in a silver jumpsuit, she found that few people in the United States were willing to take her seriously—few were willing to listen to her critiques of biotechnology and inequality. Adopting the persona of an outlandish biotech booster, Pilar began masquerading as a white person under a thick layer of silver makeup. Fervently celebrating the vacuous promises of new technologies in this disguise, she reached new audiences by staging uneasy, thought-provoking interventions (see chapter 5: Life in the Age of Biotechnology).[50]

The Reverend of Nano Bio Info Cogno was just one, among many, performance artists who turned the tables on anthropologists at the Multispecies Salon.[51] Some of these artists became authors, contributing chapters to this book. Caitlin Berrigan invited spectators to join her performance by sipping dandelion root tea while she fed a living dandelion with her own hepatitis C-infected blood.[52] This gesture of reciprocal care and reciprocal violence illustrated that Berrigan's blood, which would be dangerous to any human, could nonetheless still serve as a nutritious fertilizer for plants (see chapter 4: Life Cycle of a Common Weed). Miriam Simun offered up a tasty sampling of homemade cheese—a blend of goat's milk and human breast milk obtained from an online marketplace. This edible intervention prompted animated and agitated discussions about the risks of interspecies and intraspecies contact and contagion (see recipe 2: Human Cheese).

Performance art augmented conventional ethnographic methods in a project by Karin Bolender, who describes herself as "a poet with a busted tongue." Bolender's research involved a seven-week walking journey in the US South with an American Spotted Ass, a variant breed of the common domestic donkey (*Equus asinus*) bred specifically for its piebald (spotted) coat

color. Taking art interventions beyond galleries, Bolender walked with her donkey from Mississippi to Virginia, using her excursion as an opportunity to glean ethnographic insights about landscapes blasted by past horrors and present global economic and political forces. Rather than just write up the results of this research, she made bars of soap as an experiment in multispecies storytelling. Words contain the danger of hurting—or, at the very least, obscuring—ourselves and those we love; Bolender's project involved weaving material and symbolic elements together into a different kind of story. The soap, made with the milk of her donkey companion, congealed invisible traces of bodies and antibodies entangled in specific times and places (see chapter 2: R.A.W. Assmilk Soap).

Hal Foster's critical essay "The Artist as Ethnographer?" (1994) suggests that artists and ethnographers once envied each other. From the artist's point of view, Foster claims, this envy stemmed from ethnographers' ability to conduct contextual analysis, to forge interdisciplinary connections, and to engage in self-critique. On the flip side, Foster alleges that with the artist-envy of ethnographers, "The artist becomes a paragon of formal reflexivity, sensitive to difference and open to chance, a self-aware reader of culture understood as text." Anthropology is "prized as the science of alterity," Foster claims, describing others and outsiders on the margins.[53] If Foster was writing about the more recent multispecies Zeitgeist sweeping art and ethnography, perhaps he would take a similar line to that of Eduardo Kohn, who writes, "If we take otherness to be the privileged vantage from which we defamiliarize our 'nature,' we risk making our forays into the nonhuman a search for ever-stranger positions from which to carry out this project. Nature begins to function like an 'exotic' culture."[54]

Getting past any feelings of envy that might have been present when Foster penned his critical intervention in the 1990s, artists and ethnographers have since initiated and sustained long-term collaborations based on shared aesthetic and critical sensibilities. Ethnographic Terminalia, a curatorial collective that has been staging annual art exhibits since 2009, is only one of the more steadfast groups of artists and anthropologists committed to exploring the possibilities of new media, new locations for interventions, and new methods of asking old questions.[55] Multispecies ethnographers began collaborating with artists to study long-standing concerns about human nature, as well as speculative questions about matter and meaning. Anthropologists insinuated themselves into the place of artists at the Multispecies Salon to figure out new responses to critiques about the voice, agency, and subjectivity of nonhuman "Others."

ETHNOGRAPHERS BECOMING ARTISTS

During an earlier experimental moment in anthropology, James Clifford drew attention to the fact that ethnography "is always caught up in the invention, not the representation, of cultures."[56] If Clifford understood ethnography as the art of *writing culture*, then multispecies ethnographers began *making culture* by collaborating with artists. "Ethnography is much richer in possibility if it collaborates with the practices of other intellectual crafts that have a kinship and resemblance to it," write Fernando Calzadilla and George Marcus.[57] Rather than just producing "the monograph" or "the essay," anthropologists started to generate multimedia installations and performative interventions, bringing attention to multispecies associations we take for granted and exposing emergent forms of life. Multispecies ethnographers began using art to explore biocultural borderlands, places where species meet.[58]

Future Mix, a pioneering collaborative project that used art and ethnography to probe biocultural entanglements, investigated new possibilities opened up by transgenesis, cloning, regenerative medicine, and stem cell science. Sarah Franklin, a cultural anthropologist at the University of Cambridge, collaborated with a biochemical engineer, an artist, and schoolchildren to generate imaginative responses to emergent technologies. The team fleshed out new biological connections implied (and forged) by the cultivation of human stem cell colonies and the production of *admixed* human-animal hybrid embryos. "Multi-perspectival responses" emerged from the artistic interventions, writes Franklin, "providing a contrast to the insights gained through ethnography or more conventional academic research."[59]

Franklin's team used conventional media, such as drawings, cartoon animations, and videos. Other multispecies ethnographers have cultivated critical friendships with bioartists who grow their own artworks with living matter. Some of these thinkers and tinkerers have even created new life forms, opening up a host of ethical questions.[60] Cobbling together medical and visual apparatuses in new arrangements, bioartists have illuminated living objects of interest to anthropologists and opened up new ethnographic horizons.[61] Ethnographers are expanding their toolkits with help from these artists, who are practiced at poaching scientific instrumentation—for instance, microscopes and DNA test kits. Purloining materials and methods from biological laboratories, ethnographers are producing artworks to ask their own research questions.

Ethnographers, artists, and living organisms co-produced a number of artworks at the Multispecies Salon: a ready-made flask with transgenic fruit flies, a retrofit refrigerator housing a living rainforest ecosystem, a collage made with microscopic images of a queer bacteria called *Wolbachia* (see chapter 5: Life in the Age of Biotechnology). These para-ethnographic objects facilitated unconventional ways of speaking and thinking about the issues at hand.[62] Against the backdrop of this lively art, ethnographers gave presentations about their use of novel methods and tactics. Eva Hayward discussed how she "sexed" cup corals by "extracting gut contents with a Pasteur pipette and examining them for sperm under a compound microscope." Perverting the scientific instrumentation at her disposal, and using her own appendages, Hayward also described how she came to know cup corals through her "fingeryeyes" by touching, tasting, smelling, and groping the creatures.[63]

Food artists also showed ethnographers how to craft recipes to rework multispecies entanglements with everyday household appliances. They made concrete proposals for creating livable futures in the aftermath of disaster by reworking mater and meaning. Linda Noelle, the former poet laureate of Ukiah and a member of the Koyungkowi tribe, invited us to savor the bitter flavor of acorn mush while contemplating deeply rooted biocultural networks that have survived white settler colonialism (see recipe 4: Bitter Medicine Is Stronger). Wrapping up indigenous knowledges of starvation foods in brightly colored plastic packets, the artist Lindsay Kelley drew on her own familial entanglements with the US Southwest to subvert dominant regimes for managing life (see recipe 1: Plumpiñon). Deanna Pindell's guerrilla bioremediation strategy, her recipe for reseeding clear-cut forests with brightly colored wool balls, offers an opportunity to think about the hopeful possibilities that emerge when one subverts dominant regimes for managing life (see recipe 3: Multispecies Communities).[64]

A pair of cultural anthropologists from the Matsutake Worlds Research Group who masquerade under the pen name Mogu Mogu brought delectable mushrooms to a multispecies meal in the gallery. (Mogu Mogu, in China, translates as "mushroom" twice over, while in Japan, the phrase registers the kind of satisfaction in the belly one feels when one says "yum, yum."[65]) While participants smacked their lips with delight after eating matsutake mushrooms, many certainly also experienced indigestion after sampling insects, dandelions, and other edible companions. Eating freshly baked sourdough bread became an opportunity to discuss Haraway's ideas about companion species—organic beings such as rice, bees, tulips, and intestinal flora, all of

FIGURE I.3 Myrtle von Damitz III, *Slug Fest*, 2010. Paintings by von Damitz, the core member of the "curatorial swarm" who oversaw the participation of more than eighty artists in the New Orleans show, framed our discussions of creatures that are good to live with and to eat. Image courtesy of the artist and Andy Antippas, Barrister's Gallery. See multispecies-salon.org/vondamitz.

which make life for humans what it is, and vice versa.[66] The etymological roots of "companion," Haraway reminds us, can be traced to the Latin *cum panis* (with bread). Sniffing living sourdough cultures during this multispecies meal became an opportunity to nourish indigestion, to dwell on the presence of parasitic critters eating and living with us.[67] (For a video of this meal, see multispecies-salon.org/edible.)

Parasites are loathed in popular culture. The bacteria, viruses, and fungi living on the surface of our bodies, and in our guts, are usually noticed only when they make us sick. Animals like rats and cockroaches, as well as weedy plants like dandelions, are associated with vacant lots, trash heaps, and other sites of abandonment. In French, the word *parasite* has more diverse associations: It refers to "noise" in addition to biological or social freeloaders.[68] Michel Serres, a French thinker, wrote an unusual book, *The Parasite*, which celebrates the creative and productive potential of noise: "The parasite doesn't stop. It doesn't stop eating or drinking or yelling or burping or making thousands of noises or filling space with its swarming and din. . . . [I]t runs and grows. It invades and occupies."[69]

Anthropologists and artists who poached Serres's ideas at the Multispecies

FIGURE 1.4 Goats from the Pretty Doe Dairy, a guerrilla bioremediation scheme, by Nina Nichols and Amy Jenkins (2010). Photograph courtesy of the Black Forest Fancies. See multispecies-salon.org/prettydoedairy.

Salon came to understand the exhibit as a para-site, or a para-ethnographic field site. Ethnographic parasites, in the words of George Marcus, are spaces that facilitate alternative ways to speak and think with "moderately empowered people" who are "deeply complicit with and implicated in powerful institutional processes. . . . The para-site is a space of excess or surplus in a subject's actions but is never fully controllable by him or her. [It is] a site of alternativity in which anything, or at least something different, could happen."[70] The Multispecies Salon involved the unfolding of encounters. The exhibit was an initial attempt to get at something we did not already know rather than a reorganizing of existing knowledge. In this book we have written up the results of this provisional experiment in conversation with a multitude of poachers and para-ethnographers.

GLEANINGS FROM A PARA-SITE

The same transgressive spirit that guided artists and anthropologists who collaborated in making culture at the Salon also guided our turn back to writing culture, as we gleaned texts, images, and ideas from galleries after the artworks were packed up and shipped home. Gleaning is a form of trespassing that makes use of excess. Rusten Hogness, a science writer, has produced a multimedia website called "Gleaning Stories, Gleaning Change," with ethnographic vignettes about contemporary gleaning practices in Northern California.[71] Hogness has recorded the stories of gleaners who descend on farm fields after harvests, picking up any food that is left.

"Gleaning is a democratic, individualized practice," says Susan Friend Harding, a cultural anthropologist who accompanied Hogness to lettuce fields and orchards near Santa Cruz. Gleans involve swarms of people who descend on freshly harvested fields who generate "a gathering, rather than a community." Rather than "conscious collaborations, interactions across boundaries" of language and culture, gleans are "a bit out of control . . . often with an element of revelry." Both the Bible and the Qur'an have passages celebrating gleaning and charity, but recent legislation has turned gleaning into stealing. Gleaners must obtain special permissions from landowners in the contemporary United States before taking excess produce from fields.[72] The spirit of gleaning guided the intellectual work that went into editing this book, as common threads from diverse stories told at the Multispecies Salon were picked out and woven together.[73]

"Narratives appeared in sudden snippets and disjointed revelations" at the Multispecies Salon, wrote Matt Thompson in a review of the exhibit for the Savage Minds blog. "There was a clear connection to the human," he continued. "The exhibit remained consistently relevant to anthropology throughout. And it sent out rhizomes to tap into relationships with other living things: animal, plant, microbe. Hidden ecologies—networks of bioculture—unsettled established narratives about history, gender, and trade. No noble savages were found in this clearing of naturecultures. Indeed, romantics were largely absent while the surrealist love of the found object and the psychoanalytic was embraced with revelry. Painting, sculpture, fashion, architecture, collage, video, photography, and installation art enlivened the show. While robots roamed around, clacking and blinking, a troupe of actresses demonstrated a home pregnancy test by injecting human urine into a frog."[74]

This book is a gathering of poachings and gleanings from a para-site—a

collection of recipes, ethnographic vignettes, and other genre-bending essays that speak to the three themes at play in the Multispecies Salon. "Blasted Landscapes" (part I) will lead readers from the wickedly hot, haunted, and weedy US South to the radioactive gardens of Japan, and back again. Recipes and treatises about "Edible Companions" (part II) will unravel microbiopolitical entanglements with critters that are both good to live with and good to eat. Creatures that are proliferating amid the dreams and schemes of late capitalism will be illuminated by essays concerning "Life and Biotechnology" (part III). Gathering together snippets of narrative and establishing connections among disjointed revelations, this book knits together insights that emerged during the Multispecies Salon. Bringing together multispecies ethnographers, theorists, and artists who double as authors, this collection departs from apocalyptic tales about environmental destruction, and fabulous stories of salvation, to illustrate sites of modest biocultural hope.

NOTES

Collaborative authorship is a relatively new phenomenon in mainstream cultural anthropology. This gives us the opportunity to invent new conventions for spelling out collaborative labor relations. The journal *Science*, for example, requires authors to quantify contributions for each paper they publish with percentage points. In addition to tallying up numbers for the design and interpretation of experiments, *Science* authors are asked to account for "particular, specialized roles in the research, e.g. statistical analysis, crystallography, preparation of cell lines." Eben Kirksey did the lion's share of the work in writing this introduction. He designed the experiment (curating art exhibits to test out new methods and tactics of multispecies ethnography) and played the leading role in the acquisition of the data by installing the exhibits, interviewing artists, coordinating para-ethnographers, and formulating a Call for Poachers. Kirksey also took the lead in interpreting and analyzing data, as well as in drafting and revising the manuscript. Craig Schuetze helped in the early phases of the project by participating in the design of the experiment, formulating the CFP, and conducting and transcribing interviews. Schuetze also transformed "raw" field notes into "cooked" thick description, drafting the very first accounts of Multispecies Salon happenings. Stefan Helmreich provided pointers to histories of anthropology and kept chasing after questions of sex, gender, and race as they appeared and (sometimes) disappeared in discussions of multispecies becomings. This introduction expands our earlier essays (Kirksey and Helmreich, "The Emergence of Multispecies Ethnography"; Kirksey et al., "Poaching at the Multispecies Salon"). We build on central theoretical concepts and claims from these earlier interventions, pushing and poking them in new directions. For the "Science/AAAS Authorship Form and Statement of Conflicts of Interest" see http://www.sciencemag.org, accessed February 13, 2014.

1. Ron Broglio has explored related questions about art in the cultural world of humans while coming to terms with nonhuman realms. He explores how art calls us to consider and negotiate the space of the animal other: Broglio, *Surface Encounters*, xvii.

2. Mitchell was actually writing about history, but the same can certainly be said of ethnography: Mitchell, "Can the Mosquito Speak?" 29.

3. Grimm et al., *A Greek-English Lexicon of the New Testament*, 168.

4. Susan Leigh Star first suggested, "It is both more analytically interesting and more politically just to begin with the question, *cui bono?*, than to begin with a celebration of the fact of human/non-human mingling": Star, "Power, Technologies, and the Phenomenology of Conventions," 43. See also Haraway, *When Species Meet*.

5. Haraway, *Primate Visions*.

6. Tsing, "Unruly Edges," 144.

7. Morgan, *The American Beaver and His Works*, 281–82; see also Feeley-Harnik, "The Ethnography of Creation: Lewis Henry Morgan and the American Beaver."

8. See, e.g., Star and Griesemer, "Institutional Ecology, 'Translation,' and Boundary Objects."

9. Kirksey and Helmreich, "The Emergence of Multispecies Ethnography," contains an exhaustive review of the literature on ethnobotany, animal studies, political ecology, ethno-primatology, and science studies. For other recent literature reviews, see Cassidy, "Lives with Others"; Fuentes "Ethnoprimatology and the Anthropology of the Human-Primate Interface"; Mullin, "Mirrors and Windows"; Nazarea, "Local Knowledge and Memory in Biodiversity Conservation."

10. Appadurai, "Introduction," 17, 20.

11. Donna Haraway has critically evaluated the prospect of "speaking with" other beings across species lines. She describes how Penny Patterson, a graduate student at Stanford University, taught a modified version of American Sign Language to Koko, a gorilla with a "vulgar sense of humor" who invented a variety of jokes and insults: see Haraway, *Primate Visions*, 142. Her more recent *Companion Species Manifesto* describes attempts at interspecies communication with her own dogs and explores the power relations at play in a "pedagogy of positive bondage" that provides canines "the freedom to live safely in multi-species, urban and sub-urban environments with very little physical restraint and no corporal punishment": Haraway, *The Companion Species Manifesto*, 46. Joe Hutto, a naturalist who spent a year living with a group of turkeys, learned how to interpret and imitate turkey calls and even initiate dialogue about other beings in the world. Hutto learned to say, "Look, a snake!" and "Everything is OK." "With the exception of my incorrect vocalizations now and then," Hutto reports, "we have never had any significant miscommunication": Hutto, *Illumination in the Flatwoods*, 152. Multispecies ethnographers are starting to follow naturalists, primatologists, and comparative psychologists to responsibly speak with and for others, across species lines.

12. Latour, *Politics of Nature*, 67, 231–32.

13. Here we are echoing Mitchell's question "Can the mosquito speak?" Mitchell, in turn, was borrowing from Gayatri Spivak, who famously asked, "Can the subaltern speak?" Spivak was asking whether subordinate others had any pos-

sibility of being represented in dominant languages and discourses: Mitchell, *The Rule of Experts*; Spivak, "Can the Subaltern Speak?" For a similar criticism of Latour, see Kohn, *How Forests Think*, 40.

14. Susan Leigh Star, personal communication, September 12, 2008.

15. Haraway, *When Species Meet*.

16. Knight, *Animals in Person*, 1.

17. Henare et al., *Thinking through Things*, 6.

18. Candea, "I Fell in Love with Carlos the Meerkat," 243.

19. Tsing, "Unruly Edges," 144.

20. Hamilton and Placas, "Anthropology Becoming . . . ?," 252.

21. See Rabinow and Rose, "Biopower Today"; Foucault, *The History of Sexuality*; Foucault, *The Birth of the Clinic*.

22. Haraway, "Manifesto for Cyborgs," 65.

23. Wolfe, *What Is Posthumanism?*

24. Marcus and Myers, *The Traffic in Culture*, describes how art and anthropology can interact to create a "discursive arena." See also Calzadilla and Marcus, "Artists in the Field." The fertile terrain where art and anthropology intersect has already been discussed: see Foster, "The Artist as Ethnographer"; Pinney and Thomas, *Beyond Aesthetics*; Schneider, "Uneasy Relationships."

25. The artists whose work animated the prose in this paragraph are, in order of mention, Craig Schuetze (*Animal Ambassadors*); Rachel Mayeri (*Primate Cinema*), a collaborative piece involving Traci Warkentin, Eben Kirksey, and Michael Goodier (*Umwelten*); Frédéric Landmann (*Wolbachia* and *Drosophila*); Andre Brodyk (*Alzheimer's Portraits*); and Ruth Wallen (*If Frogs Sicken and Die*, *What Will Happen to the Princes?*).

26. Bioart entails "tactical biopolitics," a do-it-yourself approach to remaking biological and political relations, in the words of Beatriz da Costa and Kavita Philip, who edited *Tactical Biopolitics*, a definitive book on the subject. For other key accounts of the bioart movement, see Anker and Nelkin, *The Molecular Gaze*; Kac, *Signs of Life*; Wolfe, "From *Dead Meat* to Glow-in-the-Dark Bunnies"; Zylinska, *Bioethics in the Age of New Media*. Ecoartists work with dynamic processes and agents—organisms that grow, mutate, and die, according to Linda Weintraub's account in *To Life!* Grounded in an ecological ethic, these artists are experimenting with new practices of restoration and remediation: see Wallen, "Ecological Art," 235.

27. Beuys was a twentieth-century art icon who inspired much subsequent work by ecoartists and environmental activists. One of Beuys's iconic performance pieces, *Coyote: I Like America and America Likes Me* (1974), involved living in a cage for three days with an animal—a coyote named "Little John"—in a New York City art gallery. Critics of the day uncritically celebrated Beuys's attempt to reconcile and communicate with animals, nature, and shamanic spirits of Native Americans. Art historians have more recently subjected the piece to rigorous critique. Beuys moved beyond the notion that "nature" is a physical backdrop to human history but assumed that nature is deeply ingrained in the "cultural unconscious" of modern human societies.

While mystifying nature and misappropriating indigenous religious traditions, Beuys enlisted the coyote in a "social sculpture" that inadvertently reinforced and sustained the idea that humans are dominant over animals and ecological systems. Regarding animals, plants, or microbes as "artists" or "collaborators" in a common project similarly risks hiding relations of domination and exploitation. On Beuys, see Gandy, "Contradictory Modernities," 638. On collaboration, see Kirksey, *Freedom in Entangled Worlds*, 2–7. On hidden hegemonies in art, see Bishop, "Antagonism and Relational Aesthetics," 65. For a discussion of the agency of material artifacts, see Gell, *Art and Agency*.

28. De Certeau, *The Practice of Everyday Life*, 165, 171, 176.

29. Here we are "poaching" de Certeau's original ideas and language. In the French original of *The Practice of the Everyday Life* (*L'invention du quotidien*), he does not play with the Middle French word *pocher* or the Old French *pochier*. The original text uses the word *braconnage*, which only means "poaching" in the sense of hunting. We are layering in these other meanings, building on interpretations by the Matsutake Worlds Research Group and engaging in trans-linguistic word play.

30. Matsutake Worlds Research Group, "Thoughts for a World of Poaching." See also Choy et al., "A New Form of Collaboration," 385.

31. "CFP: Call for Poachers," accessed July 19, 2013, http://ebenkirksey.blogspot.com.au.

32. van Dooren, "Vultures and Their People in India."

33. Satsuka, "Eating Well with Others/Eating Others Well," 134.

34. Matsutake form structures called mycorrhiza, or "fungus roots," with the roots of red pines. Through these mycorrhiza, the mushrooms exchange nutrients with living trees.

35. Haraway, quoted in Satsuka, "Eating Well with Others/Eating Others Well," 137. See also chapter 3 in this volume.

36. Along related lines, Rafi Youatt describes how biopolitics became "a form of ecologically distributed power that involves interventions in human and nonhuman lives": Youatt, "Counting Species," 409.

37. Microbiopolitics involves the circulation of matter and meaning in local networks, outside dominant regimes of biopolitics—standardized and centralized approaches to managing life. In a similar vein, Molly Mullin has described how some dog owners, who call themselves "wild feeders," refuse to buy into the corporate pet food industry. Elsewhere, Mullin has conducted an authoritative review of the literature on animals in anthropology. She explores studies that have explicitly attempted to combine economic, ecological, and symbolic perspectives on food. Research on hunting and pastoralism has begun to grapple with how relationships among humans, animals, and their environments have been transformed by colonial and neocolonial processes: Mullin, "Feeding the Animals," 293; Mullin, "Mirrors and Windows," 209.

38. Paxson, "Post-Pasteurian Cultures," 15. See also the interlude in this volume.

39. Metcalf, "Fermenting Ethics," 147.

40. Tsing, "Unruly Edges," 144.

41. da Costa and Philip, *Tactical Biopolitics*, xvii–xix. Dumit, "Foreword," xii.

42. de Certeau, *The Practice of Everyday Life*, xix.

43. "An aesthetic of poaching, tricking, reading, speaking, strolling, shopping, desiring" animates the tactical media movement: Garcia and Lovink, "The ABC of Tactical Media." See also Raley, *Tactical Media*, 43; Critical Art Ensemble, *Digital Resistance*, 23; Wodiczko, *Critical Vehicles*, 25; da Costa and Philip, *Tactical Biopolitics*, xvii–xix.

44. Bureaud, "The Ethics and Aesthetics of Biological Art," 39; Zurr, "Complicating Notions of Life," 402; Kac, *Signs of Life*.

45. Anthropology has long been focused on "representing the colonized," in the words of Edward Said: Said, "Representing the Colonized." One influential art intervention in 1993, "The Couple in the Cage: A Guatinaui Odyssey," deliberately played with this problematic exhibitionary tradition. Guillermo Gomez-Peña and Coco Fusco put themselves on display in museums as caged Amerindians from an imaginary island. While the artists' intent was to create a satirical commentary on the notion of discovery, they soon realized that many of their viewers believed the fiction and thought the artists were real "savages": Fusco, "Couple in the Cage," accessed February 13, 2014, http://www.thing.net/~cocofusco.

46. Holmes and Marcus, "Refunctioning Ethnography," 1104; Marcus, "Multi-sited Ethnography," 188; Marcus, *Para-Sites*, 7–9.

47. See also Foster, "The Artist as Ethnographer."

48. Similar insights about inequalities in access to health care that cut along lines of race, class, and geography have been explored by medical anthropologists: see, e.g., King, "Immigration, Race, and Geographies of Difference in the Tuberculosis Pandemic"; Sunder Rajan, *Biocapital*.

49. Haraway, *Modest_Witness@Second_Millennium.FemaleMan_Meets_OncoMouse*, 42.

50. Fortun, "Mediated Speculations in the Genomics Futures Markets," 146. See also chapter 5 in this volume.

51. Playing with the French word *hôte*, which means both "host" and "guest" in English, Michel Serres suggests, "It might be dangerous not to decide who is the host and who is the guest, who gives and who receives, who is the parasite and who is the *table d'hôte*, who has the gift and who has the loss, and where hostility begins within hospitality": Serres, *The Parasite*, 15–16.

52. "Viruses appear as authors, as agents; they govern us, they rule, they reign; they are fickle, whimsical, unreasonable, inconstant" writes Ed Cohen. "They veer from one place to another; they shift shapes": Cohen, "The Paradoxical Politics of Viral Containment," 17. With this performance, Berrigan explored the limits of viral agency, showing that human viruses fail to rule and reign in the world of plants.

53. Foster, "The Artist as Ethnographer?" 305.

54. E-mail from Kohn, quoted in Kirksey and Helmreich, "The Emergence of Multispecies Ethnography," 562.

55. For an early example of such collaborations, after the critical turn in anthropology, see: Calzadilla and Marcus, "Artists in the Field." For more on Ethnographic Terminalia, see Brodine et al., Ethnographic Terminalia.

56. Clifford, "Introduction," 2. See also Marcus and Fischer, *Anthropology as Cultural Critique*, 8.

57. Calzadilla and Marcus, "Artists in the Field," 96–97.

58. Anzaldúa, *Borderlands/La Frontera*, 25; Haraway, *When Species Meet*. See also Schneider and Wright, *Contemporary Art and Anthropology*, 1; Kolodny, "Rethinking Frontier Literary History as the Stories of First Cultural Contact," 18.

59. Franklin, "Future Mix," 81.

60. da Costa and Philip, *Tactical Biopolitics*, xvii–xix. Dumit, "Foreword," xii.

61. Bureaud, "The Ethics and Aesthetics of Biological Art," 39; Zurr, "Complicating Notions of Life," 402; Kac, *Signs of Life*.

62. See Marcus, *Para-Sites*, 5.

63. Hayward, "Fingeryeyes."

64. Pindell is an ecoartist whose work addresses the web of interrelationships in which art exists—the physical, biological, cultural, political, and historical aspects of ecosystems. "Ecoartists, in creating their work, engage in collaborations with places and nonhuman agencies," writes Beth Carruthers. Ecoart involves making subversive interventions or confrontational direct actions. It entails a mode of praxis, to borrow the key phrase from Carruthers's work, which involves "acting as if everything matters": Carruthers, "Praxis," 8. See also Gablik, *The Reenchantment of Art*, 7; Wallen, "Ecological Art," 235.

65. Tim Choy and Shiho Satsuka are Mogu. See Matsutake Worlds Research Group, "A New Form of Collaboration in Cultural Anthropology," 384–89; Myers, "Poaching Mushrooms," 139–41.

66. Haraway, *The Companion Species Manifesto*, 15.

67. Haraway, *When Species Meet*, 78, 300.

68. Wolfe, "Introduction," xiii.

69. Serres, *The Parasite*, 253.

70. Marcus, *Para-Sites*, 5.

71. Hogness participated in the first Multispecies Salon event in 2006, playing a special segment of a different radio show, "California Bird Talk," which is available on his website at http://www.hogradio.org. "Gleaning Stories, Gleaning Change" is hosted by the Digital Humanities initiative at the University of California, Santa Cruz, accessed February 13, 2014, http://humweb.ucsc.edu/gleaningstories.

72. Donna Haraway collaborated with Hogness on the project. (Hogness is Haraway's husband). She describes gleaning as "complex connection through bodily pleasure." Venturing into these fields became an opportunity for Haraway to reflect on the fact that hunger "is not a natural disaster but a political arrangement." She says, "The history of gleaning is tied to the rights of the peasantry to glean after the harvest." With enclosures came "the deepening of rights of property over and against the rights of communities, gleaning became illegal in Europe." The contemporary gleaning initiatives described by Hogness are sponsored by Ag Against Hunger, a group of businesses interested in charity "within a world where we take poverty and hunger as a natural fact": see http://humweb.ucsc.edu/gleaningstories.

73. If Clifford Geertz famously described "The Anthropologist as Author," per-

haps it is time to move beyond an individualistic model of innovation to think about *the anthropologist as editor* who gleans narratives and ideas from others: Geertz, *Works and Lives*.

74. Matt Thompson, "Swarm," accessed January 15, 2011, http://savageminds.org/2010/11/29/swarm. See also Hannah et al., "The Xenopus Pregnancy Test."

PART I

BLASTED LANDSCAPES

THE MULTISPECIES SALON MIGRATED from San Francisco to New Orleans in 2010, as oil from the Deepwater Horizon spread in the Gulf of Mexico. Freshly blasted by multiple disasters, the urban landscape of New Orleans became a place where a multitude of thinkers and tinkerers were bringing critical attention to the idea of hope. David Sullivan, a local ecological artist, exhibited digital animations of oil refineries at the Salon. In his *Sunset Refinery*, bright clouds of green, orange, and yellow bled into dripping tar balls and hazy dark smog. Frog calls, peeping in the background, fuse into noise of passing traffic and pumping pistons. This piece illustrates ambivalent hopes that have emerged with industrial capitalism. The bright cascade of colors in the background invokes oil industry marketing images that portray refineries as aesthetic objects of beauty. As this slowly evolving lightshow illuminates toxic chemical reactions, it offers an opportunity to reflect on the ambivalent properties of the *pharmakon*—a poison that can double as remedy, an obstacle or an opportunity. Glowing forms of life growing on the digital sculpture, Spanish moss and fleshy tumors, are monstrous figures of hope (see Sullivan's digital animation *Sunset Refinery* at http://multispecies-salon.org/sullivan).

FIGURE P.1 Video still from David Sullivan, *Sunset Refinery*, a continuously looping, animated 3D painting in HD with sound (2008). Courtesy of the artist. See multispecies-salon.org/sullivan.

CHAPTER 1

HOPE IN BLASTED LANDSCAPES

Eben Kirksey, Nicholas Shapiro,

and Maria Brodine

In early November 2010, the multitude of creative agents animating the Multispecies Salon in New Orleans descended on a warehouse, the Ironworks, and hastily remodeled it as an art gallery. There curators gathered together some sixty artworks orbiting around a central question: "In the aftermath of disasters—in blasted landscapes that have been transformed by multiple catastrophes—what are the possibilities of biocultural hope?" The Ironworks became a site where culture workers who were deeply implicated in sweeping political, economic, and ecological transformations cautiously explored future horizons in the wake of recent disasters that put New Orleans in the national spotlight.[1] The opening night of the exhibit coincided with the Second Saturday Art Walk in the emerging Saint Claude Arts District. Hundreds flocked to the Ironworks, crowding to see a recycled fashion show by Calamity, a designer who outfitted models in postapocalyptic garb and crust-punk drag. The usual crowd of bike-riding twenty-somethings was there in full force. A strong current of cleaner-cut middle-aged viewers and a sprinkling of out-of-towners rounded out the masses. "I flew down from New York for this," a beaming fifty-year-old noted as she slipped on headphones to hear the beehive of the SOUND::MEDICINE::HOUSE installation, composed of wood and plants salvaged from nearby blighted buildings.

Dark, dystopic images, a digital rendering of fugitive emissions from nearby oil refineries, flickered overhead.[2] Illustrations of deformed and crippled insects, collected from the shadows of nuclear disasters, covered a makeshift plywood wall.[3] Images of chemical oceanographers—working to

FIGURE 1.1 Video still from David Sullivan, *Fugitive Emissions*, a continuously looping, animated 3D painting in HD with sound (2008). See multispecies-salon.org/sullivan. Courtesy of the artist.

make sense of molecular and microbial transformations taking place near the site of the Deepwater Horizon explosion—fueled discussions about upcoming protests against BP and funeral processions for the creatures killed by the flood of oil in the Gulf of Mexico. One might expect that this accumulated evidence of advancing disasters—a perfect storm of human follies and agencies beyond the control of gallery visitors—might dampen their revelry. Instead, these signs of calamity strangely fueled a celebratory atmosphere in which it seemed as if anything might happen at any time.[4]

Amid revelry in the wreckage of natural and fiscal catastrophes we found semi-empowered intellectuals who were embracing and tussling with forms of collective desire. Powerful forces have tried to appropriate the very idea of hope.[5] As a vacuous political slogan, "hope" has bulldozed over our dreams.[6] Yet artists, scientists, and other culture workers gathered together at the Multispecies Salon to engage in strategic storytelling about Hope in Blasted Landscapes.[7] Building on the critical insights of these storytellers, this essay explores the persistence of life in the face of catastrophe. Following people, and following multiple species, from the art gallery to the blasted landscapes of New Orleans and beyond, we trace the contours of modest forms of biocultural hope.[8]

OIL IN WATER

The flood of oil spreading in the Gulf set the backdrop for the Multispecies Salon in New Orleans.[9] When news of oil plumes first reached Jacqueline Bishop, an artist who teaches at Loyola University, she was hardly surprised. Some five years earlier, she had created *Trespass*, an uncanny illustration of disasters looming on future horizons. First exhibited in the months before Hurricane Katrina, this assemblage of flotsam and jetsam—baby shoes and birds' nests, toys and balls of twine—contained aesthetic premonitions of the floating debris that were omnipresent after the storm. Coated in a black patina, a dark, glossy finish like crude oil, this artwork also prefigured the oil flood that came in 2010. At first blush, from far away, *Trespass* seems to just be a collection of wreckage—a dreadful rendering of disaster. When viewed from the middle distance, it appears to shimmer and dance about like oil in water—moving in different directions, coalescing around a heterogeneous collection of objects. Scrutinizing this aqueous landscape at a close range, moving in even closer still, reveals that it is populated with hopeful figures.

A figure might be regarded as "a fashioning, a resemblance, a shape; also a chimerical vision," following Nathan Bailey's *Dictionarium Britannicum* of 1730.[10] "To figure" also means to have a role in a story.[11] Gathering up desires, figures serve as anchoring points for dreams.[12] If, at a distance, *Trespass* seems to be a uniform black morass—prefiguring Hurricane Katrina and the BP oil flood—closer inspection reveals colorful organisms hiding in the shadows. Mushrooms, seed pods, and birds' eggs anchor hopes in living forms. Like a bird's nest, built from scavenged detritus, *Trespass* nurtures hopeful dreams. The figural play of this assemblage works with shifts of scale: A sea slick with oil and wreckage, an unfathomable disaster when viewed from afar, contains anchoring points for hopeful desires that can be grasped on a molecular level. Zooming in reveals that when droplets merge together, when they grab hold of almost imperceptible figures, they generate dynamic coalescences.[13] Panning back out reveals the dance of oil in water.

Looking to possible futures, rather than to absolute endings, Jacques Derrida draws a helpful distinction between *apocalyptic* and *messianic* thinking.[14] Messianic hopes contain "the attraction, invincible élan or affirmation of an unpredictable future-to-come (or even of a past-to-come-again)," writes Derrida.[15] "Not only must one not renounce the emancipatory desire, it is necessary to insist on it more than ever."[16] Yet Derrida's sense of expectation is not oriented toward a specific messiah.[17] In contrast to Christian traditions, which pin hopes to a particular figure, Jesus Christ, Derrida's notion of

FIGURE 1.2 Outsiders unaccustomed to the celebratory antics of New Orleans, a city with a venerated history of macabre pageantry, might have overlooked subtle and thought-provoking elements of the fashion show staged at the Multispecies Salon. Some of the garb on display included fur from the pelts of nutria, a large amphibious rodent originally from South America. Calamity, a fashion designer pictured here in a nutria coat, works with the Righteous Fur collective to probe ethical issues linked to the killing of this "invasive" animal. Image courtesy of Jonathan Traviesa. See multispecies-salon.org/calamity.

Nutria were once farmed for their fur. The species was imported to the United States in the nineteenth century to support trends in high fashion. As fur became less fashionable, wild nutria populations exploded in North America. "We used to have a big nutria trapping industry," said Elizabeth Shannon, a licensed alligator hunter and ecoartist who exhibited her work in the Salon. "But the price of nutria went down to about a dollar a hide. So my friends basically stopped trapping." Lately, the prolific species has been damaging human infrastructures. Jefferson Parish, the district that includes most suburbs of New Orleans, largely lies below sea level and is kept dry by an elaborate series of dykes and canals. "Nutria have seriously weakened the canal banks by overgrazing and building a labyrinth of tunnels under the surface," says Marnie Winter, director of environmental affairs for Jefferson Parish. "The burrows are interconnected in a sort of honeycomb pattern so that some extend under the surface as much as fifty to one hundred fifty feet. Occasionally, severe tunnelling in a small area will cause a section of canal bank to collapse into the canal. . . . Patches of grass that hold the canal banks in place have been grazed down to the bare ground by these voracious critters." Calamity was reinvesting nutria with use value, drawing the nomadic species into micro-biopolitical networks of matter and meaning. By generating a new market for nutria pelts and thereby creating economic incentives for trappers to remove animals from Louisiana bayous, he scripted this species into what Haraway might regard as story of lively capital, where commerce and consciousness, ethics and aesthetics were all in play.

FIGURES 1.3–1.4 Jacqueline Bishop, *Trespass*, mixed media made with artificial birds, baby shoes, bird nests, and toys, 59.5" × 97.5", 2003–2004. Courtesy of the artist and Arthur Roger Gallery. Photographs by Eben Kirksey. See multispecies-salon.org/bishop.

messianicity is "without content." Celebrating messianic desires that operate beyond the confines of any particular figure, he describes a universal structure of feeling that works independently of any specific historical moment or cultural location: "The universal, quasi-transcendental structure that I call *messianicity without messianism*," writes Derrida, "is not bound up with any particular moment of (political or general) history or culture."[18] In other words, his notion of messianicity is not attached to a specific figure, event, political project, or messiah.[19]

The empty dreamscape of Derrida is haunted by a messianic spirit that refuses to be grounded in any particular figure. Jacqueline Bishop's imagination, by contrast, contains multiple specific objects of desire. In Bishop's work, we found a cautious spirit searching through refuse, coalescing around specific figures, and then dancing away again on other lines of flight. When we first encountered *Trespass* in Bishop's studio in the Lower Garden District of New Orleans, our visit became an opportunity for her to tell a circuitous story about how she found hope, without even going to look for it, in the aftermath of the Deepwater Horizon explosion on April 20, 2010. For Bishop, the uninterrupted flood of oil was an actualization of her worst nightmares, the horrible environmental disaster she had long imagined.

Bishop's first impulse, in the early weeks of the oil flood, was to travel to Louisiana's Gulf Coast. Initially she wanted to collect some of the oil, to use the potent substance in her artwork. Powerful fumes, a haunting cloud of toxicity, was hanging over Grand Isle—a sleepy beach town visited by Bishop that was quickly becoming the epicenter of the oil flood, as well as of the efforts to clean it up.[20] Spectatorship was officially discouraged by BP and government officials who were playing rhetorically with the potential harm of toxic vapors and substances. Rigid codes of conduct and access restrictions were put in place ostensibly to protect the public's safety. "They didn't want to get anybody hurt," Bishop told us with a smirk. Safety protocol kept journalists, independent researchers, and curious members of the public off the beaches and meant that the BP contractors who took control of the cleanup were working under a veil of secrecy. People who marched past BP's cordon themselves became objects of heightened scrutiny and surveillance. "The toxicity is why no one was allowed on the beaches, why the beaches were closed," Bishop said. "I had access as long as I was with park rangers. There were some people who drifted off, not abiding [by] the rules and the signs. A couple walked down the beach, and when they came back, [the BP contractors] stripped them, made them take all their clothes off, completely nude:

'Check their clothes, check their bodies to make sure nothing happened to them, we have these laws for a reason.'"

Forthright claims about toxicity were taken seriously on Louisiana's Gulf Coast, for the truth was immediately assumed to be in excess of the official estimation. The human health effects of emissions from the petrochemical industry in the Gulf routinely have been low-balled or rendered imperceptible by blunt toxicological methodology. Downriver from one of the more chemical-drenched regions of the country—a section of the Mississippi River called Cancer Alley—Gulf Coast residents were long accustomed to taking precaution into their own hands as a result of corporate and governmental abdication.[21] Bishop was quick to understand how the specter of toxicity was functioning as a means of social control on Grand Isle. She also quickly realized that actual chemical hazards were at play.

The reaction of Jacqueline Bishop's own body to Corexit, the chemical being sprayed on the Gulf to "disperse" the oil flood, became the source of critical ambivalence about this poison that was being used as a cure. "When I went around July 4, I didn't bring my swamp boots," she said. "I just had my forest boots, so I borrowed some swamp boots—they had a little bit of water in it. I didn't realize there was Corexit in this water. About two weeks later, several layers of my skin were eaten off the bottom of my feet. I had to ask, 'What's the deal with my feet? Is it just from the water and the oil?' They said, 'No, it's from the dispersants.' So I came to a realization about these chemicals. If they can affect my feet so quickly, just think what they are capable of in other species." Abandoning her plan to collect oil for use in her artwork, Bishop began to use her camera to document the extent of the disaster and to chronicle the cleanup response. She took pictures of oiled marshlands and tar balls on beaches, as well as of BP work crews—including teams of supervised inmates from the Louisiana State Penitentiary at Angola.[22] She also began taking an inordinate number of pictures of hermit crabs.

Bishop's access to restricted sites was facilitated by Leanne Sarco, a ranger at Grand Isle State Park, who founded the Hermit Crab Survival Project. A recent graduate from Loyola University's biology program, Sarco started her job at Grand Isle weeks before the Deepwater Horizon blowout. As the first oil slicks began washing onto the beach, she helplessly watched oil-drenched birds struggle. "When we initially saw oiled animals we would call the US Fish and Wildlife hotline," Sarco said. "I was frustrated by their response. At best, it would take them an hour or two to show up. By that time, the bird had moved on or already died." Sarco eventually stopped calling the hotline. She began asking officials if she could clean the birds herself but was told

FIGURE 1.5 Jacqueline Bishop holding a fistful of oil on the beach of Grand Isle State Park, 2010. Weeks later, the skin of her feet began to peel off from the chemical dispersants in her borrowed boots. Photography courtesy of Jacqueline Bishop. See multispecies-salon.org/bishop.

FIGURES 1.6–1.7 Oil-covered hermit crabs from the Louisiana shoreline, 2010. Photograph courtesy of Jacqueline Bishop. See multispecies-salon.org/bishop.

that several months of special training was required before she would be permitted to handle birdlife.

Amid her frustration in dealing with the official channels regulating the care of oiled birds, she saw hundreds of hermit crabs attempting to scramble ashore, only to get stuck under the sheen and suffocate. "BP and Fish and Wildlife were busy saving the birds, as well as edible wildlife—animals with either an economic benefit or a cuteness factor," Sarco told us. "Hermit crabs were just part of the beach. When I saw the BP workers shoveling living hermit crabs covered with oil into bags for disposal, I knew I had to at least try to help them." Sarco was predisposed to notice this unloved species—a creature that was outside centralized biopolitical regimes—because she had first encountered Grand Isle as an undergraduate, when she worked on a research project about hermit crab biology.[23]

Facing a bleak future, and feeling powerless as oil continued to gush into the Gulf with no end in sight, Sarco settled on a modest program of action. She called the Fish and Wildlife hotline one last time and secured permission to collect and clean the hermit crabs. Learning along the way, Sarco began to experiment with techniques for interspecies care. Falling through the bureaucratic cracks of the government's regime for managing life, being unloved in the realms of official regulation, ironically established the possibility of life for a multitude of hermit crabs.[24] Upward of ten thousand animals were cared for during the Hermit Crab Survival Project. Sarco and a small cadre of volunteers cobbled together everyday technology—donated aquariums, Dr. Bronner's soap, and household artifacts—to create a life-support system for these creatures.

Jacqueline Bishop found hope in this initiative to care for another species. Against the nightmarish landscape of the oil slick, she grounded her desire for a livable future in the figure of the hermit crab. "We had this makeshift lab, and we would collect about a thousand crabs a day," she says. Caring for the hermit crabs involved edging Q-tips into their shells without injuring their delicate bodies. "I felt so comfortable cleaning the hermit crabs." Bishop reminisced as we gazed at *Trespass* in her studio: "Swabbing with the Q-tip was the same gesture as painting, except I was taking oil off instead of applying it." Her seasoned hand traced the intricate recesses of hermit crab shells, legs, and claws. Modest hopes for specific animals stirred with each of her concrete, repetitive, and meditative actions.

As her imagination wandered from the Hermit Crab Survival Project to the fallout of the BP oil flood, Bishop found that the ultimate environmental disaster of her nightmares was generating order-destroying dreaming.

The masses were starting to move. Out on the streets people were calling for BP executives to be jailed, agitating to disrupt the predictable flows of global capital. Out in the bayous and on the beaches, thousands of people were volunteering for the cleanup. The early years of the twenty-first century may have seemed like a moment when power relations were fixed in place, when nothing ever seemed to change. But this homogeneous, empty time was quickly giving way to a revolutionary time—a moment of political possibility when collective desires began to coalesce around multiple figures and future events.[25]

Hopes began to move like oil in water. Discrete droplets danced around on the surface of water as figures of desire moved about in the imagination of individual people. Bumping into one another, figural oil bubbles coalesced—becoming more perceptible, a glimmering sheen spreading through the sea of collective imagination. The potent toxicity of this shimmering liquid gathered together expansive desires, serving as a common object for anchoring diverse hopes. In a word, the oil spreading in the Gulf embodied the indeterminate nature of the pharmakon—a poisonous substance that can double as remedy, something that presents an obstacle or an opportunity.[26] The figurative power of oil in water provided an opening for a multitude who desired to cure the ills of extractive capitalism. The seemingly unstoppable flood of petrochemicals became a call for a collective response, spurring a swarm of creative agents into revolutionary action.[27]

POLITICAL OPENINGS

The Multispecies Salon brought Jacqueline Bishop into conversation with other artists and anthropologists, as well as with natural scientists from multiple disciplines—a plankton biologist, an oceanographer, and a specialist on crabs' reproductive biology. During a public event at the Ironworks gallery, these moderately empowered intellectuals each offered alternative perspectives on the political and economic forces animating the official BP oil cleanup in the Gulf.[28] Collectively, they grappled with the challenges of understanding, representing, and responding to what President Barack Obama called "the worst environmental disaster in US history."[29]

Matthias Elliott, then a graduate student in chemical oceanography at the University of South Florida, told us that business continued as usual for oil executives in the early weeks after the Deepwater Horizon explosion. They profited as hundreds of thousands of gallons of Corexit, the toxic "cure" for oil that ate the skin off Bishop's feet, were sprayed into the Gulf. "Look at

the board members of Nalco, the company that makes Corexit," Elliott said. "They have close ties to BP and Exxon. The criminals are making money off cleaning up the crime scene. By using Corexit, they just swept the problem under the rug." The only creatures who hypothetically stood to benefit wholly from the use of dispersants were oil-eating microbes whose predators had been killed by Corexit, according to Amy Lesen, a plankton biologist who teaches at Dillard University. "Even if oil-eating microbes exist," she said, "there is not usually that much oil in the Gulf. A bloom of pollution-loving organisms could generate a massive perturbation of the system."

While operating in a state of emergency, those in charge of mitigation strategies had lost sight of who and what was being protected. Still, certain animals were flourishing in the immediate aftermath of the oil flood. "Ironically, the blowout's most powerful environmental effect seems to be both indirect and positive: the fishing closures," wrote the marine biologist Carl Safina in November 2010. With the temporary ban on fishing, red snapper populations exploded. Marine biologists were finding three times as many fish when compared with the number before the blowout. But while the toxic specter hanging over the Gulf was good for certain species loved by humans, many others—namely, dolphins, pelicans, flying fish, oysters, *Sargassum* grass, crabs, Kemp's ridley turtles, and shrimp—were not faring well.[30]

Effects of this disaster on unloved others—species largely beyond the political, economic, and affective calculus of most Americans—were less easy to understand and represent.[31] "It's the sea turtles and pelicans that get all the press," said Lesen, who is an expert on foraminifera, among the most common plankton species. At the Multispecies Salon, she was asked to talk generally about the impact of disaster on marine microbial ecology in the Gulf from her own foraminifera-centric perspective. But few studies of plankton were being conducted. With little up-to-date research to draw on, Lesen found that she had more to say in response to another question posed at the Salon: "Who is speaking for nature?" Lesen described silences shaped by oblique powers that thrust some "experts" into the spotlight. "The people who tend to be interviewed are people who are not very engaged in the research, people who work for government agencies," she said, "and the people who work for government agencies have people behind them telling them what they should and shouldn't say." According to Lesen, "Our universities are funded by corporations. There is not a single university in Louisiana that is not funded by the oil industry—not one."

Entrenched political and economic relationships may have dictated our early understandings of and responses to the oil flood, but the situation

quickly began to change. Government agents and corporate executives managing the response initially marched in lockstep through the homogeneous, empty time described by Walter Benjamin—a time when no significant events seemed to happen, when power was functioning predictably. Growing outrage from many segments of society in New Orleans opened up new horizons of political possibility.[32] Ro Mayer, a real estate agent and costume designer who exhibited work in the Multispecies Salon, told us about how she unexpectedly became swept up in the revolutionary momentum generated by the disaster:

> On May 23, 2010, I was at Jazz Fest, and I could smell the oil in the air. My friends, we were all complaining to one another. Jazz Fest was sponsored by Shell Oil. We were all walking around going, 'Ooh, ooh, this is really creepy. This could have been sponsored by BP. Then how would we feel about Jazz Fest?' So we went home that night and were all complaining to one another on Facebook, and we thought we should be marching in the streets. . . . [T]here were a bunch of artists and costume designers in my particular group of friends, so we decided we should have a parade.

Mayer and her friends began planning a parade to mourn the loss of life in the BP disaster—including the lives of eleven human oil rig workers and those of countless individuals belonging to other animal, plant, and plankton species. The parade was a mock "jazz funeral"—a traditional New Orleans commemoration of the deceased that generates a "collective space for the reflection on the structures that impinge on inner-city lives," in Helen Regis's words.[33] Described as "determined partying when it really counts," Mayer's jazz funeral mourned the ending of life but also celebrated its passage into the next world. "In New Orleans, we don't mourn like the rest of America," stated a post on the Humid City blog. "We celebrate a life when it ends. It should be no surprise that we want to honor and celebrate the lives of our lost wildlife."[34]

Mass mobilizations are often unexpected by everyone, even by their organizers.[35] When Mayer announced a funeral procession for Gulf wildlife by establishing a Facebook page, she was surprised as a small spark caught and set off a conflagration. "When you hit a nerve on Facebook, you've got these little green boxes that come up and say that someone has done something on your page," Mayer told us during the panel discussion with other artists and academics at the Multispecies Salon. "If seven thousand of your friends do something in a week, your page looks like a slot machine paying off at Los Vegas. They line up the side, then they line up across, then they roll. The next thing you know, you've got a parade and a calling."

As homogeneous, empty time quickly gave way to messianic time, Mayer created an empty virtual space, an opening for surprises beyond the reach of her own imaginative horizons.[36] "I didn't have a goal when I started," Mayer later told us. Chatting with her several months after she launched the initial Facebook page for the parade, we found the loquacious real estate agent struggling to articulate her personal dreams. Mayer said she did not want to pin any specific goals, or political agendas, to the parade she was planning. Her dreamscape contained mysterious possibilities that were unfigurable. Still, Mayer helped create an electronic architecture, a provisional opening that was quickly populated by the imagination of a multitude.

Some thinkers anticipate changes that will occur solely as a result of patient waiting. Mayer, however, saw that concrete action was necessary.[37] "I literally typed for two months almost around the clock until my fingers hurt, every day," she told us. As oil vapors continued to waft through the city of New Orleans—mixing with the sweet pervasive smell of spring jasmine to create a pungent, sickening odor—hundreds of people began to RSVP via Facebook for the upcoming funeral procession. Collective outrage, and modest hopes, settled on this future event. Mayer became the drum major for a group she called the "Krewe of Dead Pelicans."

On the day of the event, June 5, many people dressed according to the "Do-It-Yourself Parade Instructions" that Mayer had posted on the Facebook page: "Garb: wear a blue top and a black bottom for the most visual group impact. . . . Footwear: shrimp boots to show support for the marsh if you have got them. Otherwise black footwear is preferred. . . . Dead Pelican Umbrellas: bring your pelican (or other preferred critter) on a blue umbrella trimmed with black oil (plastic bags or fabric cut to resemble an oil spill and drips stapled to the umbrella points)." Others arrived in full-body handmade costumes representing Gulf Coast creatures—sea horses, turtles, crabs, and fantasy characters such as "the Pearly Oyster Queen." A parody of Sarah Palin competed for attention with fat cats who were eating oil money and Dead Pelican sandwiches.

Mayer herself appeared in an ornate blue and black gown. Uniting the crowd behind a chant—"Stop the Oil, Save the Gulf"—she strode out front with a meticulously decorated pelican-adorned umbrella. Delegated participants carried a variety of props. A coffin containing a life-size human woman's body represented the Gulf of Mexico. The US flag, hung upside down, was a symbol of mourning. A sea of "Katrina tarps"—the turquoise plastic issued by the Federal Emergency Management Agency (FEMA) that covered the rooftops of post–Katrina New Orleans—depicted the ocean. The pro-

FIGURE 1.8 Ro Mayer speaking to the Krewe of Dead Pelicans. Photograph by Maria Brodine. See multispecies-salon.org/dead-pelicans.

cession was led by John Birdsong, a retired firefighter, and the Pair O'Dice Tumblers, a band that played a funeral dirge and led the crowd in the satirical chant, "Oh, it ain't my fault." Birdsong later said that the ironic chant was aimed at generating awareness of the crowd's own non-innocence—it was a response to finger pointing that pushed the blame elsewhere. He wanted protestors to think about how their lives and livelihoods were dependent on petroleum.

Against all outward appearances of being a rabble-rouser, Mayer herself emphasizes that the Krewe of Dead Pelicans tried to work "from within the system." Mayer, and others who helped her stage the funeral procession, certainly were complicit with and implicated in powerful institutions.[38] Perhaps as a result of this position within Louisiana society, the Krewe of Dead Pelicans became embroiled in conflicts at the neighborhood level that hinged on issues of race and class, historical divisions between "uptown" and "downtown" New Orleans, and competing visions for what ecological and social reconstruction in the region should entail. Even the chant "Stop the Oil, Save the Gulf" turned out to reflect deeper tensions with competing political projects.

FIGURE 1.9 The Oilflood protest. Photograph by Maria Brodine.

On May 30, a week before Mayer's first parade, another group called Oilflood rallied thousands behind the cry of "Fuck BP." The Oilflood organizers also wanted to march with Mayer, but she did not agree with their message. "They wanted to be in the Krewe of Dead Pelicans parade, and I told them they were welcome to come," she said. "They could march after the police, because I had a parade permit, and I had families. The police weren't going to put up with that, and I really didn't want . . . a confrontation with BP. I wanted to go through the channels."

Different slogans, and differences in tactics, bespoke deeper divergences in the orientation of the two groups. The Oilflood protest was not only orienting collective anger against a single institution, BP, but also highlighting the broader injustices of global capitalism. Ian Hoch, an activist and actor who played a minor role in the HBO series *Treme*, addressed the crowd at the Oilflood protest, saying, "I don't think it's accurate to say that BP is *the* enemy. It's my belief that in the early twenty-first century, corporations are going to cut corners whenever possible. If it means saving a dime, they are going to do the wrong thing."[39] Still, the visual landscape of the Oilflood protest was populated with graphics and satirical messages that played with the bright green and yellow BP logo. One group held signs with the phrase "Bitch, Please"

underneath a man with a gas nozzle pointed at another person's head like a gun—a visual citation of Eddie Adams's iconic photograph of a Vietcong guerrilla being executed. This image depicted the oil spill as a symptom of a conflict that had spun out of control. A hand-drawn black skull and crossbones, with green-BP-flower eyes, was featured on another sign—wet with dripping oil and emblazoned with the phrase "British Polluters."

Reflecting on her actions, her refusal to confront BP directly and address the broader injustices of global capitalism, Mayer wonders whether she took the right course. "At the time, I thought that it was possible to go through the channels," she says. "Maybe BP Oilflood was right. But at the time, we were the Miss Manners of protest parades, and I was trying to hold that line." In refusing to link up with initiatives to shut down BP, perhaps Mayer was also resisting attempts to make the demands of her emergent group too concrete—to preserve the group as a heterogeneous, still somewhat unformed association, a gathering together of people who felt powerless in the face of a monumental environmental disaster.[40] Despite these local attempts to avoid a certain misplaced concreteness, in the minds of many people around the country BP became a figure that embodied all of the ills of global capitalism and the urgent situation in the Gulf. Against the backdrop of broader imaginative horizons, collective outrage came to be focused on the company.[41]

Figures can serve as anchoring points for collaborative action. Gathering together collective hopes or feelings of outrage, figures can generate concrete victories in the world. As the will of millions bore down on BP, a moment of political possibility emerged. The existence of the company itself was endangered by the Deepwater Horizon disaster. Amid actions on the streets of New Orleans in early June 2010, and solidarity actions in many other cities around the United States, President Barack Obama began to level very public pressure on the company. BP executives emerged from a meeting with the president on June 16, 2010, and told reporters assembled on the White House lawn about a new solution. A $20 billion fund would be created by BP to pay damage claims from the disaster. The fund was a rough approximation of the company's annual profits, which were $17 billion in 2009. "For the president and the Gulf this deal was a 'stunning coup,'" according to Carl Safina, a marine biologist who wrote a book about the disaster, *A Sea in Flames*.[42]

When concrete objects of desire emerge in the historical present, when specific things we hope for materialize from our broader imaginative horizons, these moments of arrival often contain disappointment. The $20 billion payout failed to address the concerns of Mayer and a multitude of angered New Orleans residents. As BP and US government agents continued to

use the same tactics to respond to the mounting disaster—as they continued to spray Corexit, as they failed to plug the blowout, as the oil continued to flow into the Gulf—protests emerged on the streets of New Orleans with renewed vigor. Mayer's Facebook group was only one hub of activity in a polycentric matrix of revolutionary imagining. Even as collective outrage generated concrete victories in the historical present—punishing BP by driving down the price of its stock and extracting a huge payout of money—the collective imagination of people who had been stirred to action searched future horizons for new figures of hope.

As petrochemicals flooded into the Gulf unabated, Mayer continued to organize funeral processions for wildlife, leading people behind the slogan "Stop the Oil, Save the Gulf." As weeks turned into months, the force of the Krewe of Dead Pelicans' street pageantry began to fade. Collective hopes of people who cared about the Gulf coalesced around a single future event: the plugging of BP's Macondo oil well. Yet when this event arrived—when Admiral Thad Allen announced that the "well is effectively dead" on September 19, 2010—anxiety and dread about the Gulf lingered in the air.

Collective dreams in New Orleans began to scatter. Hope continued to move like oil in water, but with dispersants added to the mix. If collective desires coalesced like droplets of oil during the early weeks of the flood, gathering crowds together at specific events, hopes were becoming more elusive, less perceptible. As a toxic specter haunted the aqueous landscape of the Gulf, the movements of oil became more mysterious. It embodied another principle of the pharmakon, which "defines no fixed point of reference," according to Isabelle Stengers.[43] It proved difficult to recognize and understand its effects with assurance. These pharmakological properties of oil dispersed in water endowed it with even more figural potency.

"It's not going to be over in our lifetime," Mayer told us in September 2010. "Oil is still washing up. Corexit has sunk in the water column, it's dissolved. It's going to be in the food chain. It's going to be a health issue. It's going to be a seafood issue. It's going to be a climate issue. I mean, I know enough to know I ain't wrong." But as news of the oil disappeared from the front pages of newspapers, as people scrambled to get their share of the $20 billion payout, protestors stopped showing up to the Krewe of Dead Pelicans marches. Street theater no longer seemed capable of remedying the long-term ecological consequences of the disaster.

The revolutionary spirit animating the people of New Orleans began to flit away, seeking out new sites and figures. The scale of the BP oil flood seemed too monumental for many people, the disaster in the Gulf began to

seem hopeless. More ambitious activists stepped back from images of the wreckage to rethink the scope and the scale of their future interventions. Mayer began to notice postings on her Facebook page by people she started calling the "Green Tea Party"—activists from an unformed heterogeneous collection of Green Party affiliates who were starting to imagine a broad-based populist alternative to the Tea Party of the right. Outrage over the irreparable damage to the Gulf began to fuel organizing at a larger scale. The lingering pharmakological power of oil in water became a force animating national political imaginaries. Almost exactly one year after Admiral Thad Allen announced that the well was "effectively dead," the vanguard of the Occupy Wall Street movement staged their first interventions in Manhattan. Amid ambitious imaginings about reconfiguring the modern world system, as people began to dream of interrupting business as usual, we found artists quietly turning to post-human figures of hope on the margins of the Multi-species Salon.

HOPE AFTER THE ANTHROPOCENE

Departing from the blasted landscapes of the historical present—marine ecosystems awash in toxic petrochemicals, cities destroyed by erratic weather patterns, and cultural landscapes blasted by capital—hope is emerging as artists and scientists speculate about the distant future, looking ahead through geological time. "It depends on the time horizon that you are looking at," said Amy Lesen with respect to the Deepwater Horizon disaster. "If we are looking at now, when people on the Gulf have to eat and make a living, this is a total disaster. If you value what is going to happen in the next twenty, thirty, fifty, one hundred years, then there is something to be concerned about. But, if you're talking about a two million year time horizon in the Gulf, sure, everything is going to be fine eventually."[44]

Amid revelry in the wreckage of natural and fiscal catastrophes at the Multispecies Salon exhibit, many visitors failed to notice an unassuming wooden box resting on the floor of the Ironworks. This box, Bryan Wilson's *Monument to the Future*, contained a dark vision of a time when "everything is going to be fine" for certain species, even if human life has ceased to exist. A field of cratered black glass is housed in the box. Devoid of all plant and animal life, the miniature scene prefigures a possible future after nuclear winter. At first glance, this landscape blasted by nuclear warheads appears to be bleak and desolate. More careful attention reveals that the imagined desert wasteland could be a place where barely perceptible creatures will flourish. Even in the

FIGURE 1.10 Bryan Wilson, *Monument to the Future (Specimen 1)*, cast and carved glass within a wooden box (2010). Photograph by Eben Kirksey. See multispecies-salon.org/wilson.

aftermath of a global anthropogenic disaster, even if we humans have killed ourselves, Wilson reasons, other forms of life will outlive us. "This is a blank Petri dish," says Wilson. "Microbial life will survive and thrive after humans have made the Earth uninhabitable for the life forms we love."[45]

Wilson's artwork offers a point of entry into the lifework of Penelope Boston, a microbiologist at New Mexico Tech who specializes in extremophiles—microbes that thrive in extreme cold, dryness, heat, pressure, radiation, or vacuums. Following lines of flight from Wilson's imaginings about possible futures, we became captivated by Boston's research while attending a conference in Amherst, Massachusetts, honoring the biologist Lynn Margulis's life. Early in her career, Boston wrote a series of reports for the United

Nations about the environmental consequences of nuclear war. She found that many different kinds of microbes can thrive in radioactive landscapes. Some animals—such as certain species of nematode worms and tardigrades, small eight-legged arthropods popularly known as "water bears"—also were likely to live through nuclear war. "After major catastrophic events, like the eruption of Mount Saint Helens," Boston told us, "we have all been surprised about how quickly these disaster zones have been colonized by new organisms."

Boston's latest research involves the study of microbial communities in caves. It is well known that microbes are ubiquitous underground in low-temperature environments, but she began to surprise her colleagues as she started finding even higher microbial biodiversity in deeper and hotter caves. A "geological genome bank" is trapped underground, in Boston's words. She has discovered bubbles of air inside huge calcium sulfate crystals, inside extremely hot and abyssal caves, with living microbes inside. "Time capsules have been entombed in rocks for millions of years," she told us. "These microbes are the living dead. They have likely reintroduced their banked genes to the surface micro-biosphere many times in the Earth's history."

The blasted landscape memorialized in Wilson's work offers an opening to think about the life-forms that will flourish in the aftermath of apocalyptic disasters for humans. Wilson's cratered wasteland, imagined to be ripe for colonization by the extremophiles studied by Boston, offers us a vision of a future that, in his words, "is only a possibility." While "the scales are tipping from the possible to the probable," in Wilson's mind, this future is conditional, not inevitable.[46] At the intersection of dread and hope, Wilson sees the potential of tiny actions—like Jacqueline Bishop's gestures of care toward hermit crabs—to make the world a more livable place. Against the bleak backdrop of this possible future, where concrete hopes for life on Earth can be grounded only in tenacious microorganisms, he regards the historical present as a moment that is ripe with open-ended biocultural possibilities.

The blasted landscape created by Bryan Wilson and his imagining of future possibilities stand in sharp contrast to Derrida's writings about hope. Derrida regarded the future as an "abyssal desert." Rather than dream about the terrifying specter of a literal desert landscape on future horizons, Derrida suggests that we should literally expect the unexpected by waiting for mysterious possibilities that are beyond our imaginative horizons.[47] The empty desert in Derrida's writings is devoid of all figures, empty of any objects of desire. Rather than pinning hope on something concrete, his dreams are "without content."[48] Waiting in a bleak desert—refusing to affix his desires

to specific programs of action, events, or political projects—Derrida would have us cultivate expectations that are literally empty.[49]

Waiting for nothing in particular resigns the future to fate.[50] Contentless messianicity, Derrida's empty promise, goes nowhere.[51] Rather than wait in an empty imaginative desert, rather than evacuate all content from our dreams in the face of large-scale disasters, we found intellectual allies in artists who were illuminating lively figures of hope. We found a hopeful spirit playing at the limits of their imaginative horizons, moving like oil in water, searching for figures around which it might coalesce. Prefiguring livable futures, and quickly refiguring possibilities amid changing contingencies, thinkers and tinkerers in biocultural worlds were generating surprising becomings. Against the backdrop of the bleak future imagined by Wilson, we found hopes being generated by people, living beings, and other agents already in our midst.[52]

HOPE FOR WHOM?

Amid imaginings of catastrophic possible futures, competing dreams and schemes played out at the Multispecies Salon in detritus from disasters in the recent past. In the opening pages of *The Shock Doctrine*, Naomi Klein sketches the free-market dream worlds that emerged in New Orleans after Hurricane Katrina.[53] Imagined as a blank slate, a tabula rasa, the city became an ideal site for implementing policies of privatization during a moment of profound crisis. The storm became an open invitation to experiment with the traumatized local economy—to shut down public housing, to privatize public schools, to suddenly implement a host of plans for remaking society. Amid the visions of a new world, of clean breaks and blank slates, the rubble-lined streets betrayed a different, gritty reality. The ruins of New Orleans, a place that has long been styled as "the City That Care Forgot," became habitat for multiple other species. Mold burrowed deeply into the frames of houses. Cat's claw, a rapidly climbing vine with yellow spring flowers, netted picturesque architecture, digging into roof shingles and wood siding and claiming blighted buildings as their own.[54]

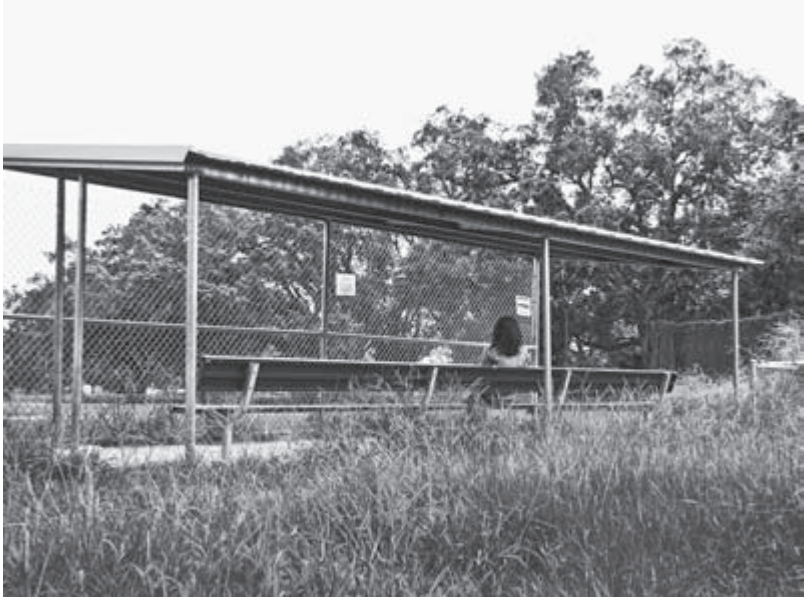
While city planners fantasized about a clean opening in the aftermath of this disaster, and tenacious forms of life proliferated, young artists at the other end of the American political spectrum began flocking to New Orleans after the storm.[55] White folks in their mid-twenties and thirties, many recent college graduates, reveled in the wreckage. Settling in neighborhoods that previously had been largely African American, these newcomers began to

remake local cultural geographies. The Multispecies Salon took place in the Saint Claude Arts District, an emerging zone along a main thoroughfare connecting the French Quarter with the Lower Ninth Ward. The neighborhoods along Saint Claude Avenue became contact zones where recent migrants were living alongside longtime residents.[56] Finding hope in the neglected city, many artists inhabiting the underground art world of Saint Claude began exploring the possibilities contained in decomposition, decline, and deterioration. "New Orleans wasn't on the same grid of power as Boston, where I was living," one recent transplant said at a backyard barbecue. "In the decay there was possibility." Thriving—or, at least, surviving—in the detritus of a collapsing system, Saint Claude artists were celebrating the aesthetics of blight.[57]

While many of the hipsters and crust punks who animated the emergent Saint Claude Arts District imagined themselves as living outside capitalism, they were also figuring into the schemes of New Orleans city planners and real estate speculators. Recently arrived white youth were finding hope at the intersection of multiple worlds, harboring dreams that were not entirely their own. The Arts District was helping transform poor neighborhoods into up-and-coming, fashionable places. Plans for a streetcar that would bring tourists from the French Quarter to Saint Claude promised to bring income to neighborhood businesses. At a lavish dinner party thrown for the curators of the Multispecies Salon by a local patron of the arts, where the themes of the exhibit were the subject of spirited conversation, the wife of a local real estate magnate enthusiastically proclaimed, "You all are bringing hope to blasted landscapes."

The hopes that real estate agents were finding in the emerging Saint Claude Arts District presented both opportunities and problems for locals with deeper roots. Many tensions, fractures along lines of race and class, underlay the reimagining of the neighborhood as a space for arts revitalization. "As soon as I saw the Saint Claude Arts District start to bloom, I was supportive, but I also had my reservations," said José Torres-Tama, a performance artist and homeowner in the Saint Claude area. "There could be a potentially brutal gentrification process developing here over the next five years, one that excludes many of the current residents of color." Skyrocketing property taxes were already hitting longtime residents hard, prompting many to move. "I am supportive of the streetcar, but I'm not interested in making money off the raised property values and flipping my house. Where would I go? I want to see an integrated arts community here."[58]

Temporary alliances with hegemonic institutions and external funding



FIGURES 1.11–1.12 Elizabeth Acevedo, *The Bench* and *Workshop*, photographs, 2010. Courtesy of the artist. See multispecies-salon.org/acevedo.

sources enabled the curators of the Multispecies Salon to explore the contours of hope in a social landscape structured by social inequality. Making practical engagements and staging tactical provocations, the curators—who were all recent migrants to the city or temporary interlopers from New York City and San Francisco—worked with longtime residents and newcomers on issues of common concern. Exposing, subverting, and rearticulating dominant regimes for managing life, they identified common interests among humans and other species, engaging with members of other social worlds and neighboring ecological communities.[59] In a situation of seeming hopelessness—as a definitive solution to the ongoing ecological disaster in the Gulf was beyond reach, as images of apocalypse and decay proliferated—the curators illustrated very personal and somewhat peculiar visions of biocultural hope.

Key members of the curatorial team that brought the Multispecies Salon to New Orleans—Nina Nichols and Amy Jenkins—used happenings in the gallery as an opportunity to show off Molly, Bunny, and Sylvie, three prized goats who lived on an urban farm, the Pretty Doe Dairy. While the goats gnashed at plants springing up between askew sidewalk slabs, Nichols told us about how the animals were involved in what she called "a guerrilla bioremediation scheme." When not on display in art galleries, the goats were living on vacant lots surrounding her house in the Saint Roch neighborhood, where they were slowly clearing blighted properties of poison ivy. The goats not only transformed the neighborhood's overgrowth and refuse into milk, but, according to Nichols, they were helping humans inhabit an otherwise inhospitable landscape. After goats eat poison ivy, their milk has a prophylactic effect against the noxious plant, she claims. "If you drink the milk, or eat the cheese we make, you simply won't have a problem with poison ivy."[60]

By twisting a poison into a cure, the Pretty Doe Dairy was playing with the alchemy of hope. Rather than uncritically celebrating the aesthetics of decay, Nichols and Jenkins used unloved plants to sustain lovable life forms. As a riotous diversity of weedy plant life proliferated in New Orleans alongside laissez-faire dream worlds, as cat's claw claimed buildings and poison ivy made people wary of wandering through blighted lots, they generated new urban lifeways. Making life and death cuts in entangled ecological worlds, distinguishing enemy species from allies, they were thriving in alliance with others in a zone of abandon. While other artists in the Multispecies Salon searched their imaginative horizons for elusive possibilities, this pair of urban farmers grounded modest hopes in living figures—individual animals capable of living in neglected places.

FIGURE 1.13 Pretty Doe Dairy logo. Courtesy of the Black Forest Fancies. See multispecies-salon.org/prettydoedairy.

Caring for actual beings—attending to the interests and needs of Molly, Bunny, and Sylvie—offered an opportunity to form alliances with other people who were deeply rooted in the local environs. Negotiating access to parcels of land owned by the city, at least on paper, meant entering into dialogue with neighbors. Grazing in abandoned properties became an opportunity to hear about histories of landownership, to learn about past agricultural ventures in the neighborhood, to explore new ways to live together in the present and the future. While feeding their goats, Nichols and Jenkins were able to save at least one elderly neighbor's property from being designated "blighted," a status that generates a hefty monthly fine from the city. With tax bills mounting, the added burden of being blighted was pushing many longtime property owners over the edge—to the brink of foreclosure.[61]

Nichols and Jenkins began to develop a more ambitious vision for the Pretty Doe Dairy—not just to use overgrown lots as pasture for their animals, but also to start cultivating plants that humans love. They began working with their landowning neighbors to help keep property out of the cycle of foreclosure and real estate speculation. Toiling alongside their goats in the weeds, Nichols and Jenkins quickly discovered that starting community gardens would demand sustained work—more of a commitment than they could personally manage. While hauling trash from yards that had been used as dumpsites, they also discovered diverse artifacts—among them, a headless doll, a piggy bank, an alligator skeleton, and an automatic pistol. Reanimating these forgotten relics, they took their visions for forming community gardens to the people of New Orleans in a mule-drawn carriage made out of

FIGURE 1.14 Ichabod, a baby goat born during the Pretty Doe Dairy project, was sold to a farm near New Orleans where he was slaughtered for meat. Amy Jenkins (left) and Nina Nichols (holding Ichabod) made lattes and cheese with milk from the pretty doe goat who gave birth to this baby. The Edible Companions exhibit at the Multispecies Salon was curated by Jenkins and Nichols, who brought their goats to the Front Gallery on St. Claude Avenue alongside live kombucha mothers, insect shish kebabs, and meat from nutria caught in the wilds of Louisiana. Photograph courtesy of the Black Forest Fancies. See multispecies-salon.org/prettydoedairy.

tin roofing, wood scraps, and theater curtains—an aboveground Subterranean Museum. Tessa Farmer, a British artist, fashioned tiny webbed demons for the project. Dana Sherwood, a prominent member of ecoart networks in New York City, created theatrical maquettes to tell stories about New Orleans in conversation with fantasy and local legend. In Nichols's words, the mobile museum brought together "mystical local history, secrets of the soil, and community participation" (see plates 1–2).

By touring her neighborhood with the Subterranean Museum and giving talks at local elementary schools, Nichols helped generate a community to sustain her garden initiative. Exposing and destabilizing failed government initiatives for managing biological life in zones of abandon, she imparted a sense of pleasure of being in the world with multiple other species.[62] Deploying "low to no maintenance agricultural techniques," she began gardening with neighbors who had very limited resources for fresh food. While working hard in the historical present—building and sustaining alliances with people and multiple species—the playful dimensions of her project remained open to surprises from the mysterious beyond.[63] Figures of demons played with goats and soil microbes in Nichols's imagination, animating dreams about possible futures to come.

ENDINGS/BEGINNINGS

Flickering specters from another dimension, the future, haunted the Multispecies Salon. Ghosts from the past also lurked on the margins. Affirming an unpredictable future to come, or even of a past to come again, the artists who animated the Salon thus harbored emancipatory desires kindred to those celebrated by Derrida.[64] The promise of the messianic is spectral, for Derrida, in contrast to the apocalyptic which "announces the end of spectrality."[65] Amid hauntings by figural demons and toxic specters, we found intellectuals in New Orleans who were joining Derrida in pushing past the definitive endings that underpin apocalyptic thought, but were also parting ways with him in understanding the spectral promises of messianic beginnings.

Artists who gravitated to the Multispecies Salon claimed the promise of the messianic by grounding their hopes in living figures and enlivening specific places. These tinkerers found hope in blasted landscapes by twining their dreams with particular plots of land, specific neighborhoods, and small stretches of coastline. Being present with significant others in the world—learning to live with goats, hermit crabs, and multiple other species—artists forged connections with the native soil and shorelines of the City That Care

Forgot. Avoiding these sorts of attachments, the spirit of Derrida's thought instead dances alone in an imaginative desert.[66] Derrida is infamous in animal studies circles for standing naked in front of his cat, incapable of responding to and having regard for an actual animal. Rather than follow this philosopher, we instead cast our lot with thinkers who have articulated tangible political positions and forged concrete proposals for novel ways of being with others.[67]

Working uneasy alchemy with the messianic spirit, visionaries transformed toxic substances into cures; they changed figures of apocalyptic endings into signs heralding new beginnings.[68] Rather than join Derrida in hoping for nothing in particular, rather than literally expecting the unexpected, organic intellectuals who swarmed to the Multispecies Salon used figuration to animate the field of biocultural possibility. With hopes moving like oil in water, with desires congealing around specific figures and then dancing away, these thinkers generated lively coalescences. Forging concrete alliances among social and environmental worlds in the historical present, caring for other beings and things, these creative agents also generated openings for more audacious hopes.

NOTES

To account for our collective labor in the authorship of this essay, as we noted in the introduction to this volume, we played with the instructions given to authors by the journal *Science* to tally up percentage points to affirm that each author "has participated significantly in the reported research or writing." In our creative accounting, we refuse to make all the math add up to 100 percent. All three of us participated in 40 percent of the "data acquisition," since we attended a number of key interviews together (3 x 40% = 120%). Eben Kirksey designed the experiment. Nicholas Shapiro conducted interviews with artists, was a participant observer at the Pretty Doe Dairy, and is an ethnographer of punk gentrification and local perceptions of toxicity. Embedded as a participant observer with the Krewe of Dead Pelicans, both in virtual mediascapes and marching in the streets, Maria Brodine took the lead in the fieldwork for the "Political Openings" section of this chapter. She also curated the companion art exhibit "Art Spill." Kirksey created an "ethnographic para-site" in the Ironworks gallery involving conversations with the artist Jacqueline Bishop and a number of biologists. Following the hermit crabs to Grand Isle, following the goats to abandoned lots in the Saint Roch neighborhood, and following the figure of hopeful microbes, Kirksey also conducted a multisited ethnography orbiting around multiple species. We shared the work of drafting and revising the manuscript equally. Shapiro and Brodine took the lead in transcribing interviews and interpreting emic cultural elements from New Orleans. Kirksey took the lead in

interpreting the results with etic ideas poached from Jacques Derrida, Donna Haraway, Isabelle Stengers, and his own earlier writings on hope: see Kirksey, *Freedom in Entangled Worlds*. An earlier version of this chapter in a different form appeared as S. Eben Kirksey, Maria Brodine, and Nicholas Shapiro, "Hope in Blasted Landscapes," *Social Science Information* 52, no. 2 (2013): 228–56.

1. Marcus, *Para-Sites*, 5.

2. "The government doesn't watch. The industry is self-regulating," said David Sullivan when we asked about the title of the digital animations he exhibited at the Ironworks. "Fugitive emissions" is a technical term for leaks from refineries or other irregularities that are not expected. Ironically, the industry's own language also implies that the refineries are renegade criminals, elusive and on the run. Sullivan has focused on refineries in light of the lack of federal oversight. Keeping track of ephemeral toxic belches, he suggests, should be done not just with technical testing equipment but also with dark images of the emissions and their manifold effects. Microscopic toxins are magnified and occasionally stutter across the screen. Chemical compounds morph into tumors. A dark object, perhaps a blackened lung or a dying plant root, drifts in and out of focus as Sullivan brings together multiple scales and spaces.

3. Cornelia Hesse-Honegger, a meticulous illustrator of mutant bugs committed to strict principles of realism, says that she "loses herself in the animal" when she is outside collecting insects, in fields, at roadsides, and at the forest edge. Hugh Raffles reports that Hesse-Honegger feels "very connected, extremely connected," a deep bond, as if, perhaps, she had once been such a creature—a leaf bug—"and had a body remembering." Gradually accumulating evidence of disfigurations rendered by uncontainable radioactive isotopes, Hesse-Honegger's illustrations are figures of growing and expansive disaster: see Raffles, *The Illustrated Insectopedia*, 13.

4. "From a millenarian perspective, things are always getting worse," writes Donna Haraway. "Oddly, belief in advancing disaster is actually part of a trust in salvation, whether deliverance is expected by sacred or profane revelations, through revolution, dramatic scientific breakthroughs, or religious rapture": Haraway, *Modest _Witness@Second_Millennium.FemaleMan_Meets_OncoMouse*, 41.

5. Barack Obama's presidential campaign in 2008 worked to embody the messianic spirit, rallying the masses behind hope and quoting Martin Luther King Jr.'s famous plea about "the fierce urgency of now." In the words of John Hartigan, Obama promised to close the gap between the imagined and possible future real: Hartigan, "Millennials for Obama and the Messy Antic Ends of Race," 7. See also Kirksey, *Freedom in Entangled Worlds*, 207.

6. Bregje van Eekelen and colleagues have written a pamphlet full of other words that bulldoze over our dreams: see van Eekelen et al., *Shock and Awe*, 1.

7. Allen, *Uneasy Alchemy*, 48.

8. Our approach in this essay is similar to that in Sara Ahmed's study of happiness. The question guiding her book is not so much "What is happiness?" as "What does happiness do?": Ahmed, *The Promise of Happiness*, 2.

9. Raymond Williams explores the differences between a willed general trans-

formation and a technological transformation in his classic article "Utopia and Science Fiction." In the case of this oil spill, a technological accident led to a profound transformation of ecological and social communities. This event catalyzed a multitude of creative human agents, who began to will a general transformation of political, economic, and ecological relationships.

10. Haraway has argued that we are all chimeras—products of technological, linguistic, cultural, political, and biological fusions. "By the late twentieth century, our time, a mythic time," she writes, "we are all chimeras, theorized and fabricated hybrids of machine and organism; in short, we are cyborgs": Haraway, "A Cyborg Manifesto," 150. The chimera—a fabled fire-breathing monster of Greek mythology with a lion's head, a goat's body, and a serpent's tail—also has served as a way for biologists to think about how tissues of genetically different individuals coexist as a result of grafting or an analogous process in nature: see also Haraway, *When Species Meet* 304, n3.

11. Haraway, *When Species Meet*, 4.

12. Kirksey, *Freedom in Entangled Worlds*, 234n40.

13. "A coalescence is a historical force that derives from an unexpected connection": Tsing and Pollman, "Global Futures," 109.

14. Reviewing Derrida's work, the acclaimed literary critic Fredric Jameson writes, "We ought to be able to distinguish an apocalyptic politics from a messianic one, and which might lead us on into some new way of sorting out the Left from the Right, the new International in Marx's spirit from that in the world of business and state power": Jameson, "Marx's Purloined Letter," 63–64.

15. Derrida, "Marx and Sons," 253.

16. Derrida, *Specters of Marx*, 74.

17. Derrida and de Cauter, "For a Justice to Come," 24–25; Derrida, *Specters of Marx*, 167.

18. Derrida, "Marx and Sons," 253; emphasis added.

19. Derrida also regards messianicity "as *promise* and not as onto-theological or teleo-eschatological program or design": Derrida, *Specters of Marx*, 28, 74.

20. Lowe, "Viral Clouds," 525.

21. Allen, *Uneasy Alchemy*, 117.

22. These prisoners and the other cleanup workers were almost exclusively African American men in a region where nine out of ten residents are white: Young, "BP Hires Prison Labor." They were paid low wages and exposed to chemical toxins.

23. Drawing attention to the badly defined organizational milieu that channels toxic waste through particular life cycles, Brian Wynne suggests that naively simple models of risk often eclipse insuperable indeterminacies. The destination of all of the "waste" collected from the beaches of Grand Isle, including the living hermit crabs, was a closely guarded secret: Wynne, "The Toxic Waste Trade," 123–24.

24. Rose and van Dooren, "Unloved Others," 3.

25. Benjamin, *Illuminations*, 261; Kirksey, *Freedom in Entangled Worlds*, 32.

26. The material properties of crude oil embody the ambivalences of the pharmakon. Classically, the pharmakon is any drug whose therapeutic effect can suddenly shift to its deadly opposite—depending on the dose, the circumstances, or the

context. The pharmakon "defines no fixed point of reference that would allow us to recognize and understand its effects with some assurance": Stengers, *Cosmopolitics I*, 29. Is oil the source of power or an irredeemable poison? Is it a panacea that cures all ills or a pervasive toxin that is generating a plague of cancers and industrial disasters?

27. Hardt and Negri, *Multitude*, 57.

28. Marcus, *Para-Sites*, 5.

29. Alan Silverleib, "The Gulf Spill: America's Worst Environmental Disaster?" August 10, 2010, 11:09am EDT. Available online: http://www.cnn.com, accessed February 24, 2014.

30. Safina, *A Sea in Flames*, 287–88, 256, 284–85.

31. Rose and van Dooren, "Unloved Others."

32. Benjamin, *Illuminations*, 261; Kirksey, *Freedom in Entangled Worlds*, 220.

33. The jazz funeral's cultural cousin, second-line parades, are moving block parties with brass bands that are convened on annual dates by more than fifty black benevolent societies on Sunday afternoons from August to April. A second line is a "dynamic participatory event in which there is no distinction between audience and performer," writes Helen Regis. These events seek to "actualize the values of participants: respect, fiscal power, order, solidarity, peace, community uplift and beauty": Regis, "Blackness and the Politics of Memory in the New Orleans Second Line," 755. When jazz funerals grow large enough to evoke wide-ranging participation—as was the goal of the Krewe of Dead Pelicans—the distinction between the two celebratory staples of New Orleans erodes. Both second lines and jazz funerals have long been appropriated as vehicles for an array of agendas, from HIV awareness to promoting the launch of an Anne Rice novel.

34. "Krewe of Dead Pelicans and the Tar Ball," blog post, 2010, accessed March 8, 2013, http://nola.humidbeings.com.

35. Jameson, "Marx's Purloined Letter," 62.

36. Vincent Crapanzano suggests that we can take pleasure in the unreality of imaginary hinterlands—the possibilities and the play it facilitates: Crapanzano, *Imaginative Horizons*, 100–102.

37. Peter Worsley, who studied messianic movements in New Guinea in the aftermath of the Second World War, distinguished "movements which anticipate that the millennium will occur solely as a result of supernatural intervention, and those which envisage that the action of human beings will be necessary": Worsley, *The Trumpet Shall Sound*, 12.

38. Marcus, *Para-Sites*, 5.

39. Certainly, Hoch, with his work in the entertainment industry, was not an "innocent." Like Mayer and the protestors who were hailed with the satirical chant, "Oh, it ain't my fault," Hoch was deeply implicated in the economic and political structures he was critiquing. A video of his speech, which was delivered on May 30, 2010, is available online as "Ian Hoch at BP Oil Flood Protest," accessed January 13, 2012, http://www.youtube.com.

40. Here we are writing in conversation with Derrida, who celebrates social movements that are "heterogeneous, still somewhat unformed, [and] full of con-

tradictions, but that gather together the weak of the earth, all those who feel themselves crushed by the economic hegemonies": Derrida and de Cauter, "For a Justice to Come," accessed January 13, 2013, http://archive.indymedia.be.

41. Crapanzano, *Imaginative Horizons*, 2.

42. Safina, *A Sea in Flames*, 168.

43. Stengers, *Cosmopolitics I*, 29.

44. Competing modes of narrative emplotment, to borrow a phrase from Hayden White, are at play in these accounts of the Deepwater Horizon disaster: White, *Figural Realism*, 9. This tragic human folly, which destroyed communities of people and multiple other species, will become a comedy in the long run in which everything will turn out all right for the Gulf ecosystem, according to Lesen. William Cronon used a similar strategy of narrative juxtaposition to account for the historiography of the Dust Bowl. Some historians emphasized the hopeful dimensions of this environmental catastrophe—for example, "Nature made a mess, and human beings cleaned it up," becoming "builders for tomorrow": Cronon, "A Place for Stories," 1348. Others historians suggest that the story of the Dust Bowl is about the failures of human beings to accommodate themselves to nature, not about the failures of nature.

45. Unloved others, those who are disregarded by humans, may well survive mass extinction events on future horizons: see Rose and van Dooren, "Unloved Others."

46. Harding, "Get Religion," 361.

47. Crapanzano, *Imaginative Horizons*, 103–4, 146; Derrida, "Marx and Sons," 253. See also the discussion in Kirksey, *Freedom in Entangled Worlds*, 44.

48. Derrida and de Cauter, "For a Justice to Come," 24–25; Derrida, *Specters of Marx*, 167.

49. Derrida, *Specters of Marx*, 28.

50. Kirksey, *Freedom in Entangled Worlds*, 53.

51. Derrida tried to protect the notion of messianicity without messianism from the tools of deconstruction that he helped create with his early work. If the messianic spirit is emptied of all content, Derrida reasons, then it remains "undeconstructible"—it cannot be taken apart. "The figures of messianism would have to be . . . deconstructed as 'religious,' ideological, or fetishistic formations," he writes, "whereas messianicity without messianism remains, for its part, undeconstructible, like justice": Derrida, "Marx and Sons," 253.

52. Notions of care, ethical responsibility, and rescue are classical symptoms of American imperialist optimism and can-do frontierism that engendered many of the "blasted landscapes" described in this book. Leo Marx describes a similar dynamics on the frontiers of nineteenth-century America. "The swelling, surging demand for everything that technology promises" is coupled with nostalgic sentiments in an "ambivalent, look-both-ways kind of native progressivism": Marx, *The Machine in the Garden*, 220.

53. Klein, *The Shock Doctrine*.

54. Doreen Piano describes packs of abandoned dogs roaming the streets of post–Katrina New Orleans. Out-of-towners, primarily men—manual laborers, con-

tractors, and white-collar professionals—descended on the city, camping out in abandoned parking lots: Piano, "Working the Streets of Post–Katrina New Orleans," 201.

55. Lauren Berlant has written about attachment to unattainable fantasies of living "the good life." Dreams of upward mobility, job security, political and social equality, and lasting intimacy, she argues, are "scenes of conventional desire that stand manifestly in the way of the subject's thriving": Berlant, *Cruel Optimism*, 16, 45. These fantasies were part of the dreamscape in post–Katrina New Orleans. Affects and emotional attachments bind humans to other beings in the present, while desires oriented toward elusive objects of hope on the horizon also proliferated.

56. James Clifford has described museums as contact zones. The notion of a "contact zone" as first developed by Mary Louise Pratt in the context of European colonialism was extended by Clifford "to include cultural relations within the same state, region, or city—in the centers rather than the frontiers of nations and empires. The distances at issue here are more social than geographic. For most inhabitants of a poor neighborhood, located perhaps just blocks or a short bus ride from a fine arts museum, the museum might as well be on another continent. Contact perspectives recognize that 'natural' social distances and segregations are historical/political products: apartheid was a relationship": Clifford, *Routes*, 204; Pratt, *Imperial Eyes*, 4.

57. Elizabeth Acevedo was attracted back to her hometown of New Orleans—after spending the early years of her adult life in San Francisco, Paris, New York, and Charlottesville—by ties with family and friends but also by a place that felt complicated and more real. Her Disconnect Series depicts sites that were neglected in New Orleans after Hurricane Katrina, such as the public baseball field in *The Bench* and the overgrown and boarded-up structure in *Workshop*. Rather than feeling hope in a blasted landscape, Acevedo is haunted by anxiety—about the possibility of dispersants in the shrimp she eats, about fresh reports of floods in the Mississippi watershed and the release of water in spillways, about the possibility of another hurricane. The future contains uncertainties and unknowns.

58. These quotes are from José Torres-Tama's interview with Pelican Bomb, an online platform dedicated to the growing Louisiana arts community: "State of Affairs: José Torres-Tama," August 31, 2011, accessed January 13, 2013, http://pelicanbomb.com.

59. See da Costa and Philip, *Tactical Biopolitics*, xviii.

60. A peer-reviewed experiment found that dairy goats that eat poison oak do not pass detectible amounts of the plant's principal toxins in their milk or urine: see Kouakou et al., "Initial Research Indicates Dairy Goats Used to Clear Poison Oak Do Not Transfer Toxicant to Milk," 4. We could not locate any studies of goat milk acting as a prophylactic against poison ivy.

61. If British imperialism was "a campaign to extend an ecological regime: a way of living on Nature," related campaigns were taking place within the municipality of New Orleans. Official codes governing how one ought to live with nature were perpetuating a homogeneous ecological regime that attempted to limit the riotous diversity of plant life: see Drayton, *Nature's Government*, 229.

62. Foucault, "*Society Must Be Defended*," 240.

63. Elsewhere, Kirksey has explored the interplay of hard work and expansive dreams. "Imaginative dreams bring surprising prospects into view when translated into collaborative action": Kirksey, *Freedom in Entangled Worlds*, 1.

64. Derrida, "Marx and Sons," 253.

65. "The messianic is spectral," Jameson writes. "It is the spectrality of the future, the other dimension, that answers to the haunting spectrality of the past which is historicity itself. The apocalyptic, however, announces the end of spectrality": Jameson, "Marx's Purloined Letter," 63–64.

66. Evading concreteness, Derrida refuses to connect spectrality with "the *topos* of territory, native soil, city, body in general." Rebuking constructions he identifies as *ontopologies*—a linking of "present-being [*on*]" with *topology*—Derrida rejects political, ethical, and cosmological projects that are grounded in particular places. Ontopological constructions, in Derrida's mind, "have no future, they promise nothing even if, like stupidity or the unconscious, they hold fast to life." Derrida's dismissal of ontopology is too hasty. The same stones that he threw at the carefully built projects of others can be used to shatter his ephemeral glass house. Hoping for nothing in particular, harboring the empty promise of Derrida's messianicity, has no future—it is literally pointless and goes nowhere: Derrida, *Spectres of Marx*, 82. See also Cheah, *Spectral Nationality*; Kirksey, *Freedom in Entangled Worlds*, 205.

67. Haraway, *When Species Meet*, 1.

68. Certain strands of messianic thought contain a misplaced concreteness. For example, Kaushik Sunder Rajan has identified biocapitalists who harbor a fetish logic—entrepreneurs who pin expansive dreams and schemes on a particular pharmaceutical compound in the hope of attracting investors. When collective desires congeal around a specific figure and bring it into contact with the field of historical possibility, these moments of arrival often contain profound disappointments. The clinical trials studied by Sunder Rajan involved some drugs that were too toxic to market to the public. Perhaps all messianic figures contain the ambivalences of the pharmakon. Concreteness placed in them can be poisonous, but in the right doses, they can cure: see Allen, *Uneasy Alchemy*, 48; Sunder Rajan, *Biocapital*; chapter 5 in this volume.

CHAPTER 2

R. A. W. ASSMILK SOAP

Karin Bolender

What happens when our words become so utterly polluted that we cannot wield them without hurting—or, at the very least, obscuring—ourselves and those we love? As a poet with a busted tongue, befuddled by a passion for wordless bodies of animal wisdom that are seldom honored in my inherited culture, I have had to find other means to express particular forms of intimacy and love. My authority is most troubled by awareness that despite the all-mighty human endowment of logos and opposable thumbs, our multispecies story is not mine alone to tell. I barely reckon the half of it. For the past decade, I have wrestled with this impasse: How can I tell my story, utterly enmeshed as it is with a family of American Spotted Asses (*Equus asinus*), knowing full well that words cannot encompass the "animal" others' sides of the story?[1]

An impasse, indeed. But the main enterprise of the Rural Alchemy Workshop (R. A. W.) is to find ways to reckon with just such impasses as these. The story begins in the summer of 2002, when I made a seven-week walking journey across the American South—beginning in Mississippi, weaving across Tennessee, ending in Virginia—with Aliass, a six-year-old female white-and-brown American Spotted Ass out of Maury County, Tennessee. This long-ass journey as a whole has many roots and outgrowths, but one aspect in particular became a potent source of material for R. A. W. Assmilk Soap. Though I didn't know it when I first met Aliass in the gloom of a Tennessee cowshed, she was pregnant. Over the many miles of our journey, as I walked behind her day after day on city streets and rural back roads, and as we slept nights

in random churchyards and patches of woods, a biological fact I had absorbed years before in a livestock husbandry class kept coming back to me: a pregnant mammal should never leave her local environment just before giving birth, because her thick first milk—known as colostrum—contains antibodies to the specific pathogens where she has been gestating. By extension, then, any milk is entangled with places: made of everything the mammalian motherbody eats, drinks, and breathes as she feeds the growing fetus and, eventually, the newborn.

All across the wickedly hot, haunted, weedy, and bastard-beautiful South that summer, Aliass's blood and mammary glands brewed antibodies to hidden, harmful elements in the places we passed through. Aliass was percolating a supercharged fetal-ass healing brew. This colostrum she made held residues and traces of all the miles we traveled, wading through roadside weeds and trash and broken glass, lonesome and thistle-grown hayfields, crossroads and train tracks, and the harrowed traces of long-gone mules and ghosts of the American South. Aliass's body made this special milk night and day, in the heat and in the shade, and from every blade of grass, blackberry, and drink from bucket, flowing water, or cracked-edge pond along the way—from the creek water she sucked in as the red sun went down on Oak Ridge, Tennessee, where the first uranium was refined for the atom bombs that destroyed Hiroshima and Nagasaki, to the melting Creamsicles she shared with me and some local kids who had followed us for blocks along the blazing, broken sidewalk of Nashville's housing projects. Aliass's milk-to-be held traces of all the border crossings, borrowed pastures, hot asphalt, roadside grasses, dark nights in strangers' woods, and infinite encounters with countless other beings, both visible and unseen—held it all like memory is supposed to.

After seven weeks on the road, Aliass and I settled for a time on a magnificent one-hundred-acre farm in the Appalachian foothills of southwestern Virginia. Then we waited, as she grew wider and wider. Passenger was born at long last in mid-September. After riding along in utero the whole way, she stood wobblily to suckle on colostrum that held traces of our whole long-ass journey. Over time, she grew her own bones and thick fur on its nourishment. Over the years that passed—and especially as memory of our adventures on the road began to fade—the notion of Aliass's milk holding unnamable essences and residues of that first long trip across the South became more and more potent in my imagination. Her milk became a figural vessel for all of the unique encounters and unresolved longings we both carried all that way, from Oxford, Mississippi, to Bewilderness, Virginia, and beyond.

FIGURE 2.1 Aliass on a highway overpass just outside of Oxford, Mississippi, on the first day of the long-ass journey in the summer of 2002. Photograph by Karin Bolender. See multispecies-salon.org/bolender.

FIGURE 2.2 Aliass nurses the newborn Passenger. Photograph by Karin Bolender. See multispecies-salon.org/bolender.

But the roots of wondering and wandering go deeper yet. Years before I met Aliass, or had ever heard of an American Spotted Ass, I had a secret name for this otherwise unnamable thing I desired to mine in a flow of words and submerged memories. I called it "the black milk." Every time I sat down to write, I would begin by asking: "Where is the black milk now?" And by this means I would begin a descent into dark crevasses of longing and memory and work my way toward shadowy forms submerged in the past. Even as it stood for something inchoate, fearsome, and hard to grasp, this black milk, I sensed, also possessed some kind of homeopathic, transformative power to cleanse and redeem.

Eventually I rediscovered a black-milk antecedent in Paul Celan's "Death-fugue" (1945): "Black milk of daybreak we drink it at evening."[2] The milk in the poem is black with ashes from Auschwitz, which rained from the sky overnight and darkened the morning milk of a nearby dairy, thus staining the quintessential substance of maternal nourishment and bodily intimacy with irrevocable traces of atrocity. As I looked more deeply at this metaphor, Celan's poem brought to the surface a vital, if latent, association between black milk and "the mother tongue"—that is, the language we are born into as humans and live within, inescapably. When Celan lost his mother and father to the Nazi death camps, his German mother tongue became, as his translator and biographer, John Felstiner, puts it, "his mother's murderers' tongue."[3] The language itself became stained with atrocity and loss. In light of this, and from the depths of unfathomable trauma, Celan was compelled to wrest a new language: hybrid word forms forged from mangled remnants of his mother tongue in his attempts to recover meaning and memory from so profound a void.

Black milk as a trope figures a kind of absence inscribed into material substance: The blackness of milk becomes a shadowy residue of lost connection to some body, some where, however formless or unnamed. While what haunted me was nowhere near as horrific or devastating as the losses to which Celan's poems bear witness, I have come to understand that my own struggles with language-as-mother-tongue are also driven by a sense of profound loss and betrayal. Guided more deeply into the black milk–mother tongue nexus by the Austrian poet Ingeborg Bachmann and, later, by the psychoanalytic insights of Julia Kristeva, I looked back at my own black-milk hungers to try to find out what shadowy figures abided in them.[4] Eventually I discovered this: It was not the loss of my mother, per se, that so troubled my negotiations with language in the purgatory chasm we humans inhabit between words and living bodies; rather, it was the loss of my mother's

place, her land, literally her family farm . . . and my grandmother's and great-grandmother's before that. My own special brand of black milk welled up from a landscape of abandoned barns and acres of paved-over pastures and, most of all, from a sense of having lost connection to a matrix—a mammalian mother tongue—much larger than any single bodily being or species.

Technically, I was born on a sterile air force base and not in a barn. But the barn is nevertheless where I found my native tongue, in time. From my earliest reckonings, the original family farm in Ohio was a visceral source of the most profound wonder: An ordinary patch of grass in the pasture or motes spiraling in a lofty beam of barn light were sites of infinite richness, all particles of the greater mystery that lived there in the dusty aura of common animal being. This mystery was most fiercely embodied in the big domestic animals who lived there. When I was very small, my aunt's horse Irvy lived in the barnyard on the old farm, and some of my first memories are of his boundless and thrilling presence. Irvy was more than an animal; he was an entire environment. Being near Irvy at that age and size was an utter immersion in a presence of rich earthy odors, sounds, and sensations. His head was as big as my whole body. The rubbery lips and whiskers of his big kind muzzle coming down from way above, looming close and sniffing, then blowing out a cloud of sweet-smelling breath. . . . Irvy could not have seemed more magical if he was actually a friendly fire-breathing dragon. He was horse, of course, and soon enough I learned to call all the animals by their proper names and put them in their places.

This brings us back to the conundrum of the mother tongue and to that specific site where, for me, it forks into a painful split—that is, in the barnyard. Significantly, the site of my primal encounter with Irvy was on the same ancestral farm where my mother spent a singular summer of her own childhood in the mid-1950s, living with her young aunt Jean, who was seemingly half-equine herself (and who, incidentally, was the first woman to earn a degree in animal husbandry from Ohio State University). My mother remembers running wild in the pastures all summer with her older brother, riding bareback and braiding flowers into the mane of a spotted mare named Marblecake. An old photo of my eight-year-old mother shows her in a short dress with her hand on the sleek spotted shoulder of Cupcake, Marblecake's foal. Other old photos plucked from the family scrapbook show Cupcake grown up and in her winter fur, hitched to a sleigh in deep snow; Cupcake in a sea of green grass, carrying one of my mother's cherubic younger cousins bareback, surrounded by the farm's resident flock of Dalmatians.

I suspect that, in some magic and fateful way, Aliass began with Cupcake.[5]

I only ever glimpsed Cupcake once, a far-off patch of bony brown and white seen fleetingly from a car window as we passed an impossibly green Virginia hollow where she had been turned out to pasture with cattle in her old age; from all I had heard about her, it was like seeing a mythical beast across the veils of time. My mother's recollections of that halcyon summer with Marblecake became part of my own story before I even had ears, and more so thereafter, as the generations, horse and human, twisted down through the later decades of the twentieth century. Through my childhood, my mother's stories, and the longings and kinships borne in them, took earthly forms in encounters with real dogs and horses. I can still recall the sweet-edged, dusty smell and wiry mane of Cupcake's foal Crumb, a black gelding I got to know as a beloved and notorious member of the extended family on the springtime trips we took over the years to visit great-aunt Jean on her family's horse farm in Virginia.

The ancestral farm has since succumbed to the sprawls of Columbus. Needless to say, it was not the only one. As more and more family farms disappeared under housing developments and parking lots, the sprawl of asphalt and mown lawns gradually cut off access to the original source of raw animal kinships found there. I grew up into the late twentieth century watching a steady disappearance of such places where people had long lived entangled with other domestic species. Meanwhile, I grew up and studied and became critically aware of the legacies of colonial history and industrial technoculture. I grew skeptical of humanist assumptions, witnessing firsthand the violent species hierarchies and sickening materialist commodifications of animal lives that shape the American stable and barnyard.[6] More than all that, though, I was haunted by an acute sense of loss that came with the end of access to these familiar sites of kinship and mystery, rooted in wonder and respect toward our animal companions.

And with this awareness came that split in the mother tongue. In my own version of black milk, I sought forms of kinship with the mysteries of animal being I had first tasted in my mother's barnyard, so to speak. My education and grasp of language had given me a vast framework of words and concepts, yet none of them could encompass what I longed for most or assuage the growing sense of betrayal I felt: that somehow there were two mother tongues—the syntactical language of speech and thought, on the one hand, and the quiet wisdoms of bodies, on the other. What was worse, they seemed to be in conflict—or, rather, the blustery arrogance of human logos was always bulldozing over the quieter wisdoms of embodied beings present in times and places.

So my own black milk figured a breach: the body of language as a substance darkened with the loss of a primal embodied mother tongue; the "body's nocturnal memory," as Kristeva calls it in *Strangers to Ourselves*.[7] At the same time, in the act of pursuing this separation poetically, I glimpsed a promise of redemption: the shadow of what was lost reabsorbed into the substance, made present again. The black milk trope promised a new way in, somehow—one that could flow through the barriers between species, which in human terms are mainly made of words and names that are supposed to distinguish "us" from "them." I was cultured to assume, after all, that our taxonomies and syntaxes are the exceptional faculties that hold us humans high and clean above the mud in which the killable beasts are mired.[8] But the traces written into the barnyard mud are where I had always found the deepest mysteries of being: not a human mother tongue, in the strictest sense, but the promise of a broader intraspecies one.

So my black-milk longings reached out toward that other mother tongue and thus required a passage through the barbed-wire strands of logos that stand between us humans and the "lower animals." Paradoxically enough, this slipping through logos began with the discovery of one small but powerful three-letter word, and a dirty one, no less: the word was "ass." In the luckiest moments of creative practice, such explosive words or images may ignite, like fireworks or dynamite, to blow open an unforeseen passage across some previously intractable impasse. Artists have no choice but to trust such openings when they arise: Potent symbols and metaphors can sometimes be our only means of getting at something so massive and complex that it will not fit inside our viewfinders otherwise. A potent symbol can embolden us to explore intuitive territories that scare off the rational mind. Sometimes obsessions like these can even become flickering beacons, shining forth to carry cracked hopes through the black wind of terrible times.

So it was for me when I first encountered the American Spotted Ass. It happened in the spring of 2001. I stumbled, innocently enough, onto spottedass.com. Perhaps the power of the word in this case dwelt in the fact that "ass" was the one "dirty" word my mother discouraged me from saying as a child; she said it was "unladylike" and perhaps even "crass." Significantly, this was one of few linguistic prohibitions that came down from a mother who had her own mouth washed out with soap (literally) as a teenager for telling her little brother to "shut up." She frowned on "fuck" and "shit," yes, but for some reason "ass" was the only edgy word that I did not use liberally into adolescence and onward. But . . . when I saw the possibilities of "ass" as transformed suddenly by the multilayered appendages of "American"

and "Spotted"—here representing a relatively rare, humble, and spectacular breed of domestic equine—this dirty word's forbidden nature bloomed with lovely ambiguities. Better yet, it skipped with the slip'n'slide felicity of the double-meaning pun that by its very nature undermines the stability of any tongue. Indeed, "ass" may well be the only "dirty" word in the American vernacular that also appears in Holy Scripture. In any case, "ass" had just the charge I needed to implode certain impasses, to blast through the seams between words and the physical world that pester every poet. The word "ass" became like a skeleton key, unlocking door after door into labyrinthine depths. I had no choice but to seize on this beacon, the American Spotted Ass, with all my might.

And so Aliass and I came to be zigzagging our way across three Southern states in that summer of 2002. Haunted as I was by the breach between naming and other ways of knowing, I delighted in the pun because it figured the vast gulf between knowing the name of a species and knowing another creature more deeply. What do you do, as an aspiring poet, when words become more of an obstacle to intimacy than a means of connection? Or, more accurately, what do you do when the very use of names and abstractions seems to imply an exclusive authority that undermines our companions' ways of knowing the world? I went into that first journey under the guise of a "writer," but what I really hoped was that our time on the road itself *was the book*. Over those weeks of traveling with Aliass, I became more and more certain that the truest, most beautiful book I could imagine must be written collaboratively, with the full participation and presence of Aliass and every other invisible and visible swarming entity we moved among. Aliass must be co-author in her own inscrutable way as much as I was in mine, along with the cedar trees of Tennessee and stray dogs and cicadas and brightly clad churchgoers milling in their parking lots on Wednesday evenings and roadside vines and turtles and thunderstorms and even that lone brown cow ruminating on a far hilltop overlooking Interstate 40, who watched with mild interest one evening as we passed. The author of such a journey, any journey, could not be one human woman alone but every swarming body that was part of it, every agent that operated visibly and invisibly in all those places in time.

Nevertheless, a person cannot go around calling herself a poet without something to show for it: a book that people can read or, at the very least, a single poem. So my poetically burdened ass remained stuck in a double bind, in a kind of artistic no-man's-land, with no choice, it seemed, but to suck it up and claim the sacred burden of human authorship, or . . . what?

In honor of open questions and Aliass's wordless ways, I have spent the

past decade establishing this very "what?" at the heart of an artistic practice. Our adventures did not end with arrival in Virginia and Passenger's birth. Indeed, the first long-ass journey proved to be the initiation of an ongoing exploration—ways of bodily being writing themselves through passages in places and times. So it was in the summer of 2004, when a strange and peculiarly American vehicle known as the Dead-Car Wagon made a slow crossing, departing from the gates of a NASCAR speedway in rural Virginia and heading south, over the state line, to end its journey in the parking lot of an abandoned church in Eden, North Carolina.[9] As an incarnation, the Dead-Car Wagon's physical form was resurrected from the stripped carcass of an orange 1980 Ford Pinto, pulled by a team of asses (Aliass and Bronson) and piloted by two human drivers. Along the Southern back roads and county routes, this vehicle—heavy with a load of cultural history and other cargo—rattled on for three days: a rolling meditation on the American sense of place and passage, in light of car culture and suburban sprawl, Manifest Destiny and colonialism, and in remembrance of the kinds of wayside exchanges that are impossible when all places, along with the communities and ecologies they contain, are nothing but terminal blurs in the windshield glass.

The Dead-Car Wagon sparked rich conversations. Almost every person we met had a memory to share, from Kodachrome-tinted recollections of their own ill-fated Ford Pintos to Granny Lankford's rusty memories of riding bareback on her daddy's mule to local square dances. The Dead-Car Crossing reached into local environs in ways a poem on the page could never do, especially in a region where many people—many other beings, for that matter—do not read as a pastime. One afternoon as the wagon creaked past a row of dilapidated, seemingly abandoned mobile homes on a rural Virginia back road, an old lady came out of her trailer holding a quivering Chihuahua to her chest, and as we passed, she pointed at the strange equipage and talked softly to the little dog. Her words, though unheard by anybody but the Chihuahua, were the real substance of the poem we set out to "write" with the Dead-Car Wagon.

On the road, it is always a different story. Narrative unravels itself with its own momentum and with a cast of untold millions. Immersion in the journey is one thing, but in the aftermath, I was bedeviled again by the tension between incarnation borne in time and places and the seemingly opposite task of sitting down at the desk to conscript experiences into text, given only one's own limited perspective and vocabulary to draw from. Once again, I was frustrated by a desire to let the wordless interweavings of bodies in time somehow *be the text*.

FIGURE 2.3 Bronson and Aliass taking a roadside rest from pulling the Dead-Car Wagon in the hammering heat of a July afternoon in 2004, stopping across the road from the trailer home of Bertha "Granny" Lankford and her son David Harris in Ridgeway, Virginia. Photograph by Jack Christian. See multispecies-salon.org/bolender.

Then, in the spring of 2005, I came across the French phenomenon of *savon au lait d'anesse* (assmilk soap). Aliass's milk for Passenger was gone by then, but nevertheless, when I held in my hand the paper-wrapped, flowery-scented soap a friend had sent me from France, all the figural possibilities of assmilk that I had pondered back on the road with Aliass and years afterward took a sudden and solid form. This soap offered a way to hold milk, a substance by nature as perishable as memory itself, and to transform its immunoglobulins and phospholipids into a cool magical little stone with properties of both cleansing and healing.[10] With *savon au lait d'anesse* I felt like somebody had handed me a formula for the Philosopher's Stone, or maybe the blueprint for a Rural Alchemy Workshop magnum opass.

Rural Alchemy Workshop Assmilk Soap may be the most potent material means I have found to reckon with the abyss between human ways of knowing and the full-bodied presences of other animals who inhabit the world with us. Like our bodies, every bar of Assmilk Soap holds its own unwritten story in the invisible traces of bodies and antibodies immersed and entan-

FIGURE 2.4 R. A. W. Assmilk Soap on display in the Ironworks gallery in New Orleans. Photograph by Sean C. Hart. See multispecies-salon.org/bolender.

gled in specific times and places. Here at last I found a way to figure the wordless body's side of the story, writing itself in milk made of interactions in time and places. Given that every lactating femammal responds to her environment biochemically, all milk must hold a story of places her body has been and her various encounters with other species along the way—millions of interactions in every breath and bite and suck—from nourishing plant proteins to unfamiliar bacteria. Try letting your imagination dwell on that astronomical infinitude of mammalian experiences next time you stand in the dairy aisle of a supermarket. That said, milk need not be translated into words or chemical equations to work its ordinary magic. For R. A. W.'s aims, the potency of Assmilk is its capacity to open imaginative space for holistic wisdoms of the animal body, known and unknown, and to remind us that our bodies are always bound to the places and others we find ourselves among. With its double-barreled cleansing powers—combining the immunobiology of milk and the unique chemistry of soap—R. A. W. Assmilk Soap draws on both biological and metaphorical aspects of our multispecies mammalian enterprise, grounded in the living narrative I have inhabited with a special herd of asses over the past decade.

From idea to incarnation, R. A. W. Assmilk Soap became the material medium of an ongoing collaboration involving *Equus asinus* and *Homo sapiens*, which invites human users to imagine and enact ways we might work to cleanse tough stains of fear, shame, and fouled tongues that plague our kinships with other creatures and ecosystems. In this sense, R. A. W. Assmilk Soap draws inspiration from contemporary ecological artworks that involve both material and semiotic acts of biological remediation, wherein artists frame systemic biological processes to address particular environmental woes. Mel Chin's *Revival Field* (1990–), for instance, uses several different plant species called hyperaccumulators to naturally leach toxins from poisoned soil in the Pig's Eye Landfill in Minnesota; Chin draws poetic resonance from cycles of plant growth and harvest as they cleanse the soil over time. Jackie Brookner's installation *Prima Lingua* (First Language/First Tongue; 1996) demonstrates a cycle whereby the biochemical filtering processes of mosses, plants, and volcanic rocks cleanse water polluted by agricultural runoff. As the dirty water runs over the rock—shaped provocatively like an extended human tongue—the plants and minerals absorb pollutants, over time cleansing the water and the surrounding air. *Prima Lingua* suggests in both function and title that the healing powers of such invisible, biological processes are an essential part of an original mother tongue that all earthly bodies speak. More so, this mother of all tongues is a porous matrix of bodies in process that always enfolds us, whether we are aware of it or not.

I initially envisioned R. A. W. Assmilk Soap as a kind of exhaustive scholarly investigation of specific places, akin to the massive *Landscape and Memory*, which Simon Schama describes as "an excavation [of landscapes] below our conventional sight-level to recover the veins of myth and memory that lie beneath the surface."[11] Yet the essence of R. A. W. Assmilk Soap holds that those humanly historical "veins of myth and memory" buried in our landscapes are inextricably entwined with the fleeting, unwritten, embodied blood vessels and mammary glands of many species and with the mandibles and rootlets and beating blood of all who inhabit places. Playing on Schama, I called the earliest incarnation of the Assmilk Soap project "Landscape and Mammary," building on the idea of an embodied woman–she-ass partnership within specific places. I, humanly, could dig into a place through observation, direct experience, and research into threads of natural-cultural history, while the lactating she-ass's role was to percolate the cleansing milk-of-place to go into the soap. The hope was that excavating the "lyes" of the land in this sense and then mixing them with the beneficent properties of locally

brewed assmilk might work with imagination to neutralize some of a place's buried ailments.

But just what kinds of stains are we talking about here? What kinds of shames and fears? And how, specifically, do I propose R. A. W. Assmilk Soap could work to cleanse them, or even act as a conduit for hopeful gestures in landscapes blasted by past horrors and present complex global economic and political forces?

Take, for instance, the American South, where in many places a history of racial exploitation is barely buried in the sandy red soil; the dirt roads, white-columned front porches of antebellum mansions, and crooked backyard slave shacks still evoke memories of the Southern plantation economy founded on slave labor, reliant on the suffering of humans and mules and the plundering of forests and soils and whatever entities could be made to serve its rapacious hungers. More than this well-known history, though, the postindustrial South these days is scarred by other, infinitely more voracious consumer economies, evidenced by acres and acres of asphalt, Walmart parking lots and endless gas stations, empty gravel lots, and half-abandoned strip malls. I remember with a shudder one day in 2002 when Aliass and I got lost on the Alcoa Highway on the outskirts of Knoxville, Tennessee. I was hauling Aliass in the trailer behind my Chevy Caprice, looking for a place to leave the rig and set out on foot and hoof again, but what I saw on the Alcoa Highway made me lose my nerve entirely. The landscape was nothing but acres of blinding car dealerships and heavy-machinery lots for as far as the eye could see in any direction—an impermeable desert far more forbidding than Death Valley could ever be.

If the vision of an endless Alcoa Highway is not enough to unsettle our lingering pastoral idylls, one can always turn to gut-wrenching images of ravaged Appalachian mountain ranges, clear-cut old-growth forests, Gulf Coast beaches strewn with tar balls and dead seabirds, or drowned neighborhoods in the paths of broken levees. That said, the territory of Assmilk Soap is not just the visible scars of industrial wastelands but more so the hidden pollutions—poisons born of exploited bodies, beings, minerals, and ecosystems—and the ways they linger in our bodies, thoughts, and utterances. The inner realm is where R. A. W. Assmilk Soap really finds its potency, calling on imagination to bring our buried stains to the surface—at least to attend to them, if not to assuage them. The actual milk soap-making act depends on a transformative chemical process known as saponification, which significantly changes both assmilk and another essential soap ingredient, lye (sodium hydroxide). Lye alone will burn the skin fiercely, but when mixed

with milk and base oils and stirred until it "traces," lye neutralizes to become the solvent agent in soap and thus the ultimate cleansing substance.[12]

The transformation embodied in saponification echoes back to the black milk as it functions in Celan's poetics. In his "black milk," Celan (whose name I often accidentally mistype as "Clean") seeks to "find words for 'that which happened,' as he called the Holocaust, or *Shoah*. . . . [H]ow to speak of and through the 'thousand darknesses of deathbringing speech.'" Transformative power abides in the poetic act, as Felstiner observes: "The cadence and imagery of this ballad ["Deathfugue"] . . . engage atrocity with art, as Celan would go on doing during the next quarter century."[13]

Drawing on its own distinct sources of black milk and poetic hope, R. A. W. Assmilk Soap seeks first to acknowledge how human logos too often excludes interspecies wisdoms in the act of dividing "human" and "animal"—a separation that justifies the ways in which we exploit and desecrate so many forms of life. We all live in landscapes and languages that hold traces of lost kinships and human and ecological atrocities. I thought of this often as I wandered through the South with Aliass. I liked to imagine that somehow the elements of weeds she ate on that byway in Tennessee that parallels the Trail of Tears, or the stream water she drank in the historically toxic town of Oak Ridge, were being transformed as they passed through her muzzle, tongue, stomach, blood, and glands to become something more wholesome—foremost, of course, the colostrum that nourished Passenger. At the same time, though, as the milk holds traces of unspoken intimacies and elements we gather on our journeys through times and places, Assmilk Soap becomes a figural substance that might also nourish human imaginative action, holding forth a cleansing hope in the form of a rarefied solvent for our environments and psyches. And finally, as it melts away with use and time, R. A. W. Assmilk Soap emulates the fleeting and infinite body-to-body intimacies that inscribe the unwritten and richly entangled autobiographies of every animal being.

These ordinary-looking bars of soap foam up in the usual way when they mix with water, but the real power resides in collective meaning-making gestures. In recent years, R. A. W. Assmilk Soap has engaged a collaborative approach, inviting individuals to encounter the beneficent properties of assmilk in cleansing suds and to lather through layers of whatever forms of pollution (chemical, psychological, linguistic) threaten the places and others we love. Along with R. A. W. Assmilk, each bar of soap contains other "ingredients" submitted by a collaborator. These ingredients relate to a place, way of life, memory, conundrum, or relationship that the soap's imaginer wants to wash in some way. Ingredients of R. A. W. Assmilk Soaps have ranged from

gatherings of native and non-native plant species of a specific bioregion to personally or culturally loaded objects or substances, such as the artist Bill Kelly's mix of rain, motor oil, and blood and the poet Claire Hero's teeth of a road-killed coyote. Each soap label reads like a dark little love poem to the complexities of our multispecies habitations. Each bar of soap is an experiment, an ongoing interrogation.

One of the first batches of R. A. W. Assmilk Soap included milk from both she-ass and human sources. Sixteen people—in this case, mostly educated, middle-class artists, mothers, musicians, and psychotherapists from different places in the United States—contributed ingredients for their own, individual R. A. W. place soaps. This batch was part of an interdisciplinary collaboration with the artist Emily Stone called *Domestic/Wild*, which culminated in an experimental performance that she produced in Portland, Oregon, in January 2010. Under Stone's direction, *Domestic/Wild* explored embodied tensions between the bounds of domesticity—especially as they are experienced by homebound mothers of small children—and the body's inherent animal wildness and wisdoms. In the role of "Lecturer" within the *Domestic/Wild* show, R. A. W. talk of interspecies nursing and rarefied forms of she-ass husbandry brought interesting twists to the questions of mammalian wildness and domesticity, as the show explored these themes and questions through dance, spoken words, video, live music, and still images.

In keeping with *Domestic/Wild*'s aims to delve into unexplored places that we find inside our own bodies and homes, Stone's breast milk provided a vital human ingredient in that particular R. A. W. soap batch. The label she wrote for her specially made bar of soap tells a story of imaginative exploration into such territories:

> Ingredients: 100% RAW milk (she-ass and human),
> organic base oils; question; dust from
> under couch (terra incognita); grass, leaves, and sticks
> picked up by Athena at night; a green note from my Dad;
> small portions of a nest that had two dead baby birds in it;
> a burnt match and a small bit of firewood.

Questions of home and homemaking: Who lives here? What are we most afraid of? What happens if we leave a door wide open between inside and outside? How can we make any given place safe and clean for loved ones and fellow creatures? (A place can be bounded however one wants, of course: a city, a state, an estuary, a childhood, a kitchen, a room that exists only in the mind) How can we move beyond the paralyses of fear and shame, knowing

our species floods the land continuously with invisible toxins, poisoning soil and watersheds and the many biologies and ecologies that depend on them? How can we reckon with all that is being lost at our hands?

Rural Alchemy Workshop Assmilk Soap must be a powerful solvent, indeed, to equal the fearsome pollutions of hopes and homelands it goes up against. I can testify to this much: every time I pour the measured ounces of lye into assmilk in making the soap, the mixture sizzles and steams and glows bright and hot as a barn fire. The first two times I poured lye into Passenger's milk, the reaction was so strong it cracked the jar. That last batch, the mixture got so hot it turned black.

I suppose it is no coincidence that R. A. W. Assmilk Soap took physical form in Carnesville, Georgia—a place that goes a long way toward evincing how "the dirty South" got its name. Every time it rained on our little ass farm, shards of glass and scraps of burned plastic, broken mirrors, and bent scraps of rusty metal surfaced from the soil in the paddock. This trash had been left behind by the land's previous inhabitants, buried in the heart of our barnyard where the herd lived on bare hooves. I kept a little collection of these artifacts in the feed room until it got too overwhelming—trashy treasures including old cassette tapes and pink plastic My Little Pony change purses, crushed metal light bulb ends, whole antique bottles, and ancient pull-tab beer cans—but mostly the collection was just sharp and dangerous pieces of old burned and broken things. These dangers in the barnyard haunted me with a deeper need to know: How deep down does the human pollution go? What about on the other side of the hill, where the powers-that-be bulldozed the forest for the coming industrial park? If I dug down deep enough, could I ever find soil that is fertile, dark, and clean?

So I went out one January day with my bar of Assmilk Soap, made especially for Carnesville with bits of plastic trash and broken mirror and fur and creek mud and leaves and acorns from the massive old water oak by the barn, and I scrubbed for hours with everything I had. I washed the mud, the fouled creek, the sad depleted soil. I scrubbed the dead pine trees in the asses' paddock where the power line crew had sprayed herbicide one day when we were not home. I spent that whole winter afternoon with my bare feet sunk in the cold mud and manure of the barnyard, washing Carnesville with the faint hope that it is possible to maintain a plot anywhere on this wracked Earth that is safe for all our bodies to thrive. This hope was not easy to conjure; along with a general sense of ominous presences in the local landscapes, there was the woe that welled up in me every week when our next-door neighbor, Mr. Crump, burned his plastic household trash, and

the noxious black smoke wafted through the scraggly pine trees and into the lungs of the herd, along with the lungs of the dogs, humans, birds, and every other breathing being, even coating the leaves of the trees and garden greens. Traces of it likely ended up in Passenger's milk. And let us not forget the chicken shit: Carnesville is the seat of a Georgia county that boasts the most industrial chicken houses of any in the United States, and every winter the farmer who leased the hayfields just up the road would spread the reeking manure of millions of bald and miserable birds onto the fields as fertilizer so that the next rain would roll it downhill and into our soil, creek, and drinking water. Carnesville is stained in other ways, so many ways, and it is our fault; all of us are implicated. As we well know, Carnesville is not the only place so stained in the Anthropocene.

But in spite of all this toxic fear and shame—or maybe because of it—R. A. W. Assmilk Soap holds forth that heartening forms of interspecies eros and wonder can still be found in places alive with worldly webs of creaturely beings. For three years, hardscrabble Carnesville offered a quiet place on a forested dirt road in which to operate the Rural Alchemy Workshop's small-scale, secret ass dairy operation. Passenger and Henry's foal, Nicholass, was born in the summer of 2010. Aliass stood by in the dark like a sentinel while Passenger labored, pacing back and forth until the time came when she lay down in the paddock dirt and birthed the little wet wisp, who was born black as a shadow under the full moon.

For a year after Little Nick was born, R. A. W. was in full swing; Passenger made milk for him, and I made Assmilk Soap.[14] There beside the twinkling waters of the foamy brown creek, I stirred this mixture of lye and Pass-milk, and dark as it was with local, historical, and global-industrial-capitalist-petrochemical realities, it was just as densely sweet with abiding desires, kinships, and rememberings. A certain joyful post-domestic eros flows in the midst of a big ass multispecies family, in the dusty domestic ungulate mesh of tail-swishing, ear-flicking, braying, grazing, long-eared listening, and the rarefied wonder of coming to know oneself and others more deeply in daily acts of R. A. W. ass husbandry.

As much as I invest artistically in the power of Assmilk Soap, the scope of this R. A. W. enterprise remains small. Aside from the fact that R. A. W. Assmilk Soap is intimately bound to the fortunes of one small ass herd, the scale of any ethically sound ass dairy is limited by harsh economic and sociocultural realities that affect the lives of American asses in general. Way too many abused and neglected domestic donkeys live in the United States, with way too few humans who have the will and means to properly care for

FIGURE 2.5 Passenger nursing Nicholass Moon about an hour after his birth on a steamy Georgia night in July 2010. Aliass stood in the near distance through the whole labor, birth, and early hours, quietly alert to the goings on and protecting the space and time of newborn mammalian bonding. Photograph by Karin Bolender. See multispecies-salon.org/bolender.

them.[15] But this is not the only reason I do not make a business of selling R. A. W. Assmilk Soap. While we know too well that almost anything can be traded in the global market these days, from preteen girls to cloned embryos, Assmilk Soap is not an easy product to move. It is not pretty, and it is not scented with alluring perfumes; R. A. W. Assmilk Soap is only as solvent as the imagination that a washer is willing to wet it with, and it is not for the squeamish. Each soap is embedded with physical objects of significance (gnarly tufts of ass fur, for instance, or shards of veal-calf bones), along with other special ingredients and whatever affective layers of meaning, longing, memories, and taboos a user imbues it with.

But for all of its others possible uses, in the end R. A. W. Assmilk Soap is a solvent made especially for language, to wash down past the accumulated stains of this and that named distinction to the common roots of beings in places. It is about trying to be at home in earthly ecologies, and as such, it aims to rinse away the dualism that splits the language-laden tongue from

the quieter, embodied wisdom of the other ones, the ones that thrive in flesh and fur and mud, beyond all the names and distinctions. In essence, I make Assmilk Soap because I am a member of a unique and uniquely burdened species, trying to find her place in the world with respect to other creatures while navigating a minefield of human shame, divisive definitions, and earthly desecrations. We all have to recognize the sources that sustain us to survive, and by those recognitions and connections, we come to understand what and who we are, where and how we belong.

And this brings me back one last time to the idea of black milk and to the particular forms of hope and longing embedded in Assmilk Soap. Despite all of the buried trash and broken mirrors in the Carnesville barnyard, years of R. A. W. exploration in the woods and grass and paddock mud finally revealed the true source of my shadowy assmilk hungers. One morning when Little Nick was just a few days old, I was out in the paddock with him and Pass and I saw him do something funny: He was bent down awkwardly between his still wobbly, widespread front legs, trying to nurse on a small clump of grass. His little black muzzle worked at the green wisps with the full force of his nursling hunger, puckering around the stems in an earnest, if experimental, effort to suck sustenance from them. He gave up after a minute, as his efforts failed to yield sweet assmilk from the grassroots and dirt. But he was onto something: His moment of conflation foreshadowed a big leap he would take soon enough from milk to roughage; he was already beginning to learn to pluck and chew and so laying claim to the herbivorous being he was born into.

At the time, I was amused by his conflation of the motherbody and the world of things in the surrounding environment. For the newborn ass, this was just a transitional moment, but as I reflected on the scene later on, I realized that my own confusion on this matter—of where and how in the world we find our true sustenance and ways of belonging—has been lifelong. Like Little Nick, I have been seeking nourishment among the roadside weeds and dirt and asphalt of landscapes, places where I found myself tangled with others in time. I have tried in vain to suck a black-milk brew of lost times, places, and even ways of knowing from the land itself, from lichen-crusted rocks and barks and tall grass, from birdcalls and cattails and thorny brambles and mud puddles. In the circuits of all those long-ass journeys, I never could find that one sweet spot that would yield it, but I always felt the milk of the land was present out there, flowing just under the surfaces, invisible and potent, through infinite webs of tissues and minerals and leaves and watersheds.

In my experience as a postindustrial American human person, the search

FIGURE 2.6 Aliass and a pine tree. Photograph by Karin Bolender. See multispecies-salon.org/bolender.

for nourishment in wracked landscapes is as much a psychological or spiritual hunger as a biological one. Each in our own special ways, Little Nick and I felt around our shared environment, looking for what we needed most to help us survive and to know who we are and where we belong. For a time at least, we both found what we needed in the bright eyes, dusty fur, and sweet assmilk of a familiar, ornery herd of American Spotted Asses. For him, Passenger's milk held essential antibodies and proteins he needed to develop and grow. For me, R. A. W. Assmilk remains a substance full of unspoken traces, shadowy hopes, and wholesome promises of full and deeply lived immersion in the meshes of otherness where we find ourselves.

NOTES

1. The American Spotted Ass is a variant breed of the common domestic donkey, bred specifically for piebald ("spotted") coat color. While the genes for multicolored coats exist in donkeys worldwide, the history of this breed in the United States, as narrated by the American Council of Spotted Asses, is described on the organization's official website accessed January 14, 2013, http://www.spottedass.com.

2. Celan, *Selected Poems and Prose of Paul Celan*, 30.

3. Felstiner, "Preface," xxii.

4. I discovered an interesting insight in an essay on Bachmann's fiction by Gisela Brinker-Gabler, who writes, "Rejecting contact with the mother tongue cuts off the past and might be a life-saving strategy, if there is some profoundly detested experience." As a contemporary of Celan's, Bachmann shared his struggle to cleanse language in light of the ways it was twisted and stained by the Third Reich. That idea resonated with me, although I did not know then what "detestable experience" might be the source of my own skepticism toward language. Later I came upon Kristeva's discussion of the mother tongue in *Strangers to Ourselves*, in which she describes "not speaking one's mother tongue. Living with resonances and reasoning that are cut off from the body's nocturnal memory, from the bittersweet slumber of childhood. To cut off one's mother tongue cuts off one's childhood and whatever past there was in that language." The relation of bodies and language is thus by no means a simple proposition. There might even be more than one mother tongue to reckon with: Brinker-Gabler, "Living and Lost in Language," 83; Kristeva, *Strangers to Ourselves*, 193.

5. I cannot resist echoing Nabokov's narrator Humbert here, "I am convinced, however, that in a certain magic and fateful way Lolita began with Annabel": Nabokov, *Lolita*, 14. Since there is no law on the books forbidding it, my love for Aliass may not demand quite the same degree of wistful eloquence that Humbert calls on to justify his illicit passion for the nymphet Dolores Haze. Nevertheless, I think Nabokov might appreciate the gesture of homage, given the ways in which adult passions are sometimes kindled by vital encounters submerged in the murky depths of childhood.

6. Horses maintain a distinct place of honor in the American imaginary—whether or not this translates into actual care for the real lives of individual equines. The thoroughbred racing industry is one major contributor to both the longstanding public passion for horse heroes and the darker side of myths and markets that revolve around them. The thousands of long-legged equine athletes who fail to become Seabiscuit or Smarty Jones end up trundling off to the "glue factory" in the long run. These horses are the ill-fated by-products of the storied Kentucky bluegrass industry. The anthropologist Rebecca Cassidy offers an insider's view of the complex history and inner workings of the thoroughbred industry in both Kentucky and Great Britain. Cassidy illustrates rich worlds orbiting around the towering icon of the perfect thoroughbred champion: proud and noble blood, speed incarnate: see Cassidy, *Horse People*. Asses, by contrast, do not enjoy such honors in the broader American culture, with the exceptions of certain circles that laud illustrious mammoth jacks used to sire mules and the ever growing and adored population of pet miniature donkeys. Both mammoth donkeys (more than fifty-four inches tall) and miniatures (less than thirty-six inches) are hot rural commodities, rarely selling for less than $500, whereas I have seen ads on Craigslist offering to throw in an average-size (thirty-six to fifty-four inches) standard donkey jack for free if you buy the seller's chicken coop for $60. In the world of American asses, size definitely matters. Indeed, it can be a matter of life and death.

7. Kristeva, *Strangers to Ourselves*, 193.

8. Eben Kirksey and Stefan Helmreich draw on Agamben's *Homo Sacer* to illuminate a vital distinction in the introduction to their essay "The Emergence of Multispecies Ethnography." They write, "Animals, plants, fungi, and microbes once confined in anthropological accounts to the realm of *zoe* or 'bare life'—that which is killable—have started to appear alongside humans in the realm of *bios*, with legibly biographical and political lives": Kirksey and Helmreich, "The Emergence of Multispecies Ethnography," 545. This is the essence of a harrowing truth for me: Aliass and Passenger are killable in the society we live in. If something happened to our family, they would become mere assets without much economic value, and it is likely that they would wind up on a rumbling trailer to the slaughterhouse. More likely (because donkey meat is not much desired in the United States), they would go to a glue factory. Growing up, I was always aware of the distant hovering threat of the Glue Factory, the doom of equines who, for whatever reason, fail to find or no longer fit useful roles in human society. I always pictured the glue factory vaguely, something like a remote, snow-covered mountain in Mongolia. I was not aware as a kid that the proverbial "glue factory" is a very real place, otherwise known as the local rendering plant. I did not know that I was consuming the products of this industrial process daily and in hundreds of ways other than Elmer's. Equines were not the only creatures I considered family who ended up, literally, in the mix. Thousands of unwanted dogs and cats also end up at the rendering plant and so are annihilated and dispersed into products as diverse as makeup and soap and, most horrifically, cheap dog food. Back in my childhood, the glue factory was only a distant threat, like mortality itself. It was not until I came into new awareness as I grew up that I began to realize and struggle with the conundrum this presents: However fuzzy the boundary between other species and me may be in my experience and ontology, a stark line is drawn in Western society that renders some of my loved ones killable while others enjoy a full suite of civil and individual rights. Most deeply, I know this to be wrong, wrong, wrong. I know that dog and donkey and horse and cat and every other creature has a unique *bios*, however unwritable or unknowable it may be for human logos. Thus, like so many of us, I find myself in a society with which I am fundamentally at odds.

9. The Dead-Car Wagon rolled out in collaboration with the poet Jack Christian, with the draft power of Aliass and Bronson, and with help from the renegade engineer Fred Taylor, the ass-angel Cheryl Haas, the Christian family, and a grant from the Gunk Foundation, which supports public art in nontraditional venues.

10. With "magic stone," I echo the French poet Francis Ponge, who wrote an entire treatise (simply titled *Soap*) on the nature of this slippery proposition. He explored the notion that his "processual poetry" on the essence of soap could itself act to cleanse habitual and crusty ways of reading, writing, using language to interface with the world. "So we slip from words to meanings . . . by a glistening inebriety, or rather an effervescence, a cold ebullience which, besides, we come out of, and here is the great lesson—with cleaner, purer hands than before this exercise began": Ponge, *Soap*, 19.

11. Schama, *Landscape and Memory*, 14.

12. As one stirs the mixture of milk, lye, and oils for anywhere between twenty minutes and two hours, it gradually thickens. When a line of the thickened liquid dripped onto the surface remains there without sinking (a phenomenon called "tracing") it means saponification has begun and the mixture is ready to be poured into molds to fully saponify and harden.

13. Felstiner, "Preface," xxii.

14. Following the best practices of French assmilk farmers and the advice of my veterinarian, Dr. Alice Beretta, I did not milk Passenger for the first five months of Nick's nursing life. Once he was old enough to eat hay and grain, I began the milking process. A few times a week, I would let Passenger out of the paddock to graze in the yard. Nick would invariably stand in the corner of the paddock and stamp his front hooves; he had not learned to bray yet. After a separation of an hour or so, I could milk Passenger—yielding a cup or so on a good day—then put them back together. If I had been more diligent, I could have separated them longer and more often and thus obtained a lot more milk. I learned a thing or two about milking asses from Jean-François Wambeke, the proprietor of the beautiful Asinerie d'Embazac assmilk dairy farm in L'Isle Jourdain, near Toulouse in the south of France. Among other important facts, he told me that lactating she-asses (commonly known as jennies in English and as *les anesses* in French) must be able to see their foals to produce milk. Asinerie d'Embazac maintains two enclosures—one for the anesses and one for the foals—separated by a flowery footpath and a distance of maybe twenty feet. The anesses enter the milking paddock in the morning. Throughout the day Wambeke milks them several times and obtains one to two liters from each. Needless to say, the market for assmilk in Europe is different from that in the United States. Asinerie d'Embazac maintains a website that offers insight into the daily operations of an assmilk dairy: accessed January 14, 2013, http://www.embazac.com.

15. From the ramshackle livestock-sale barn in Paris, Tennessee, my ass mentor Mariann Black reports that haggard and neglected standard donkeys are selling for $20–$30 a head. Even in the South—which often celebrates and mythologizes the mule (i.e., the sterile offspring of a donkey sire and a horse dam) as a partner in Southern heritage and Reconstruction—domestic donkeys are still oft-misunderstood creatures whose status as equine companion species varies wildly, along with their standards of care. According to Jean-François Wambeke of Asinerie d'Embazac, economic and ethical considerations of dairy-ass farmers vary within Europe, especially in France and Belgium. I gathered that donkeys are more populous in France because Europeans eat equine meat. Humane slaughter is a viable option for donkeys who do not find places as companion animals. As of this writing, the question of whether to reopen equine slaughterhouses on US soil is hotly debated.

CHAPTER 3

BLASTED LANDSCAPES (AND THE GENTLE ARTS OF MUSHROOM PICKING)

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Ruins are now our gardens. Degraded ("blasted") landscapes produce our livelihoods. And even the most promising oasis of natural plenty requires massive interventions to be maintained.

In a bustling wild mushroom market in southwestern China, traders were eager to explain to me why Japanese put such a high value on matsutake, aromatic wild mushrooms gathered across the Northern Hemisphere for export to Japan. After the Americans dropped an atom bomb on the city of Hiroshima during the Second World War, they explained, the first live thing to grow in the charred and blasted landscape was matsutake. The mushrooms must be strong, they figured, explaining that consuming the mushrooms makes Japanese strong, too. Matsutake, they said, give you energy.

Energy is not how Japanese consumers describe the mushroom. But certainly, southwestern Chinese need energy to survive and thrive on their own blasted rural landscape, damaged in national production campaigns, then stolen by corrupt elites, and, on top of all that, used heavily for peasant livelihood. Because of matsutake's reputation as a strength-giving tonic, demand for it—not a traditional Chinese food—is developing across China. Perhaps the story of the surge of mushrooms despite nuclear disaster makes a good metaphor not just for the new capitalist economy rising from the rubble of socialist modernization but also for the stimulating role of forest products despite a history of environmental damage.

There is even more ambivalence one might read into the story. Matsutake, like many mushrooms, are efficient collectors of radioactivity. Those mat-

FIGURE 3.1 Battered statues standing watch on a hill in Nagasaki, Japan, weeks after the city was destroyed by the world's second atomic bomb attack. Photograph by Corporal Lynn P. Walker Jr., US Marine Corps, National Archives and Records Administration (NARA) file no. 127-N-136176. See multispecies-salon.org/tsing.

sutake rising from the ashes of Hiroshima may have been strong, but they also may have been toxic—at least in the long run—for humans or other animals. This toxic content, the poison in the gift, only strengthens my metaphoric reading. Emergent forms of global capitalism, within which China is a concentrated node of activity, extract wealth from blasted landscapes as both gift and poison. World-circling supply chains extract not just commodities but also the histories of violence that make the ultra-cheap production of those commodities possible. Just as the history of exploding the atom bomb was embedded in the flesh of those Hiroshima matsutake, so, too, every supply-chain commodity carries histories of damaged human and nonhuman lives. Every matsutake mushroom tells a story of blasted landscapes.

Yet mushroom picking is a gentle art, and it can tell us about ways to live together in at least some damaged environments. Matsutake remind us that some, though not all, forms of disturbance can be life-giving. Matsutake can-

not be cultivated. They require histories of radical disturbance for their associations with pioneer plants and mineral soils. Matsutake forests thus teach us about systems of world making and energy sharing that reach beyond the conceits of farming, with its appeals to stable harmonies between people and crops. But thus we cannot get away from blasted landscapes.

This chapter describes the environmental histories of four matsutake forests to consider how varied trajectories of destruction and disturbance are made ecologically viable for at least some species mixes, including matsutake, pine trees, and humans. Let me be clear: This example does not justify environmental destruction, even if we learn to live with it. And some destruction is worse than others for the possibilities of life. Matsutake forests are lively blasted landscapes, but not all blasted landscapes are lively.

DAMAGED LANDSCAPES

By the end of the twentieth century, modernization had extracted a great toll on planetary life. Tropical rainforests had been cleared and plundered, damaging these ancient ecosystems possibly beyond repair. Great dams silenced the worlds' rivers. Salinization and chemical poisoning threatened vast areas of cropland. Species were disappearing at an alarming rate. Decline and failure haunted industrial forests, once modernization's showplace for sustainable yields. The effluence of mines, the waste of industrial production, the debris of warfare, and both planned and unplanned radioactive emissions swept out with wind and water to blanket whole regions.

Perhaps it is not by chance that people's awareness of all this damage developed at the same time as the rather sudden abandonment of dreams of human empowerment through the betterment of communal well-being. National governments have increasingly given up the idea of communal welfare, encouraging instead an unregulated, catch-as-catch-can economy in which all are free to get rich (or healthy, or well fed) in any way they can. Corporations have moved away from standards of responsibility to employees or communities to set their sights more completely toward stockholder profits. Of course, there are exceptions, and these "trends" are in large part a consequence of the historically contingent power of the United States to set global standards. Still, despite exceptions, these trends have taken hold of public imaginations around the world. Their influence is evident in the expansion of a "scrounging economy" among the poor as well as powerful entrepreneurs around the world. Scroungers look for anything to make money. Scrounging was always popular in poor countries, but now it is a model for

livelihood in rich countries, as well. Working the cracks within official systems of regulation, they look for opportunities to use their off-the-grid skills. One model sector for this economy was the trade in illegal substances (e.g., drugs, guns) of the twentieth century, and the lines between legal and illegal in today's scrounging are still hard to draw. But the form has spread far beyond twentieth-century expectations.[1] Every ruined industrial city and abandoned or partially abandoned site of modern agribusiness or industrial forestry is full of scroungers. Many of these scroungers were once industrial workers, farmers, or loggers. Now they find a living in the ruins.

Luckily, ruins are sometimes full of treasures. In zones without radioactivity, wild mushrooms are one of the least dangerous and most life-giving of such treasures. Wild mushroom gathering is an exemplar livelihood for displaced and disempowered people. In the economic collapse following the fall of the Soviet Union, many Russians turned to wild mushrooms for subsistence, as well as for livelihood.[2] Meanwhile, gourmet niche markets have blossomed in the food industry. Facilitated by the availability of high-speed transcontinental transportation, which makes it possible to ship fresh mushrooms around the world, the global commercial value of wild mushrooms has rocketed. But the foraging part of the wild mushroom business does not lend itself easily to corporate organization. In most commercial picking areas, independent foragers seek the mushrooms, exchanging them at buying stations for cash. On the damaged seams of modern resource management, turning mushrooms into cash brings together human and nonhuman histories of radical disturbance. With mushrooms, displaced and disempowered people find life on blasted landscapes.

Ruins are now our gardens.

THE UNCULTIVATED LIFE

It does not help to glorify gardens, which are always sites of disturbance, with benefits for some living things and death sentences for others. Only in agrarian ideologies do gardens merely signify the gift of life. The uncultivated habits of wild mushrooms are good to think with for scholars because they push us beyond the idioms of controlled and beneficial reproduction ingrained in us by farming regimes. Where an orientation to farming encourages us to imagine a one-to-one relationship between humans and our food crops, wild mushrooms press us into multispecies ecologies in which control may be impossible. And where an orientation to farming encourages us to imagine a generationally repetitive regime of reproduction, thinking with mushrooms

FIGURE 3.2 A gift basket full of matsutake mushrooms. Photograph by Tomomarusan. See multispecies-salon.org/tsing.

introduces us to open-ended landscape histories. Matsutake are particularly good to think with here: Japanese researchers have worked vigorously to cultivate matsutake, but so far they have not succeeded.

It is not enough to say that matsutake require an ecological community; matsutake *are* an ecological community.[3] Matsutake get their nutrients from trees. Together with tree roots the fungi build joint structures called mycorrhiza. To cultivate matsutake, one would have to create the right conditions not just for the fungus but for the mycorrhizal combination of root and fungus.[4] Symbiotic relationships are never placid. Matsutake stimulate the gnarled fingers of "witch's broom" growth in infected roots, and when the infecting fungus gets a little older, they kill off that part of the host. As one matsutake researcher put it, infected trees must feel "itchy."[5] Still, the fungus has clear benefits for roots, especially in the nutrient-poor soils where this species combination is most successful. Matsutake secrete strong acids that dissolve minerals from rocks and sand, making nutrients available to the otherwise deprived trees. This life-giving habit is also a hostile defense. Matsutake form dense, water-repelling mycelial mats to concentrate their digestive acids; these mats also ward off other soil fungi and bacteria, which

might themselves have made nutrients available.[6] The Japanese name for these mycelial mats, *shiro*, which can mean "castle," underscores their ability to defend against fungal and bacterial competitors. If competitors are many, as in better soils, matsutake dies out. Thus, the association between matsutake and the poorest soils is reinforced. Would-be cultivators would frustrate themselves if they insisted on the soil enrichment more commonly associated with farming.

Only certain historical trajectories allow a reproductively active matsutake ecological community to develop. There must be bare mineral soil, itself often the result of a great cataclysm, whether human or nonhuman. There must be the specialized flora of pioneer species—especially pine—that can grow in such impoverished places. And the forest should be at least forty years old. While matsutake can infect tree seedlings, annual mushrooms start to appear only after thirty to forty years. But there is something of a contradiction here. In the ordinary course of things, trees drop litter and die and are recycled by fungi and bacteria. Humus builds up, adding to soil nutrition. As the soil develops, a wider suite of plants and fungi replaces the pioneer species, which may disappear altogether. Forty years is often enough time for humus to build up and pioneer species to begin to lose their dominance. For a productive matsutake forest to exist at all, some kind of disturbance must be maintained. The cycling of organic matter and the succession of species must be blocked. Matsutake mushrooms are thus creatures of continuing disturbance—from the initial great disturbance that wiped away older layers of organic matter to everyday small disturbances that impoverish both the soil and the species mix. Yet these, too, are forests, which means they have been somehow sheltered from forest annihilation.

Professional ecologists of the past few decades have turned to the view that all natural history is a history of disturbance. It is no longer possible to offer an easy dichotomy between pristine and damaged landscapes. But few are callous enough to imagine that, as a result, there is no difference between a healthy forest and a nuclear waste dump. Instead, new challenges arrive with disturbances. Which disturbance regimes are we willing to live with? Given the realities of disturbances we do not like, how shall we live? The first step in answering these questions is to explore the consequences of particular disturbance histories, perhaps even to try out some typologies. Sites in which human and nonhuman histories of disturbance come together are particularly good to think with because such sites allow us to track humans as both vectors and victims of disturbance. This is a territory of unintended consequences for both humans and nonhumans. Social as

FIGURE 3.3 Grazing as "unintended design" in Yunnan matsutake forests. Photograph by Anna Tsing. See multispecies-salon.org/tsing.

well as natural scientists are needed for this deeply historical and place-centered work.

The matsutake commodity chain allows us to identify a particular type of disturbed forest through its mushrooms. Describing such forests can stimulate a vocabulary for livable disturbance—a first step in coming to terms with the anthropogenic environment our species has created. Furthermore, with a few very minor exceptions, forests are not planned for matsutake. Rational directives do not explain matsutake ecologies, and human-made forest disturbances cannot be explained functionally by the presence of matsutake. Matsutake is an unintended consequence; it is a product of what one might call, leaning on the oxymoron, "unintended design" in the conjunction of human and nonhuman landscape modification. Mushroom picking as a livelihood, too, is generally an unplanned outcome of other livelihoods gone awry.

Yet not all matsutake forests and matsutake pickers are alike; both human and nonhuman disturbances are achieved in many ways. To appreciate dis-

turbance requires immersion in the history of places. Let us turn to disturbance histories in four matsutake forests.

LANDSCAPE ONE: SCAVENGING GREEN STEEL

Michael Hathaway, my collaborator in China, walked me into a series of surprises during our research trip to Yunnan in 2009. Although most media and even scholarly accounts of neoliberalism in China focus on urban areas, unbridled entrepreneurship was at least as wildly thriving in remote mountain areas. Everyone wanted to scratch some enterprise, however meager, out of the earth. Wild mushroom picking is one of the most meager; one needs no start-up capital, only healthy legs and eyes, to do the work. If women and children are out every morning scouring the woods, it is because mushroom picking is especially appealing to those without other resources. When I first heard the official figure of six hundred thousand people in the Yunnan wild mushroom business, I thought it could not be right. But after seeing the rural scene, I realized it could be low.

An extraordinary number of species have entered the commercial trade, and in the season, local markets and even roadsides teem with sellers, each with baskets of colorful mushrooms. Here the metaphor of gift as poison is exceptionally concrete. Some of the mushroom pickers I met collected every mushroom they found. The expensive mushrooms—including matsutake—were separated out for the fresh market trade. The rest were sliced and dried on screens in the sun or over the kitchen fire. Dried mushrooms are often sold in rural markets in unsorted, mixed batches. The pickers told me that poisonous mushrooms lost their poisons by being dried; therefore, they did not bother to differentiate between edible and poisonous mushrooms in picking. A Chinese mycologist, describing his conversation with a woman selling mushrooms, offered another way to cast this dangerous practice. "Those mushrooms are poisonous," he told the woman after inspecting her basket. "Yes, I know," she answered. "I wouldn't sell them to you. But if I sell them to a company, where they are mixed with other mushrooms, it doesn't matter." The wild mushroom economy runs on scrounging energy. Survival here is selling, not buying.

The forests are very young—and very much used. In the rural county where we settled, I saw few trees older than forty or fifty years, and Chinese colleagues told me the situation was similar elsewhere. In these mountain forests, evergreen oaks offer a bounty of biodiversity, but they have been cut back to resemble shrubs.[7] Even small pines find the sun by towering over

them. Everywhere there are signs of intensive use. The oaks are coppiced for firewood, which forms great stacks by the sides of houses. The pines are cut for building materials. The pine needles are raked for bedding for the pigs; the mixture of pine needles and pig feces is spread on the fields for fertilizer. Wandering goats and cows graze areas classified by the ill-defined and expansive phrase "barren lands." Tracks crisscross the forest, and the forest floor, raked and checked for herbs and mushrooms, is often bare. This is a version of the *satoyama* forest idealized by Japanese conservationists, but it looks much messier than the orderly parklands reconstructed by Japanese citizens.

Figuring out the history of these forests turned out to be difficult. Chinese researchers, busy catching up with international colleagues, have no taste for the simple pleasures of oral history. Forestry officials walked us through eras of national policy, which have left the forests divided into overlapping administrative layers, each with different and sometimes contradictory mandates. It was no wonder that villagers told idiosyncratic and often confusing stories in which the lines between public and private access options, as well as between legal and illegal harvesting, were hard to draw. Collecting and arranging such stories for a forest history would have been a labor of love. I made heroic efforts to push our Kunming-based graduate student assistant in this direction, since he was looking for a research topic. It seems significant that he could not recognize this task as "research."

Still, it seems likely that many of the trees were cut in the national production drives of the Great Leap Forward, in the late 1950s, and perhaps in the hungry years that followed. One villager who lived through those times told us that forests were considered "green steel." Small-scale "backyard" steel production was a goal in the Great Leap, and forests were felled for fuel. When we pressed the man to elaborate, he retreated to the safer ground of contemporary forest conservation. The difficulty of straightening things out was underlined when a neighbor joined the conversation to describe how easy it was to get permits to cut trees in a pocket of remaining older forest nearby. Legally, the wood should be cut only to build your house, but most of it actually was going to the provincial capital, he said. Our host later said that neighbor was a lying braggart, but he had trouble explaining the substantial pieces of timber stored in the back of his own house. Clearly, there are many intertwined histories here—all leading to a young and well-used forest.

The discourse of sustainability has become a tool of the mushroom export trade. Southwestern China produces the vast bulk of matsutake mushrooms

consumed in Japan, often sending more than one thousand tons annually. Furthermore, there are mountains of matsutake picked but rejected by the export trade, which must find domestic buyers or be wasted. It is thus not surprising that concerns have arisen among conservationists that the resource is being overharvested. Researchers, government officials, and nongovernmental organizations have become involved in this question. They have promoted the education of pickers, as well as changes in access to resources. But to my surprise, among the varied pieces of advice that have been floated, only one has gained traction across multiple venues: "Don't pick the babies"—that is, the young, small mushrooms.

There is no conservation-based reason that I can think of to avoid picking small mushrooms. Picking at any size deprives the fungal population of new spores but does not harm the living body of the fungus, which is underground. The only thing wrong with small mushrooms is that Japanese importers reject them. Waiting to pick the mushrooms until they are larger thus draws in more money. But more money for whom? For entrepreneurs with access to the mushrooms.

Sustainable-best-practice studies are promoting a particular form of forest tenure that saves the babies: whole villages subcontract mushroom rights in their forests to private entrepreneurs, who in turn offer cash payments to villagers. The entrepreneurs then hire forest guards to keep the villagers out of their forests. Because mushroom harvesting is controlled, matsutake can be picked when they are a perfect size, suitable for export. Meanwhile, the arrangement offers further entrepreneurial opportunities. In one guarded forest we visited, the guards sold me the right to pick matsutake at an inflated price. In another, the entrepreneur showed us how he searched for rare flowering trees in the forest to dig up whole and sell for transplantation in urban "greening" projects. I am not sure conservation was being served. Meanwhile, the guards admitted that they seldom keep out all the "thieves"—that is, the villagers who sneak in to pick mushrooms in their long-familiar spots. The competitive rabble this tenure system is designed to squelch makes its way back, but with a little more difficulty.

Both forests and people in Yunnan have lived through jarring times. That matsutake flourish here is almost surely a feature of the environmental battering—the young forests, the cutting back of oaks, the raking of pine needles. That exporters are so successful in getting the matsutake out is a feature of the desperate entrepreneurial spirit that has seized villagers suddenly released from communal dreams and guarantees. Scheming and survival become difficult to distinguish. This is a regime of disturbance in which both

some peasants and some mushrooms have learned to find their way. But lest you conclude that I am telling you a story about the backwardness of China, let me turn to a parallel situation in the US Pacific Northwest.

LANDSCAPE TWO: IN THE RUINS OF INDUSTRIAL FORESTRY

When white settlers first came to Oregon in the nineteenth century, they found forests of mythic proportions. In the eastern and central Cascades, huge ponderosa pines were spaced with park-like grace. Although in hindsight it appears that this ponderosa-park landscape was created in part by Native American fire management, to those settlers the forest seemed a natural wonderland of timber. They started cutting it right away. Not satisfied to see the trees pulled out with oxen, the government gave the land to private railroad companies, which not only cut the trees but also built railroads to cart them away. By the early twentieth century, the land was settled with loggers and lumber-mill towns. In 1938, Oregon became the leading timber state in the United States.[8]

The sheer bulk of Oregon timber during that period made the state an important proving ground in the struggles between the nascent US Forest Service and the timber industry. The Forest Service began at the turn of the twentieth century with concerns that the greed of loggers would quickly destroy the forests. But government regulation in the United States has always emerged in intimate dialogue with free enterprise, and timber regulations were no different. The US Forest Service worked closely with the logging industry to devise its standards for sustainable yield forests, even on the national forests claimed by the government. Whether foresters have supervised the industry or have merely been its agents is still debated. However, even today, after the decline of US logging, every Forest Service district is evaluated by the board feet it produces.

Until the end of the Second World War, much of Oregon's timber was cut on private land. During the postwar economic boom, however, the national forests were opened for massive logging operations. The eastern Cascades' famous ponderosa pines were in short supply by the 1960s. Then the US Forest Service had to turn its attention to the regeneration of this supposedly renewable resource. Since pines are light-loving pioneer species, it seemed logical to open up the forest as much as possible to support pine regeneration. The practice called clear-cutting, in which all forest vegetation is removed, was introduced to privilege pines. Unfortunately, at least in an eastern Cascades now sheltered from fire, it privileged the wrong pines. Instead

of valuable and massive ponderosa pines, a much slimmer but more prolific pine grew up in the clear cuts: lodgepole pine. Lodgepole in this area is a slender tree, useful mainly for poles—or even biofuel—rather than lumber. Worse yet, lodgepole grows up in a clear cut so thickly that no other plants have a chance. Foresters call this "dog hair regeneration" because the trees are as close as the hair on a dog. One old-timer showed me a stand so close that he joked we should call it "frog hair regeneration."

What a fire hazard this thick hair-like growth poses. In the dry summers of high-country Oregon, all of it would have burned down—perhaps eventually reopening the area to ponderosa—except for one thing: the US Forest Service's policy of fire exclusion. Fire exclusion was one policy about which timber companies and the Forest Service could agree, since fires destroy valuable timber. By the 1960s, the national forests were peppered with fire towers, and the smallest flame was immediately put out. So those lodgepoles grew and grew, following the clear cuts to spread across the landscape. The Forest Service did not know what to do with them. Everything was tried: all kinds of thinning treatments, selection cutting, seed trees, prescribed burning. But the only treatment that reliably produces ponderosa has been to plant it, seedling by seedling. Then it still needs to be weeded to keep those lodgepoles out. But such work requires labor, which requires money. Today, such plantations are possible only in the eastern Cascades when the state can get prisoners to work on them.

By the time great end-of-the-century wars between environmentalists and loggers shook the Pacific Northwest, the eastern Cascades—once a center of industrial logging—was mainly out of the loop. The mills had closed down, and the remaining trees were just not valuable enough to fight about. The climate is dry. The soil offers little organic matter; instead, it offers pumice and sand, the debris of a volcanic eruption some seven thousand years ago. Spindly, sickly, crowded lodgepoles fill the land, hardly able to support their own silvicultural treatments, much less make a profit. Enter the wild mushroom economy. Its flowering followed a faraway disaster: the nuclear accident Chernobyl in 1986, which spread a radioactive cloud over most of Europe's mushrooms. Europeans contracted to buy the porcini, chanterelles, and morels of the US Pacific Northwest. The matsutake trade followed soon after. By chance, the dry, ruined industrial forests of the central and eastern Cascades turned out to be bountiful gardens of matsutake. Japanese disposable incomes were still high in the 1990s; prices were extraordinary. For a brief moment in 1994, a bad year for matsutake worldwide, the price of central Cascades matsutake in the hands of the pickers was $600 per pound.

FIGURE 3.4 "White gold" in the ruins of Oregon's industrial forest. Photograph by Anna Tsing. See multispecies-salon.org/tsing.

One group of forest researchers calculated that the mushrooms were worth as much as, or more than, the timber.[9]

Displaced people flocked to the mountains. Downsized loggers, flexibly employed fire fighters, demobilized soldiers, and the radically conservative rural "traditionalists" who reject the liberal secularism of American cities were the first of the mushroom pickers. Some traced year-round circuits from Idaho to California, following the mushrooms. In picking matsutake, they learned from Japanese Americans, who had been picking for their own community for a century. But both groups were soon swept to the side by a flood of Laotian and Cambodian refugees who quickly became the central figures in the matsutake harvest. Most had come to the United States from Thai refugee camps in the mid-1980s, a time of neoliberal retrenchment of public services. Few had mastered English; many had no urban job experience. All had terrible experiences of war and flight. Left to fend for themselves by the dismantling of the welfare state, they found solace in Oregon's forests—and a place to make a living. They became skilled and avid mushroom hunters.

Perhaps there is some parallel between the confidence that allowed Amer-

icans to believe they should police trees in industrial forests and that they should police people in Laos and Cambodia. Certainly, these histories converged in the forests of Oregon, where damaged people learned to make do in damaged forests. Matsutake have thrived in the crowded lodgepole pines spread by clear-cutting and saved to matsutake-fruiting maturity by Forest Service fire exclusion. So have the Southeast Asian pickers who, for the season, make lively villages of Forest Service industrial camps in the middle of the forest and use not just the lodgepoles but all of the herbs and mushrooms the forest has to offer.

LANDSCAPE THREE: TRACING GLACIERS

It was with some surprise that I listened to forest managers and researchers in Finland who saw their work in simple continuity with the past one hundred years of scientific forestry. Their Oregon counterparts were obsessed with the mistakes and failures of mid-twentieth-century dreams and imagined a post-1970s attempt to balance timber and environmental protection as a new start. Even now, they explained, their forest management work was contested and only sometimes successful. In Finland, in contrast, forest managers were not defensive about scientific forestry. Although they admitted criticism, they saw no problem combining ecosystem protection and timber production. Sustainability, they argued, is still best accomplished through timber-oriented intervention.[10]

Part of the difference between Oregon and Finland is that issues of forest biodiversity are less pressing in Finland. By chance, ice has simplified Finnish flora. The flora was completely wiped out by repeated glaciations, and when the ice sheets melted, the spread of species north was slowed by having to cross over east-west watersheds. Only two kinds of conifers made the journey north: Scots pine and Norway spruce. In the northern half of Finland, they are joined by just two species of birch, as well as a few other trees that do not form forests. Glaciers thus simplified the species composition of forests; northern Finland has one of the lowest tree diversities in the world. Nature creates what humans work so hard to maintain in other areas: timber-ready mono-crop pine forests.

The job of scientific forestry, I learned, has been to sustain the simplified landscape that glaciers made. Instead of intense forest fires, which used to clear large swaths of the forest about every hundred years, forest managers have substituted clear-cut logging at around the same rotation. To speed up natural self-thinning, the forest is thinned every fifteen to twenty years. To

simulate the destruction of the soil of a massive forest fire, they advocate plowing or harrowing after the final cut. This is deadly for any fungi that happen to be in that soil. But without soil disturbance, Finnish soils tend to become waterlogged. Unmanaged and waterlogged pine forests succeed to spruce, a slower growing, less economically attractive timber. Besides, foresters reminded me, some edible fungi—such as the popular false morel (*Gyromitra esculenta*)—thrive in the torn-up soil of post-clear cut treatments. No need, they said, to worry about the fungi.

Much to my surprise, then, the Finnish forests I saw looked as clean and orderly as parks. Thinning created openness between the ranks of trees, and dead wood and snags were entirely missing from the forest floor. In northern Finland, reindeer are given open grazing rights, and they clip back the lichens that otherwise cover the forest floor in puffy profusion. The Japanese fantasy of the "proper" matsutake forest—so light, clean, and open that a woman in high heels can walk through carrying an open parasol—emerges in Finland through the work of scientific timber production. Disturbance need not *look* messy.

Furthermore, the age of the forest is just right for producing matsutake mushrooms. Much of Finland's forests were cut in the 1950s and 1960s. Timber was the most important export earner in Finland at that time. The country's economy—later to take off into cell phones and the like—was built on timber. Furthermore, two post–Second World War developments hastened the logging of Finland's forests. As an ally of Germany, Finland was among the losers of the war. The government agreed to pay war reparations to Russia, and the money was raised through logging. At the same time, Russia took a large chunk of what used to be eastern Finland. Thousands of Karelian peasants—from the area that now belongs to Russia—were resettled across the newly reduced Finland. Forests were cut for their fields, and new roads were put in, facilitating further logging. The regrowing forests from these ambitious cuts are now the matsutake forests of Finland.

Matsutake mycelium (the underground fungal body) is there. Japanese residents in Finland have been quietly picking matsutake for several decades. The setup for picking is in place. Finns are proud of the "everyman's rights" convention that allows open access to all forests for non-timber forest products. Forest berries were once the most popular open-access product, but mushroom picking has been growing in popularity for a century. Even if Finns are not motivated to pick, others are waiting for the opportunity. Berry companies have facilitated the summer entry of pickers from the poor, northeastern region of Thailand, cousins perhaps of Lao pickers in Oregon.

Pickers are lined up, too, from Russia and the Ukraine; some pick boletes for export to Italy. Japanese importers are ready. Ever since Swedish scientists announced the DNA match between the matsutake of Nordic Europe and Japan's own matsutake, importers have been eager to add Nordic matsutake to their collections. But where, then, are the matsutake?

Here is what happened. Early in 2007, a well-known Finnish filmmaker announced her intention to export Finnish matsutake to Japan. Seminars were held around the country to familiarize residents with the mushroom, which was not previously known as a food. The seminars were packed with eager potential pickers; everyone wanted to learn about this new mushroom. And by chance, the fall of 2007 was a banner season for matsutake in Finland. One young man claims personally to have found one thousand kilograms of matsutake. The patches were big and beautiful; people were practically tripping over the mushrooms. Even the reindeer could not keep up with the harvest, and most of the mushrooms just rotted. The media were thrilled; dozens of newspaper articles were published to herald Finland's newest product.

By the fall of 2008, however, everything had changed. The export company had folded. Other enterprises were ready to take over—but there were no mushrooms. The year 2008 was a dead one for matsutake in Finland, and 2009 was not much better. It seems that Finland's cold, wet summers are just not suited to prodigious matsutake production. In northern Finland, trees produce viable seed perhaps only once in ten years, for similar reasons. It takes an unusual year for a bumper crop of matsutake to emerge in Finland.

Worse yet, long-distance blasting beyond the bounds of edible mushroom export has contaminated half of Finland's forest landscape. The radioactive cloud from the Chernobyl accident passed over all of southern Finland, leaving residue in its wake. Japanese importers require that every batch of matsutake from Finland be tested for radioactivity, and only mushrooms from above the Arctic Circle consistently pass.[11] Every test costs 125 euros. It is just not economically feasible to ship small batches.

Matsutake promoters in Finland have not despaired. There is one thing that Finland can export better than most other places: the *idea* of the perfect matsutake forest. The new goal is to attract Japanese tourists. Glossy Japanese-language brochures promote the purity and beauty of Finland's forests and show matsutake among the berries anyone may pick. According to my collaborator Shiho Satsuka, Finland nicely fulfills Japanese fantasies of the beauty and plentitude of nature. On one Japanese television show devoted to fulfilling the dreams of children, a boy who longed for matsutake

was flown to Finland, where he could scamper across the forest, picking.[12] Even without export quantities of mushrooms, Finland's forests offer the clean order of a dream of nature. Tourists need not visit the harrowed clear cuts from which such dream parks sprout.

LANDSCAPE FOUR: NOSTALGIA GARDENS

In Japan, the appeal of disturbed forests as gardens centers on the satoyama, the village forest used by peasant farmers.[13] The pillars of the ideal satoyama forest were heavily coppiced deciduous oaks, especially *konara* (*Quercus serrata*). Japanese red pines (*Pinus densiflora*) were their companions, and matsutake grew with the pines. As in southwestern China, this landscape was maintained by constant disturbance. Shifting cultivation and timber cutting kept the forest young and open. Oaks were cut back for firewood and charcoal making. Pine needles and leaves were raked for bedding for the animals, leaving a bare forest floor with little litter or humus. With the help of matsutake partners, pines prospered in these bright open spaces.

Calling such a forest "satoyama" is a relatively new idea—indeed, it is a product of the demise of village forests. After the Second World War, Japanese farmers replaced firewood with fossil fuels and work animals with tractors. Oaks were no longer cut back; the forest was no longer raked. Young people moved to the city, leaving the countryside to the elderly. Village people stopped visiting their forests. Evergreen oaks began to invade these spaces, creating a shady cover in which neither deciduous oaks nor pines could thrive. Pines, stressed from the shade and the competition, were also vulnerable to a wilt disease spreading from an imported nematode. Matsutake disappeared. Village forests became choked with evergreen broadleaf trees and invasive bamboos. Rather than human-friendly spaces, these forests seemed thick and abandoned.

The citizens' movement that emerged to advocate for satoyama restoration in the 1980s acknowledged that they were part of the story of the forests' abandonment. Urban migrants became active "citizens" through leaving their peasant backgrounds behind. Development, in turn, displaced village forests with urban and suburban sprawl. Yet many of these citizens remembered the landscapes of their childhoods—or, at least, of their visits to grandparents' homes—with pleasure and nostalgia. Satoyama forests were part of agrarian landscapes that also consisted of rice fields, irrigation canals, kitchen gardens, and conifer plantations. For the first generation born in the city, satoyama plants and animals became associated with the innocence

FIGURE 3.5 Reconstructing a matsutake forest in Japan. Photograph by Anna Tsing. See multispecies-salon.org/tsing.

of childhood visits to the countryside, as well as with national standards of beauty. The seasons were imagined through these agrarian landscapes: spring flowers of the open forests and verges brought in new life; deciduous oaks and maples offered fall colors. Fireflies, dragonflies, frogs, rabbits, and other well-loved creatures flourished in the edges between fields, forests, and small irrigation canals. All of these were threatened by the neglect of rural environments. The new evergreen forests supported none of the color and life associated with either love of the seasons or childhood pleasure. In response, then, a vigorous citizens' movement sprang up to reconstruct village landscapes. Volunteers flocked to the countryside to remake the beauty of Japan's disturbed forests and fields. Citizens' groups have had different goals. One has been to restore matsutake forests.

When I visited matsutake-forest restoration projects, I admit, my first reaction was shock. To a North American schooled in wilderness protection, the work of reconstruction looks frighteningly destructive. Not only do these new forest managers cut down almost all the trees; they also dig up all of the fertile humus that has accumulated from the new species mix. They dig out the roots as well as the topsoil, and they cart the whole mess away, leaving

bare steep slopes. In one reconstructed matsutake forest, the forester showed me where he had hired people to shovel out the topsoil, leaving crumbling rock. The slope was so steep we could barely keep our balance. "What about erosion?" I asked. "Erosion is good," he explained. The whole point is to privilege pine and matsutake.

Satoyama restoration is understood, however, not as destruction but as healing. Everyone I spoke with about satoyama restoration stressed the benefits for human health in the hard work and outdoor exercise of restoring peasant forests. This healing work is particularly significant because of the nationwide damage said to be caused by modernization, with its rapid growth and unexpected crashes. The same forces that caused the abandonment of village forests drive people to overwork, suicide, and fear of public spaces. Satoyama restoration is work intended to restore people as well as nature. Intervention in natural landscapes and in human habits is equally desirable in this understanding of gardening. Tradition, with its hopefully sustainable forms of beauty, offers a guide to the right level of disturbance for each.

Yet some historians think that the well-loved satoyama landscape, so often fetishized as tradition, is a product of the late nineteenth century.[14] At the beginning of the Meiji period, it seems, the central part of Japan was quite deforested, with many bare and eroding hilltops. Afforestation with pine was begun. Pine created the conditions that allowed deciduous oak to get a new hold; satoyama forests took off. By the beginning of the twentieth century, the pine forests were just the right age for matsutake production. Indeed, in the first part of the twentieth century, there were plenty of matsutake in Japan, and they were not particularly expensive. Only in the 1970s did pines, satoyama forests, and matsutake decline. With this decline, the price of matsutake—and the need to import it—rose.

The high value of matsutake today makes it easier to love matsutake forest reconstruction. Whether or not it is tradition, one can feel the dream of plenty there. The motto of the Matsutake Crusaders of Kyoto is "Let's reconstruct the forests so we can all eat sukiyaki." Their reconstructed park-like hillsides are bright, open, and green with pine. In the fall of 2008, their first matsutake emerged.

COMMODITY CHAINS AND CONCEPT CHAINS

Matsutake traders care about disturbance histories only to the extent that they interfere with the purity of the mushrooms. Finnish mushrooms are checked for radioactivity. Chinese mushrooms are checked for pesticides.

Once the mushrooms pass these tests, they enter the market without the baggage of their environmental histories. They become equivalents, separable only by pricing strategies, which, in turn, are related more to national reputations than to the particular disturbance histories of forests.

This is the terrifying feature of global commodity chains, which extract commodities from their social and natural histories of production and make them equivalently exchangeable for cash. This dependence on cash exchange to identify the goodness of a commodity accounts for the reputation of global commodity chains as irresponsible in relation to both labor and the environment. Both labor and environment are erased in the process of transferring the product to market; it is sold merely by what are seen by traders and consumers as intrinsic features, divorced from the history that has created them.[15] As a result, global commodity chains are amoral. They do not respond to issues of human or nonhuman welfare.

Scholars and advocates have worked hard to consider how to put questions of human and nonhuman welfare back into deliberations about commodity chains. One key intervention has been the invention of new forms of storytelling: the stories of commodities under production. The fascination of Japanese citizen groups with the satoyama forest can contribute to this kind of storytelling, at least for the matsutake commodity chain. Satoyama forests are reconstructed with great effort, involving volunteers in appreciating the work of disturbance. Matsutake is an incidental by-product of all that work; it cannot be forced. Mushroom lovers must wait patiently for the life processes of the fungus within the disturbed forest. In this waiting is the beginning of an appreciation for multispecies ecologies and open-ended landscape histories.

Japanese satoyama advocates have tried to export the concept around the world. Satoyama offers a distinctive vision of "sustainability" in which human-nonhuman relations are defined not by hands-off tolerance but, rather, by the hard work of maintaining amenable disturbance regimes. Mostly, international satoyama outreach has gestured to the beauty and cultural value of stable agrarian landscapes. But the concept might have even more traction if it were willing to take on other, riskier regimes of disturbance. The global diversity of matsutake forests offers one example. Matsutake forests, as I have shown, are not all park-like sites of order and beauty. (Where they are, as in Finland—and Japan—hardly any mushrooms are produced.) Telling their stories does not bring us into an all-encompassing harmony with nature. Instead, they open stories of both social and natural disturbance. Still, these stories are good to tell: good not just to bring us into

the often distressing conditions of life on earth but also to offer hints of how multispecies accommodations can be made despite these conditions.

Satoyama storytelling is infused with love. One satoyama scholar spoke to me candidly about his personal quest: of how he had trained in economics because he wanted to help people but became disillusioned with his discipline; of how he worried about his bored and indifferent students; of how he remembered the joy of spending summers with his grandmother in the countryside; and of how he was able to gain university access to neglected satoyama landscapes. Now he sends students to plant rice, make charcoal, and open up the forest. I saw the pleasure in the faces and voices of his students. And I saw them discuss with disappointment how they took the satoyama message to Laos, where no one had any idea what they were talking about.

The work for scholars of commodity chains is to follow the commodity to the sites of its production and to recognize their diversity—even as they are drawn into the connections of global capitalism. The same work faces scholars of what one might call global concept chains—that is, internationally spreading ideas.[16] Such concepts facilitate international dialogue but also find separate histories in varied national and regional sites. To advocate satoyama—or sustainability—across continents requires taking on the disturbance histories of particular people and landscapes, even as their comparison sparks common questions. In these times of mass destruction, appreciating the forms of life that populate disturbed landscapes is particularly important. We need to know something about the variety of disturbances that characterize our times. Satoyama is an inspiring starting place—particularly if its global stretch admits the varied disturbance regimes that have become places to live for humans and nonhumans around the world.

CODA: MORE RUINATION COMING

Just as Japan's Global Satoyama Initiative was fully opened, the conditions for thinking about Japan's rural landscapes completely changed. On March 11, 2011, the Fukushima I Power Plant in northeastern Japan released a cloud of radioactivity, contaminating landscapes for miles around. Wind, water currents, and the movements of living things spread radioactivity far and wide. Off the coast of California, radioactive kelp was found within the month; tuna contaminated by cesium from Fukushima had been found near San Diego by August.[17] By the end of the year, radiocesium from Fukushima was being reported in Finland's forests—that is, in the opposite direction from

the prevailing winds, which first carried radiation across the Pacific Ocean.[18] Meanwhile, although the half-life of cesium-137 is thirty years, researchers have found that Chernobyl radiocesium levels have a much longer span in living landscapes. In the zone around Chernobyl, the "ecological half-life" of cesium-137—that is, the time for half of the radiocesium to leave the landscape—is currently estimated at 180–320 years.[19]

Radioactive materials are easily incorporated into living bodies. Fungi are particularly efficient collectors of radioactive cesium. Mycorrhizal fungi—or fungi that live in mutualistic relations with trees—pass radioactivity around forests and to mushroom-eating animals. In the shadow of Fukushima, it is hard to feel anything except despair at human-sponsored environmental damage. On these kinds of blasted landscapes, fungi, with their high levels of radiocesium, are hardly a portal to hope. Indeed, fungi are a potent reminder of why exposing the Earth to radioactive contamination is such a terrible idea for humans and for all life.

We need to be able to differentiate between forms of disturbance that are inimical to all life and those that offer multispecies opportunities. One place to start is by recognizing that not all human-shaped landscapes are as deadly as those spread by the Fukushima power plant. It is in that patchy difference that we can look for hope. Blasted landscapes are what we have, and we need to explore their life-promoting patches.

Ruins are now our gardens.

NOTES

The Matsutake Worlds Research Group (Timothy Choy, Lieba Faire, Michael Hathaway, Miyako Inoue, Shiho Satsuka, and me) is conducting collaborative work on the matsutake commodity chain. Research in China and Japan has been supported by a grant from the Toyota Foundation. I am particularly grateful to Shiho Satsuka and Michael Hathaway for teaching me about Japanese and Chinese landscapes, respectively. Much of the material in this chapter was garnered through personal interviews. Following the conventions of cultural anthropology, I have not cited them except where it seemed absolutely necessary. However, I express special gratitude to Phil Cruz, Anne Harju, Chris Mickle, Ogawa Mankoto, Eira-Maija Savonen, Su Kaimai, Takeuchi Kazuhiko, and Xu Jianchu for the information I have gathered in this chapter. I apologize for any errors I have introduced into their explanations. I also thank Noboru Ishikawa, Eben Kirksey, and Heather Swanson for their help and encouragement.

1. Nordstrom, *Global Outlaws*.
2. Yamin-Pasternak, "How the Devils Went Deaf."

3. In this discussion, I lump together the closely related species acceptable within the Japanese matsutake trade, including *Tricholoma matsutake*, *T. magnivelera*, and *T. caligatum*.

4. Ogawa, *Matsutake no Seibutsugaku*.

5. Ogawa, interview by the author, 2008.

6. Lefevre, "Host Associations of *Tricholoma Magnivelera*, the American Matsutake"; Charles Lefevre, interview by the author, 2007.

7. I use the term "oak" with generous breadth to include oak-like trees of the beech family, including *Lithocarpus* and *Castonopsis*, as well as *Quercus*.

8. For my discussion of the history of Oregon's timber and the landscape of the eastern Cascades I rely on interviews, oral histories, and standard sources such as Cogswell, "Deschutes County Pine Logging"; Langston, *Forest Dreams, Forest Nightmares*; Robbins, *Landscapes of Conflict*; Robbins, *Landscapes of Promise*; Steen, *The U.S. Forest Service*.

9. Alexander et al., "Mushrooms, Trees, and Money."

10. See Hannelius and Kuusela, *Finland*.

11. At the time of my research in Finland, Japan had a higher bar to pass for foods containing radioactive cesium than that used in Europe. Foods could not exceed 300 becquerels (Bq) per kilogram. After the Fukushima power plant accident in March 2011, Japan raised its standard to 500 Bq per kilogram. Perhaps more matsutake from Finland will be exported to Japan in the future, especially now that many of Japan's mushrooms are more radioactive.

12. "Sekai no Hate made Itte Q" (aired on October 14, 2007).

13. Takeuchi et al., *Satoyama*.

14. Takeuchi Kazuhiko, interview by the author, 2008.

15. Japanese domestic products are sometimes sold through attention to their production histories, which give them higher value than equivalent products made elsewhere. In contrast, foreign produce, including matsutake, is labeled only with its country of origin. Subnational regions, which might offer a little more information about conditions of production, are excluded from labels for foreign produce by law.

16. Ronald Stade, "Global Concept Chains," n.d., unpublished ms.

17. Cone, "Radioactive Iodine from Fukushima Found in California Kelp"; Zaberenko, "Fukushima Radiation Seen in Tuna off California."

18. STUK, "Small Amounts of Radioactive Cesium from Fukushima Have Been Detected in Finland's Forests."

19. Madrigal, "Chernobyl Exclusion Zone Radioactive for Longer than Expected."

PART II

EDIBLE COMPANIONS

EDIBLE COMPANIONS WERE SERVED up at the Multispecies Salon as artists, academics, and significant others came together to break bread. The word "companion," to repeat Donna Haraway's reminder, comes from the Latin *cum panis*, or "with bread." Our table was spread with multiple species of organisms that are not just good to think with (as Claude Lévi-Strauss had it) or simply good to eat (as Marvin Harris countered), but also creatures that are good to live with (as Haraway maintains). The painting *People Paella*, by Myrtle von Damitz III, one of the Multispecies Salon's curators, de-centered our discussions by personifying morsels of food. People wearing party dresses, playing a tuba, a saxophone, and a bass drum, seem to be unaware of monstrous beings preparing to feast. As visitors to the Salon sampled edible insects and cheese made from human milk and washed their hands with R. A. W. Assmilk Soap, some reported feelings of indigestion—a feeling that can disturb seemingly settled relations and generate new sorts of entangled associations.

FIGURE P.2 Myrtle von Damitz III, *People Paella*, acrylic paint on plywood, 2001. Image courtesy of the artist and Andy Antippas, Barrister's Gallery. See multispecies-salon.org/vondamitz.

INTERLUDE

MICROBIOPOLITICS

Heather Paxson

Modern life has been antiseptic. Antibiotics are a hallmark of modern medicine; sanitation is the cornerstone of modern urbanism; pasteurization facilitated the industrial modernization of our food supply; and, as Nancy Tomes reveals, even modern gender aesthetics introduced during the Progressive era—rising hemlines for women and beardless chins for men—reflected a "rising consciousness of the germ."[1] Despite the concerted efforts of informed housewives and public health inspectors, however, modern life has never been fully *aseptic*.

In 2008, in an article in *Cultural Anthropology*, I introduced the notion of *microbiopolitics* to call attention to the fact that dissent over how to live with microorganisms reflects disagreement about how humans ought to live with one another.[2] To do so, I began with Michel Foucault's argument that the nineteenth century saw the rise of *biopolitics*, the fashioning of categories of people to facilitate the statistical measurement and rational management of the conditions of life for a population, largely via sex and reproduction.[3] The article also engaged with Bruno Latour, who traces the accommodation of microbial agents into the constitution of this social field. Latour argues that while microbes were revealed in laboratories in order to be controlled, hygienists, government officials, and economists laid the groundwork for what they believed to be "pure" social relations—relations that would not be interrupted by unwanted microbial contamination and therefore could be predicted and rationally ordered. Biopolitics, then, is joined by microbiopolitics: the creation of categories of nonhuman biological agents; the anthro-

pocentric evaluation of such agents; and the elaboration of appropriate human behavior, given our entanglement with microbes engaged in infection, inoculation, and digestion.[4]

Discourses and regulatory measures of food safety are microbiopolitical. Modern hygiene adopted a Pasteurian microbiopolitics bent on suppressing germs to promote human health writ large as "public health." Routine pasteurization famously (and not without controversy at the time) provided urban Americans with "fresh" milk free of bacteria that could cause such communicable diseases as tuberculosis and typhoid, a not insignificant accomplishment.[5] Not coincidentally, the technoscientific hygiene of automated manufacture also facilitated increased economies of scale in industrial processing and distribution.[6] Modern discussions of food safety have never been removed from calculations of corporate profit. Microbiopolitics also calls attention to how debates over food safety regulation are also social and moral arguments. Public health concerns are just one example of the sorts of arguments that may be posed as an obstacle to the individual liberties of consumer choice and capitalist profit, and vice versa.

My research has explored the microbiopolitics of a perishable food: cheese, particularly when made from raw (unpasteurized) milk. By US law, cheese made from raw milk, whether imported or domestically produced, must be aged at least sixty days before it is sold. The sixty-day rule intends to offer protection against pathogenic microbes that might thrive in the moist environment of a soft cheese. But while the US Food and Drug Administration (FDA) views raw-milk cheese as a potential biohazard, riddled with threatening bugs, fans see it as the reverse: a traditional food processed for safety by the action of *good* microbes—bacteria, yeast, and mold—on proteins in milk. The revival of artisanal cheese making and rising enthusiasm for raw milk and raw-milk cheese in the United States provides a critical window onto social and regulatory negotiations of a hyper-hygienic Pasteurian social order (as currently promoted by the FDA) and what I have called a post-Pasteurian microbiopolitics. Latour's Pasteurians recognized microbes as fully enmeshed in human social relations, legitimating the hygienist's right to be everywhere; post-Pasteurians, by contrast, move beyond an antiseptic attitude to embrace mold and bacteria as potential friends and allies. The post-Pasteurian ethos of today's artisanal food cultures—recognizing microbes as ubiquitous, necessary, and even (sometimes) tasty—is productive of modern craft knowledge and expanded notions of nutrition. It produces a new vocabulary for thinking about conjunctures of cultural tradition and agrarian environments, along the lines of what the French call *terroir*.[7]

PLATES 1–2 Tiny fairies, created from pieces of plant roots and insects by the British artist Tessa Farmer, toured New Orleans in a mule-drawn carriage as part of a Subterranean Museum. This installation, created in collaboration with Nina Nichols and Dana Sherwood, is titled *Lafcadio's Revenge*. Courtesy of the artist. See multispecies-salon.org/farmer.

PLATE 3 Myrtle von Damitz III, *Dinner in the Back Lot*, inks & acrylic on paper, 11" × 17", 2011. The painting depicts a riotous diversity of imagined and actual creatures flourishing in an abandoned lot behind the artist's home in the Saint Roch neighborhood of New Orleans. Image courtesy of the artist and Andy Antippas, Barrister's Gallery. See multispecies-salon.org/vondamitz.

PLATE 4 A piece of cheese made with human breast milk, with a herd of people in New York City in the background. Photograph by Shimpei Takeda. See multispecies-salon.org/simun.

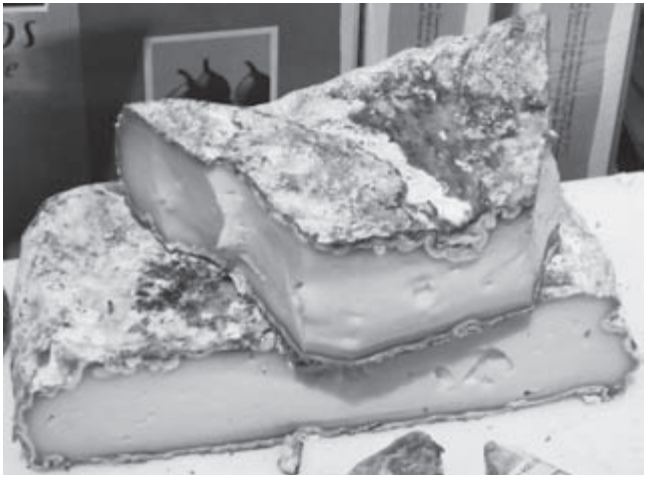
PLATES 5–6 (Top) *Life Cycle of a Common Weed* (2007), Caitlin Berrigan. Performance documents. Photos by Alia Farid. (Bottom) *Life Cycle of a Common Weed* (2009), Caitlin Berrigan. Participants fertilize dandelions with their own diluted blood in exchange for a dandelion sprout. Mills Gallery, Boston. Photos: Gina Siepel and Sara Smith.

PLATE 7 A host of experimental organisms "whose genomes have been sequenced, partially annotated and altered" lived with Adam Zaretsky in a biosecure room for a week. By bringing laboratory laborers out of the shadows, and assembling them together into a *Workhorse Zoo* (2001), Zaretsky provoked debates about the use and abuse of other organisms. After frying an albino African clawed frog (*Xenopus laevis*)—an animal commonly used to study genetics and developmental biology—he invited audience members to take a taste. Photograph by Julia Reodica. See multispecies-salon.org/zaretsky.

PLATE 8 Patricia Piccinini, *The Young Family*, silicone, fiberglass, leather, human hair, and plywood, approximately 85 × 150 × 120 cm, 2002. Photograph by Graham Baring. Image courtesy of the artist. See multispecies-salon.org/piccinini.

PLATE 9 Patricia Piccinini, *Still Life with Stem Cells*, silicone, polyurethane, human hair, clothing, and carpet, life-size with variable dimensions, 2002. Alternate view of the same sculpture featured in Figure 7.3. Photograph by Graham Baring. Image courtesy of the artist. See multispecies-salon.org/piccinini.

PLATE 10 Life-sized sculptures in the *Nature's Little Helpers* series, in the words of Donna Haraway, depict unsettling but oddly familiar critters who turn out to be simultaneously near kin and alien colonists. Patricia Piccinini, *The Embrace*, silicone, fiberglass, leather, plywood, human hair, clothing, variable dimensions, 2005. Detail of the same sculpture featured in Figure 7.5. Photograph courtesy of the artist.



INTERLUDE FIGURE 1 Square Cheese, made by Michael Lee of Twig Farm, in Vermont, with the raw milk of his goats, inoculated microbial cultures, and ambient microbes in the air. Photograph by Heather Paxson. See multispecies-salon.org/paxson.

To offer a recent example, in 2012, the celebrity chef David Chang and two associates at New York City's Momofuku restaurant published an article in the *International Journal of Gastronomy and Food Science* titled, "Defining Microbial Terroir: The Use of Native Fungi for the Study of Traditional Fermentative Processes." In it, the chefs describe developing a fermented pork product, *butabushi*, as a source of intense umami flavor for use in cooking. While excited about the wild fermentation they were undertaking in their kitchen, they were concerned about safety for consumption. To set their minds at ease, they sent samples to microbiologists at Harvard University, who not only screened for potential pathogens (none were found) but also conducted DNA sequencing and analysis suggesting that ambient fungi may have contributed to the sensory characteristics of the end product. Taken with the idea of species indigenous to their "environment" imparting their cuisine with its own "microbial *terroir*," Momofuku's kitchen worked with the Harvard researchers to "understand and replicate traditional fermentations, and also to sample and harvest native microorganisms from our environment" through isolating and sequencing fungi from additional dishes, including koji and miso. In the article's conclusion, they articulate post-Pasteurian sentiments: "We feel we are on the cusp of a movement that connects us not only to these ancient techniques but to our environment on the

INTERLUDE FIGURE 2 Artisanal cheese of Velay made with raw cow milk, microbes, and a small animal: the cheese mite, *Acarus siro*. Photograph courtesy of Abalg, an avid user of the Wikimedia Commons. See multispecies-salon.org/paxson.

deepest possible level." Moreover, in an equally post-Pasteurian afterword, they caution readers not to try this at home: "The harvesting and utilization of environmental microbes is an extremely risky endeavor. All of the aforementioned experiments were performed in controlled environments with appropriate safety precautions. . . . The authors would like to discourage any attempt at performing comparable experiments without the supervision of professionals and sufficient equipment."[8]

I want to be very clear: Some bacteria and viruses make some people sick, something no food maker wants to risk. Successful post-Pasteurian food makers are never cavalier about pathogenic risk. Dairy farmers who trade in raw milk and cheese makers who work with it are exceptionally careful about hygiene—they are not *anti*-Pasteurian. To the contrary, they work hard to distinguish between "good" and "bad" microorganisms and to harness the former as allies in vanquishing the latter. Post-Pasteurianism *takes after* Pasteurianism in taking hygiene seriously. It differs in being more discriminating.

Pasteurian microbiopolitics has been criticized for taking a one-size-fits-all approach to food safety. Focused on the national population, this

approach to hygiene focuses on industrial-scale production that relies on pasteurization or irradiation to kill pathogens presumed to be present owing to insanitary agricultural practices. It also assumes that products will be consumed by all segments of the population. Young raw-milk cheese is thus forbidden to all because it carries particular threat to some—in particular, it is a threat to immunocompromised and pregnant consumers. Post-Pasteurians counter that fresh milk is not inherently "dirty" and in need of pasteurization. Contamination is a matter of human agricultural practice; it is not in the "nature" of milk. Moreover, many assert, heterogeneity of the public in "public health" should not be reduced to its lowest common denominator. People are individuals. In other words, the post-Pasteurian position lobbies for socio-legal latitude that would permit potentially risky foods to be made and consumed safely by some, but not by others.

I worry, though, that as enthusiasm for the beneficial agencies of microorganisms grows, under-informed enthusiasts may overestimate the power of "nature's" microbial goodness.[9] I am further distressed when such a position is characterized—as I am beginning to see—in terms of "post-Pasteurianism." In preparing to write this essay, I discovered for sale on the Internet T-shirts, bumper stickers, even maternity shirts and baby bibs emblazoned with a smiling microbe and the slogan, "I'm a Post Pasteurian." Descriptive copy explains, "What is a 'Post Pasteurian'? A really smart person who understands that pasteurization kills all (yes, ALL) the good in food."[10] This is not how I defined "post-Pasteurian" in my 2008 article. Indeed, I reject the claim. Pasteurization does not "kill" all the good in food.[11] Nutritive proteins, fats, and vitamins are unaffected by the pasteurization process. The position putatively espoused by the T-shirt would pit a beneficent "nature" supernaturally enlivened by microorganisms against a power-greedy "culture" embodied by regulatory overreach. But the natural-cultural reality is that milk and fermented foods such as cheese, yogurt, miso, and beer are multispecies muddles that resist such simplistic parsing.

Microbiopolitical heroes and villains are not ontological designations but are to be judged on the basis of situated, contingent action and effect. "Safety is relative," writes the nutritionist Marion Nestle, "it is not an inherent biological characteristic of a food. A food may be safe for some people but not others, safe at one level of intake but not another, or safe at one point in time but not later."[12] There is nothing essential about a food's goodness. Humility is required to navigate (not necessarily manage, let alone steward) post-Pasteurian microbial ecologies.

I intend microbiopolitics, then, to offer an idiom for describing and an-

INTERLUDE FIGURE 3 Shirt from TshirtCrusade.com with a bold claim: "I'm a Post Pasteurian." Photograph by Beatrice Pegard Ferry. See multispecies-salon.org/paxson.

alyzing regimes of social management that admit to the vital agencies of nonhumans, for good *and* bad. Beneficial microbes, such as starter bacterial cultures and cheese mold, must be included in accounts of food politics in addition to the harmful *Lysteria monocytogenes* and *Mycobacterium* species. Agro-food studies can be extended into the body, scaled down into the gastrointestinal. "Microbes connect us through diseases," writes Latour, "but they also connect us, through our intestinal flora, to the very things we eat."[13] At the beginning of the twenty-first century, as it comes to light that 90 percent of what we think of as the human organism turns out to consist of microorganisms, the truism "We are what we eat" has never seemed more literal. The aim of my work has been to show how artisan food-makers carefully sort out microbial friends from foes. Their work (not faith) produces the conditions through which a post-Pasteurian dieticity might safely emerge—for some if not for others.

The essays and recipes in this collection extend or "poach" my ideas about microbiopolitics, taking them in new directions beyond the realm of human food.[14] Caitlin Berrigan has pushed microbiopolitics to think about interspecies transactions during performance art with dandelion plants, hepatitis C-infected blood, and human bodies (see chapter 4). She describes "intimately *micropolitical*" relations as "supple movements of power and subversion that complement the rigid centralization of macropolitics." Eben Kirksey describes microbiopolitical interventions by an ecoartist, Deanna Pindell, who has repurposed the form and function of commodities to cultivate habitat for mosses and multiple species of vascular plants (see recipe 3).

Rearticulating prevailing discourses, and subverting standard practices, bioartists and ecoartists are engaging in tactical microbiopolitics—displacing dominant regimes for managing life.[15] These interventions illustrate the promiscuous potential of microbiopolitics as an aid for cultivating livable and livelier worlds.

NOTES

1. Tomes, *The Gospel of Germs*, 157–62.

2. Paxson, "Post-Pasteurian Cultures."

3. Foucault, *The History of Sexuality, Volume 1*.

4. Paxson, "Post-Pasteurian Cultures," 17.

5. DuPuis, *Nature's Perfect Food*; Freidberg, *Fresh*; Valenze, *Milk*.

6. Dunn, "*Escherichia coli*, Corporate Discipline and the Failure of the Sewer State"; Bobrow-Strain, *White Bread*.

7. For a more complete discussion, see Paxson, "Post-Pasteurian Cultures," and Paxson, *The Life of Cheese*.

8. Felder et al., "Defining Microbial Terroir," 65, 69.

9. See also Enticott, "Risking the Rural."

10. "I'm a Post Pasteurian" T-shirt, available at http://www.tshirtcrusade.com. It is also available at the online libertarian emporium Liberty Buys, accessed June 26, 2012, http://www.libertybuys.com.

11. At the same time, nutrition should be evaluated across an entire diet. While the Centers for Disease Control acknowledge that pasteurization diminishes vitamin C, the CDC also points out that dairy products are not an appreciable source of vitamin C: see "Raw Milk Questions and Answers," accessed June 26, 2012, http://www.cdc.gov.

12. Nestle, *Safe Food*, 16.

13. Latour, *The Pasteurization of France*, 37.

14. Kirksey et al., "Poaching at the Multispecies Salon," 130; Matsutake Worlds Research Group, "Thoughts for a World of Poaching."

15. See also the cheese microbe art of synthetic biologist Christina Agapakis and odor artist Sissel Tolaas, including "Selfmade," an installation as part of the 2013 *Grow Your Own: Life after Nature* show at the Science Gallery of Trinity College Dublin, accessed February 9, 2014, https://dublin.sciencegallery.com/growyourown/selfmade.

RECIPE 1

PLUMPIÑON

Lindsay Kelley

Are we fully aware that we are about to connect, and thus transform through multiple and partly unpredictable acts of reciprocal capture, histories that, on Earth and until now, were distinct?
—Isabelle Stengers, *Cosmopolitics II*

PLUMPIÑON

Ingredients
2 T. piñon nuts, ground into paste
1 t. protein powder
1 t. powdered sugar
1 t. granulated sugar
1 T. powdered milk (optional)

Preparation
Mix ingredients together to form a paste. For additional comfort, fill a small plastic bag, snip a corner, and suck the paste from the bag.

Plumpy'nut ("plump" plus "peanut") is a peanut-based humanitarian aid food developed by André Briend and licensed by Nutriset, a French company that specializes in therapeutic food. Plumpy'nut requires no water or refrigeration, making it ideal for extreme environments that provide little support for malnourished people. Used most often with infants and children in Africa (especially in Niger and Malawi), Plumpy'nut has also played a role in tsunami relief. Writing for the *New York Times*, Michael Wines witnessed Plumpy'nut distribution and consumption in Maradi, Niger. He is quick to point out that Plumpy'nut's humble ingredients should not be underestimated: "Plumpy'nut, which comes in a silvery foil package the size of two grasping baby-size hands, is 500 calories of fortified peanut butter, a beige paste about as thick as mashed potatoes and stuffed with milk, vitamins and minerals. But that is akin to calling a 1945 Mouton Rothschild fortified grape juice."[1] Wines's fine wine analogy suggests that Plumpy'nut allows simple ingredients such as peanuts and powdered milk to transcend their everyday function and participate in something grander. By making Plumpy'nut into wine, he shifts its purpose from fulfilling desperate need to enjoying luxurious pleasure.

Perhaps *New York Times* readers do need creative metaphors to understand how Plumpy'nut works and why it matters, especially in Niger. Situated in the Sahara Desert, landlocked Niger suffers severe droughts, leading to desertification and famine. Plumpy'nut is a rich, quick intervention for malnourished children, replacing local starvation foods such as "bitter berries," the fruit of the hanza bush (*Boscia senegalensis*). Outside observers often understand eating bitter berries as "pica," or the pathologized practice of consuming non-food.[2] The peanut's familiarity to Western palates allows for an easier understanding of Plumpy'nut's value. We see this familiarity at work with the backpackers' favorite Justin's Peanut Butter, which serves the "highest quality natural and organic ingredients" in small foil packets that strongly resemble those used by Nutriset.[3]

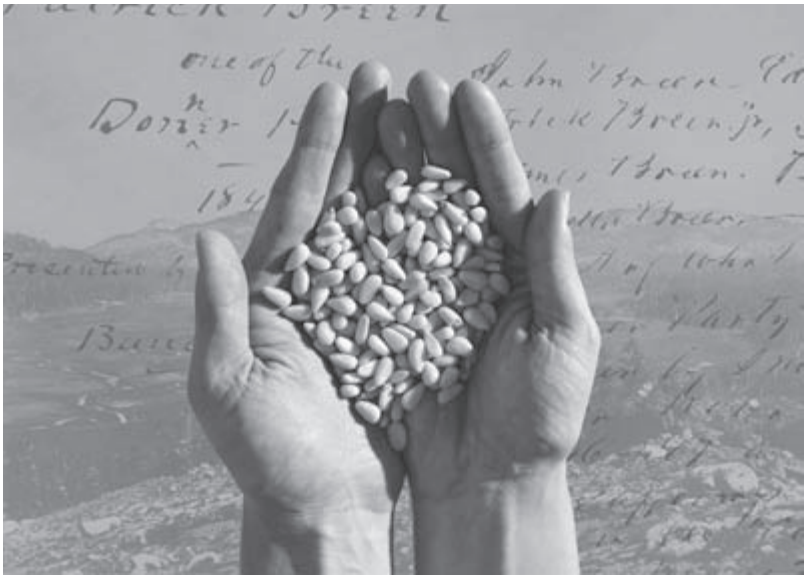
Plumpy'nut hails from France, a former colonial power in Niger and many other African nations. Nutriset's entanglements with colonial pasts haunt its present status as a copyright-holding entity that exerts cultural and economic pressure on local producers. Although Plumpy'nut production happens locally, producers are beholden to Nutriset for the patented vitamin mixture that is added to the peanut butter base. Sending engineered laboratory foods to Niger ignores the potential of local starvation foods such as "bitter berries."[4] The well-traveled peanut acted as starvation food for the pre-Columbian South American civilizations responsible for its domestica-

tion; under what conditions might the hanza berry and the acorn thrive and travel?[5] Given the historical confluence of postcolonial politics and identity, multispecies engagement with hardy flora such as hanza and piñon, and my own family's story and geography, *Plumpiñon* comes to represent both a formal inquiry into the structure and sociality of humanitarian aid food and an investigation of reciprocal relationships between settler colonies and indigenous peoples.

As a remembrance of local famine foods around the world, the ongoing performance series and research initiative I call *Plumpiñon* promotes one such famine food native to the US Southwest. The native piñon tree's seeds function much like Plumpy'nut and the hanza bush. New Mexico, and the southwestern United States more generally, present a richer edible landscape than Niger, but the region also suffers lean times and famines. *Pinus edulis*, the Colorado pine, historically has been—and continues to be—an important source of nutrition, fuel, and cultural connection in both Colorado and New Mexico, where it is the state tree. The nutritious and storable seed keeps for long periods of time, and the strong, durable wood of the pine tree is valued for construction and smells sweet when burned. Piñon pine forests can be found in Colorado, southern Wyoming, eastern and central Utah, northern Arizona, New Mexico, and the Guadalupe Mountains in westernmost Texas.[6] Also known as Colorado pinyon or two-needle pinyon, the trees frequently hybridize with other pine tree varieties and rely on the pinyon jay (*Gymnorhinus cyanocephalus*) to disperse their seeds.[7] Piñon forests are old and can appear sparse. The drought-tolerant tree grows slowly and is not very tall, reaching around thirty feet, at most.[8] Slow growth means that pine nut crops are increasingly limited.

When I buy pine nuts where I live in California, I am most likely buying nuts sourced from China. Among the varieties of nuts on the shelf, pine nuts are often the most expensive. Nuts sourced from the US Southwest could cost up to twice as much as imports. While visiting my family in Colorado, I might be given a small plastic bag containing a handful of piñon nuts gathered from a friend's property, but I would not be able to purchase locally grown piñon in the store. Even when passed from hand to hand, piñon seeds circulate in plastic of one form or another. I package *Plumpiñon* in sealed plastic bags made from recycled material, and my recipe contains pine nuts, sugar, protein powder, and, optionally, powdered milk. *Plumpiñon* is different from Plumpy'nut in taste and texture, even though its plastic preservative container closely follows the delivery system developed for Plumpy'nut.

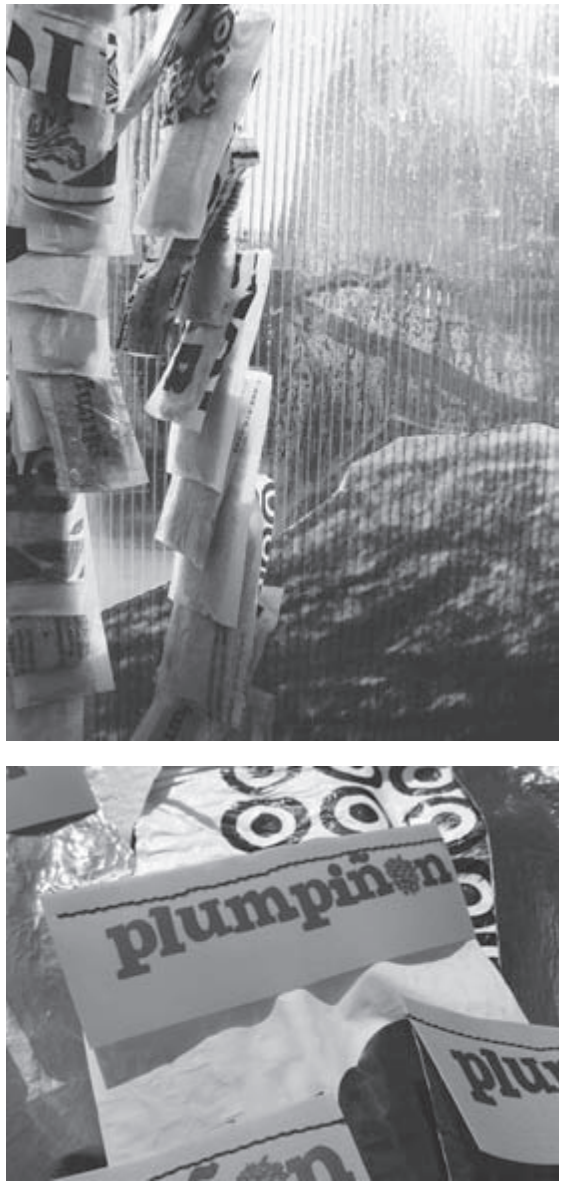
I first experimented with squishy bags of paste in January 2009, when



RECIPE FIGURE 1.1 Lindsay Kelley, digital collage (2009). Courtesy of the artist. See multispecies-salon.org/kelley.

I offered a public demonstration of *Plumpiñon* production. While talking about the cultural and family histories that connect me with the piñon nut, I prepared *Plumpiñon* for about a dozen people and served it in small plastic bags obtained from a bead shop. The presentation prompted me to pursue alternative ways to deliver *Plumpiñon*. Heather Paxson's portmanteau "*microbiopolitics* . . . call[s] attention to the fact that dissent over how to live with microorganisms reflects disagreement about how humans ought to live with one another."[9] The recipe development and packaging process for *Plumpiñon* became microbiopolitical interventions. The paste and its delivery systems question the logic of Plumpy'nut, its corporate origin points, and the ethics of copyrighting food.

Sterility and concern about contaminating microorganisms are at the heart of Plumpy'nut packaging choices. My homemade equivalents are sealed in such a way as to invite rather than guard against, in Paxson's words, "human encounters with the vital organismic agencies of bacteria, viruses, and fungi."[10] *Plumpiñon*'s imperfect containers are made from a material called "fused plastic." This production method resists Plumpy'nut's mode of mass-produced packaging: Fused plastic is easily made with an iron, parchment paper, and polyethylene shopping bags, a material that has been the subject



RECIPE FIGURES 1.2–1.3 Fused plastic—made by melting polyethylene shopping bags to parchment paper with an iron—is hand-stitched to make *Plumpiñon* packets. A hanging display of these packets, in a temporary plastic house on the roof of the Santa Cruz Museum of Art and History, invited visitors to sample *Plumpiñon* on the spot. Photographs by Lindsay Kelley (2009). See multispecies-salon.org/kelley.

of several ecological design interventions in recent years.[11] Handmade bags, small-scale production, and extremely expensive ingredients combine to critically reflect on Plumpy'nut's method of branding and Nutriset's corporate ownership.

Airdrop packaging resembles plastic tarps and fused plastic, with its durable, rip-stop nylon with reinforcement threads. In both process and product, the activity and visual culture of air dropping makes a number of commodity chains and intercultural knots visible. Airlifts reach inaccessible places to deliver, in the military context, everything from tanks to supplies and propaganda leaflets. Humanitarian aid airdrops from United Nations planes are designed to distinguish materials and planes from military counterparts. Airdrops pass judgment about the safety and accessibility of the terrain where supplies are dropped. Looking down from the plane, removed from the ground where the parachutes will land, aid stays in the air, cocooned in materials and markings specially developed to withstand the physical and cultural distance created by flight.

Transforming a staple starvation food from the US Southwest into a relief food used around the world comments on both poverty and luxury. While many eaters are familiar with the pine nut as an ingredient in pesto or salad, people living in the Southwest remember surviving on the pine nut as recently as seventy-five years ago. Birdie Jaworski interviewed one such person in her essay "Pride in Piñon."[12] Jane Yazzie is a Navajo woman in her eighties living in Bernal, New Mexico, where she harvests some fifty pounds of piñon nuts each fall, roasting them by hand before making traditional foods such as *biscochitos* (the New Mexico state cookie). According to Vernon Maye and Barbara Bayless Lacy, the piñon pine is involved in nearly every Navajo ceremony as seed, wood, or pitch. Also used as medicine, food, fuel, and in trade networks, the piñon is a vital element of Navajo foodways and culture.[13] Harvest rights for piñon seeds entangle land, people, and labor: The US Bureau of Land Management in Nevada "has closed some traditional gathering areas to commercial harvest to ensure that treaty obligations" with Native Americans are honored, while in Colorado, Arizona, and New Mexico, "Navajos are the major commercial pickers of pinyon nuts," their skill far surpassing that of other commercial pickers.[14]

Harvesting piñon nuts is arduous work. First the tree must be shaken; then the nuts and cones and needles that fall from the tree must be sorted and stored. Yazzie remembers the piñon nut helping her family survive the Dust Bowl: "I remember eating piñon for days. For weeks. It was all we had. We kept these big sacks filled with the last piñon harvest. My mother used to

tell me that we were like piñon. We sometimes have a hard shell around us when times are difficult, but our insides are always sweet."[15] As both a starvation food and a metaphor for the body, the piñon's pale sweet meat mirrors the flesh of those consuming it. Yazzie remembers how her grandmother stored piñon nuts in clay pots and in holes in the ground. Isolating foods in clay, earth, plastic, or foil helps nuts and seeds survive conditions that make other food spoil. Yazzie's town, Bernal, sits near a mountain called Starvation Peak. The legend behind the naming of the mountain involves a detachment of colonial Spanish soldiers. Having been chased to the top of Starvation Peak, the soldiers chose to die there rather than be captured. The Southwest is full of stories and places that mark colonial communication breakdowns, failed reciprocity, unsuccessful negotiations, and the violence of starvation.

My family, mostly living in Denver now, shares entanglements with *Pinus edulis*. My great-grandfather grew up in the small town of Madrid, New Mexico. When he was a child, Madrid was a coal mining company town, where Mexican-Irish alliances were common, and complicated. Today, Madrid bills itself as "a recovered ghost town that now exists as an art destination," with a population of 204 in the 2010 census, only seven of whom identify as "Hispanic or Latino."[16] For my family, whiteness is mutable. My great-grandfather contributed to our cultural blanching by changing his name from Narvaez to Kelley, taking his mother's name.[17]

Although my family does not share Yazzie's memories of surviving on piñon nuts, and we do not gather the seeds, even recreationally, our family history and myths are connected to the seeds nonetheless. When my great-grandfather died, one of his cousins visited my grandparents and told us that my great-grandfather had a living brother, and that remaining estranged brother kept the name Narvaez. This name, his cousin explained, was inherited from Pánfilo de Narváez, a Spanish conquistador who wrecked his ships in the Gulf of Mexico in 1528, launching the expedition that would make Cabeza de Vaca the first European (and his slave Esteban the first African) to travel though the American Southwest. My great-grandfather's cousin believed us to be cultural kin to this conquistador (despite his immediate shipwreck and death on arrival), and therefore Spanish. Many New Mexican families have a similar story. If I accept our version of this story, then my family is intimately connected with the piñon and its peoples' first experience of Spanish presence in the Southwest. These seeds have thus come to be associated with colonial activity as much as with native survival tactics. In *The Piñon Pine: A Natural and Cultural History*—an interdisciplinary approach to the cultural life of the piñon tree that includes recipes and picking

instructions—the forest biologist Ronald Lanner writes that if the seeds did help de Vaca survive, "The piñon pine casts a long shadow indeed, for when the tattered survivors reached Mexico, their arrival touched off a series of historically important expeditions into New Mexico."[18]

Scholars have debated Cabeza de Vaca's exact route for centuries, and the pine nut has helped provide evidence of de Vaca's path through the Southwest. De Vaca created a multispecies community on his journey, becoming enmeshed with the seeds to such a degree that his detailed descriptions of nuts with paper-thin shells have allowed bio-geographers to determine his route based on the prevalence of the piñon variety *Pinus remota*, or "paper-shell Piñon."[19] Perhaps de Vaca's intimacy with piñon was an "act of reciprocal capture," a precocious moment of "cosmopolitics."[20] De Vaca describes his experiences with piñon nuts in the context of exchange:

> They gave us many beads and many hides of cows, and they loaded all those who came with us with some of everything they had. They ate prickly pears and pine nuts, and there are throughout that land small pines, and the cones of them are like small eggs, but the pine nuts are better than those of Castile, because they have a very thin hull. And when they are green they grind them and make them into lumps and eat them in this manner, and if they are dry they grind them with the hulls and they eat them as a powder.[21]

Without local people, perhaps de Vaca would have recognized the pine nut's edibility (he refers to similar nuts in Spain), but he certainly would not have understood their versatility or significance to the Southwestern diet and landscape. The people who teach him how to eat this landscape facilitate de Vaca's multispecies meal.

Unlike de Vaca, a group of later explorers, the Donner party, would not be captured by piñon and would die as "pure nomads."[22] For some reason, even though Indians had probably demonstrated how to gather and eat the nuts, the Donner party turned to cannibalism before eating piñon. Lanner wonders why the Donner party chose human flesh over nut meat: "Why didn't the hard-pressed emigrants collect piñon nuts along their route through Nevada? . . . They could have gathered a stock of piñon nuts that would have seen them through the winter, but they did not try. Their journals never mention piñons. Were they ignorant of the value of pine nuts, despite the experiences of earlier travelers? Did their hostility to the Indians they encountered along their route discourage the Indians from offering piñons in trade?"[23] De Vaca introduces pine nuts in the context of his evolving efforts

to achieve a state of reciprocity with the human and plant cultures he encounters on his journey.[24] Lanner's suspicion that systemic and specific hostilities may have blocked communication with the Donner party provides a telling counterpoint to de Vaca's experience and illuminates the distinction between capture and captivity. Hostility, fear, and intercultural violence promote captivity (as with the Spanish detachment starving at the top of Starvation Peak), while hunger without tolerance makes space for multispecies productivity.

Accepting gifts of food and clothing precipitates the exchange that turned the tide of de Vaca's journey, allowing him to move among Indians freely and productively and to be physically and gastronomically captured by a multispecies landscape. The Donner party never experienced this turn or engaged such concepts of reciprocity, instead keeping to themselves, unable to perceive the food sources all around them. The limits of Nigerien foodways resemble the limits of Yazzie's sacks of piñon seeds in that scarcity has forced, with varying degrees of comfort, "reciprocal capture" across species boundaries. The Nigerien may be captured by *Boscia senegalensis* in much the same way that Yazzie and de Vaca were captured by *Pinus remota*. The Donner party's dietary speciesism demonstrates a nonreciprocal relationship with the land: captivity rather than capture. If starvation can be negotiated with, human animals must walk the desert hoping to be taken in by the land, thus figuring capture as a multispecies entanglement that nurtures and sustains.

NOTES

Elliot Anderson, Elizabeth Stephens, and Amy Balkin shared most generous readings of this material in its earliest incarnations as a master of fine arts thesis paper for the Digital Art and New Media Program at the University of California, Santa Cruz. Eben Kirksey's collaborations via the Multispecies Salon series also have been instrumental to the ongoing energy and attention I give to this project, and his reading and comments on this essay animate both the work and the writing. I also thank Megan Palmer Browne, Eva Hayward, Heather Waldroup, and Kris Weller for thoughtful reading and comments.

Epigraph: Stengers, *Cosmopolitics II*, 368. Stengers precedes the question in the epigraph with other useful questions that animate my interest in how food, art, ethnobotany, and conceptions of humanitarian aid coincide: "How can protagonists capable of complicating the problem be empowered? How can the presence of those who might share in the associated risks, choices, and decisions be ensured?"

1. Wines, "Hope for Hungry Children, Arriving in a Foil Packet."
2. Hanza berries are often mentioned in media coverage of past and present

famine in Niger, usually with the caveat that the berries are "inedible" when famine does not compel their consumption: "Hungry people have started adding 'bitter' berries to their diet—this is survival food, normally unpalatable but when starving, the unpalatable becomes welcome—essential" (Stewart, "Millions Face Starvation as Niger Prays in Vain for Rain"). "Some of the people have been surviving on the bitter berries from the local hanza bush, which are usually considered inedible" (Hurd, "UN Pleads for £124 Million to Help Starving Niger)." "Facing the worst harvest in years and surviving on the bitter berries and tasteless grasses that grow in the surrounding sandy soil" (Dixon, "Season of Destruction Returns to Niger). Not everyone dismisses the hanza bush: "Having survived thousands of years of recurrent drought without horticultural help this wild species holds the potential to make life more bearable under the desiccating conditions in which millions of Africa's most destitute are increasingly forced to exist. . . . The species produces enough different products to sustain human life almost by itself" (National Research Council, *The Lost Crops of Africa*, 221).

3. For details on a range of products that include chocolate peanut butter, honey peanut butter, and maple almond butter, all distributed in foil packets, see "Justin's Nut Butter," accessed January 4, 2013, http://www.justinsnutbutter.com.

4. The berries are often presented with a warning, as in the text that accompanies Jane Hahn's photograph of Nigerien women: "Hanza berries . . . can be highly toxic if not prepared carefully." The group of women in the photograph, one of whom displays a handful of hanza berries, are implicated in this statement. Will the woman holding the berries not "prepare carefully"? The berries become a dangerous, risky food, a non-food, and the scarce handful implies that everyone in the photo will have to share this quantity of berries for lunch. A reductive nutritional reading of the hanza berry alongside the familiar, friendly peanut would be inappropriate, given the berry's status as fringe food and the peanut's established entry into global foodways. Organizations like the US National Research Council and the Belgian Royal Museum for Central Africa act as documentarians, often gleaning information about the hanza berry from veterinary contexts. The hanza berry does not make an appearance in the sparse recipe archives devoted to Nigerien cuisine—the self-proclaimed "largest gathering of Nigerien recipes into one place on the web today" contains eleven recipes, which feature ingredients such as peas, mango, and okra: "Celnet Recipes Niger (Nigerien) Recipes and Cookery," accessed January 4, 2013, http://www.celtnet.org.uk; Jane Hahn, "Niger—Food Crisis," accessed January 4, 2013, http://corbis.com.

5. The anthropologist Tom D. Dillehay recently determined that the domesticated peanut has a more established presence in the Andes than previously thought. His team found evidence of agricultural peanut activities ten thousand years ago, even though "the peanut was long thought to be among the later cultivated plants of the Andes, and one that is particularly suited to the lowland tropical forests and savannahs where it was prized as a high-protein complement to starchy manioc-based diets." Dillehay relates a geographic center for the peanut. "The peanut's center of origin is believed to be in an area east of the Andes comprising southeastern Bolivia, north-western Argentina, northern Paraguay, and the western Mato Grosso

region of Brazil": Dillehay et al., "Preceramic Adoption of Peanut, Squash, and Cotton in Northern Peru," 1890. The peanut has messy origins, with this initial "center" having been productively polluted by other trade ways. In popular cooking culture in North America and South America, the peanut is often promoted as a food that may "help recover the health of Indigenous peoples": American Indian Health and Diet Project, "Peanuts," accessed January 4, 2013, http://www.aihd.ku.edu.

6. Kershner and Tufts, *National Wildlife Federation Field Guide to Trees of North America*, 92.

7. "Pinyon" is an Anglicization of "piñon" that stops short of "pine." "Pinyon" is an effort to write the word without the "ñ" while preserving its Spanish pronunciation.

8. There are many natural histories of the piñon tree: see, e.g., Floyd, *Ancient Piñon-Juniper Woodlands*; Rhode, *Native Plants of Southern Nevada*; Savinelli, *Plants of Power*. One of my favorites is Lanner, *The Piñon Pine*. Lanner's text includes a "section on pine nut cookery" and joins a range of texts that Lanner has produced in an effort to educate people about trees. The cookery section illuminates the rich interconnections among kitchens, forests, and human animals.

9. Paxson, "Post-Pasteurian Cultures," 16.

10. Paxson, "Post-Pasteurian Cultures," 18.

11. For documentation of a hot-press process designed to manufacture fused plastic at a bigger scale than my own efforts, see "Waste for Life," accessed February 4, 2014, http://wasteforlife.org. For examples of fused plastic design prototypes from the Rhode Island School of Design's "It's in the Bag" design competition, see "RISD Waste for Life," accessed February 4, 2014, http://risdwasteforlife.wordpress.com.

12. Jaworski, "Pride in Piñon," 12.

13. The Navajo Ethnobotany project, produced by Dykeman Roebuck Archaeology, has collected data from Maye and Bayless and other sources to produce a study that describes significant native plants found in Navajo lands: see "Piñon Pine," accessed January 14, 2013, http://www.drarchaeology.com. See also Mayes and Lacy, *Nanise,' a Navajo Herbal*.

14. "Navajos often harvest as families, and they have a reputation for being the most skilled pinyon nut pickers," according to McLain. "One buyer in northern New Mexico said, 'Most commercial pickers will pick five pounds where a Navajo will pick 30 pounds. They've got a system in place. Know-how is a big part of doing well in the business.' . . . For the Navajo, Western Shoshone, and Paiute—and likely other Native American pickers—the pinyon harvest is a sacred activity, even when the nuts are harvested for commercial exchange. Most Navajos, for example, give an offering and say a blessing as part of the harvesting ritual." McLain, *Management Guidelines for Expanding Pinyon Nut Production in Colorado's Pinyon-Juniper Woodlands*, 38, accessed February 25, 2014, http://www.ifcae.org/.

15. Jaworski, "Pride in Piñon."

16. Madrid has a fascinating, if brief, history, with the superintendent of mines Oscar Huber providing high living standards for town workers and a compelled cooperative effort around recreational activities that included annual holiday light

displays. Huber's son Joe started renting abandoned mining properties to local artists in the 1970s. Mexicans were counted as white in the US census until 1930. The statistic I use here comes from the 2010 census, in which "Hispanic or Latino" can be selected alongside race and "type," which refers to national origin: US Census Bureau, "Madrid CDP, Hispanic or Latino by Type." The most extensive history of Madrid I have found online is "New Mexico Legends: Madrid—A Ghost Town Reborn," accessed January 14, 2013, http://www.legendsofamerica.com. See also the history of the town's reinvention in Hovey, *Anarchy and Community in the New American West*.

17. Taking one's mother's name is both a traditional Spanish/Latino practice and a way to change how the color of one's skin might affect opportunities. Of course, my great-grandfather would not have identified as a man "of color." He would have positioned himself somewhere inside a messy knot that included multiple national, ethnic, and racial identities, all of which were moving targets of the US government as land and people in the region were introduced to still changing and ill-fitting taxonomies. After posting my grandfather's eulogy online, members of my extended Narvaez family contacted me. We have since been corresponding about family history and genealogy. The name Narvaez appears to have died out, due to a preponderance of women in our family. When she learned that my branch of the family also neglected to produce a male heir to the name Kelley, my cousin Juanita Gordon wrote, "It seems the Narvaez name may have been meant to die out." My great-great-grandfather Max Narvaez appears in a list of names of miners published by Midori Snyder as "Madrid's Illiad: The List of Miners' Names: Part III," accessed January 4, 2013, http://msnyder.typepad.com. See also my grandfather's eulogy, "Piling Up," accessed January 4, 2013, http://starvationseeds.blogspot.com.

18. Lanner, *The Piñon Pine*, 89.

19. Olson et al., "Piñon Pines and the Route of Cabeza de Vaca," 183.

20. "The term 'cosmopolitics' introduces what is neither an activity, nor a negotiation, nor a practice, but the mode in which the problematic copresence of practices may be actualized: the experience, always in the present, of the one into whom the other's dreams, hopes, and fears pass." Stengers, *Cosmopolitics II*, 372. Looking back on de Vaca, both as readers of the *Journey* and as readers of biogeography have noted, he appears to have described this mode in his encounters with the piñon. Learning how to eat piñon coincides with a turn in de Vaca's journey: he is able to perceive and narrate the "copresence of practices" as never before.

21. If the nuts de Vaca describes are *Pinus remota*, this makes a strong case for a southerly route, given *P. remota*'s bio-geography. Bio-geography also helps interpret how the de Vaca party consumed the piñon seeds. Crushing *P. edulis* seeds into a powder would be difficult because their shells do not break down. The mashed green piñon paste reminds me of the delivery system used with both Plumpy'nut and *Plumpiñon*: de Vaca, *The Narrative of Cabeza de Vaca*, 140.

22. Cannibalism is not the inevitable end result of a purely nomadic strategy, but this particular instance of cannibalism, in the midst of nurturing vegetation, would be an excellent example of pure nomadism. For Stengers, "The only one who is dangerous, irremediably destructive or tolerant, is someone who believes himself

to be 'purely nomadic,' because he can only define his practice in contrast to all the others and, regardless of his good intentions, can only define others in terms of tolerance": Stengers, *Cosmopolitics II*, 372.

23. Lanner, *The Piñon Pine*, 97.

24. Writing about the life and travels of Mungo Park in Central Africa, Mary Louise Pratt defines "reciprocity" as "the desire to achieve equilibrium through exchange": Pratt, *Imperial Eyes*, 78. James Clifford reminds us that "'reciprocity' is a translation term, whose meanings will depend on specific contact situations": Clifford, *Routes*, 194. Here I attempt such a translation, reading reciprocity for Park against the tension at play in de Vaca's *The Narrative of Cabeza de Vaca*. Torn between base survival and "the greatest non-reciprocal non-exchange of all time: the Civilizing Mission," de Vaca, like Park, becomes "that creature in whose viability and authenticity his readers may have longed to believe: the naked, essential, inherently powerful white man." De Vaca's description of the pine nuts prefaces his emerging role as an unlikely faith healer, a career he embarks on as a way of deepening the reciprocity he earlier sought to engage through trade. For example, de Vaca performs surgery on a man with an arrow point embedded in his chest, giving de Vaca and his companions "a very great reputation." De Vaca deals in flesh and life: as piñon sustains him, he sustains the human flesh of those who gave him piñon flesh to eat. He works with touch, faith, and occasional tangible surgeries. Trading life for life, pulling life from faith, from thin air, from nothing at all, shows that de Vaca recognized the life-giving capacity of piñon pines: de Vaca, *The Narrative of Cabeza de Vaca*, 81, 141.

RECIPE 2

HUMAN CHEESE

Miriam Simun

> Cheese. . . . Behind every one is the presence of the civilization that gave it form and takes form from it.
> —Italo Calvino, *Mr. Palomar*

> Cheese is the odor of decay. . . . [O]nce acquired, however, the taste of partial spoilage can become a passion, an embrace of the earthy side of life that expresses itself best in paradoxes.
> —Harold McGee, *On Food and Cooking*

I began making human cheese—cheese made from human milk—to rework dominant forms of biopower. One of my aims was to generate indigestion by reimagining products of the human body as a new tactical media. "Trying to make a living, critters eat critters but can only partly digest one another," in the words of Donna Haraway. "Quite a lot of indigestion, not to mention excretion, is the vehicle for new sorts of complex patternings of ones and manys in entangled association." Indigestion can denature relations we take for granted. Human cheese illustrates a story of multispecies collaborations—complex patternings of entangled agents—among mammals, microbes, and other companion species (see plate 4).[1]

Human cheese is a novel food. In offering it to people, I found vastly divergent opinions about the use of human milk compared with that of cow, or goat, or even buffalo.[2] Some readily—excitedly even—tasted cheese made from the milk of their own species during a special event at the Multispecies

Salon. A good number of participants—especially the vegans—felt that such cheese was indeed more ethical, as the human providing the milk was doing so consensually. Others claimed that human milk has been precisely—in fact, *evolutionarily*—designed for human bodies. On the other side of the spectrum, plenty of people reacted almost violently, claiming that human cheese was disgusting, unnatural, and even cannibalistic. Interestingly, the common polite response from those who refused a taste was that they could not be sure what the human who provided the milk was eating—which prompted an obvious question: What is being consumed by the animals who produce the milk that we routinely consume?

The issue of marketing human cheese as a commodity prompted a similarly vast range of reactions. Some gallery visitors were outraged over human milk being turned into a product and the implications of "farming" women (figure Rec2.1). Others pointed out the not dissimilar uses of the human body in medical and sexual contexts. Human hair, eggs, sperm, and kidneys are all regularly extracted and inserted, bought and sold. Critical conversations about the commodification of the human body inspired my cheese project. If the biopolitical norms regulating the use and trade of human bodies are perpetually shifting, then human cheese is a bio-tactical intervention meant to highlight these shifts, as well as perpetual resistance.[3]

Human milk is the first food we consume, but it does not come without real risks. The specter of live microbial agents, semi-living viral particles, and deadly chemical toxins haunt the consumption of human milk.

Human viruses can be passed through milk. Hepatitis, HIV, and human T-cell lymphotropic virus can all be transmitted, but rates of contagion are low. These viral pathogens can be killed with a number of different pasteurization methods. Both high-tech and low-tech methods of pasteurization have been found to be successful in inactivating communicable viruses in milk. The pasteurization of human milk routinely takes place in the most expensive of hospitals and in out of the way places, over simple fires in the Sahara.[4]

Ubiquitous toxic contaminants are also found in milk. These contaminants, unlike viruses and bacteria, cannot be removed through pasteurization. Chemicals used in household products and in industrial agriculture are continuously and persistently found in the milk of humans and our mammalian kin. The list of chemical toxins found in human milk reads something like an acronym alphabet—it includes CDDS, CDFS, DDT, NPS, OWCS, PCBS,

RECIPE FIGURE 2.1 A donor using a mechanical pump to extract milk for the project. Photograph by Shimpei Takeda (2011). See multispecies-salon.org/simun.

and PBDE, as well as dibenzofurans, Triclosan, heavy metals, and bromine-based flame retardants. These compounds are also widely distributed in the air, the water, and the earth. Adult mammals build up a lifetime of pollutants in stored fat. As these contaminated bodies lactate, the fat is expressed, producing contaminated milk. The traces of toxins found in human milk are small, and the epidemiological significance of their presence is understudied.[5] Perhaps the consumption of human milk as cheese product suddenly imparts pressure for understanding the significance of this contamination in new ways.

Currently doctors encourage breastfeeding, despite the contamination of our bodies, claiming that human milk is immunologically so superior to synthesized infant formula that even a contaminated version is healthier for a child. Ironically, the only effective way to remove contaminants from human fat is through the process of lactation. Lactation purges the body of dioxins present in stored fat, and the new fat that forms for the next milk is comparatively uncontaminated.[6] Lactation thus actually improves women's health, as it purges the body of contaminants.[7] Therefore, it may be advisable for cheese makers to use milk from a body that has already been lactating for several months, as this will lower the quantity of contaminants persistent in

the cheese. It is also important for any aspiring human-cheese makers and cheese mongers, especially those who use local human milk, to minimize the pollutants contributed to the environment, as these toxic chemicals eventually end up in the cheese. Milk is a tricky substance—entangled with bodies and environments where it originates. Steering clear of chemical toxins, and deadly microbial agents, requires a real commitment to understanding exactly where this food substance comes from.

FINDING THE RIGHT MILK

But where can one find human milk sources? A great way is to find a friend who is happy to provide her excess milk. This enables issues of trust to be managed in person, as one can ask the provider questions regarding her diet and habitat. It gives one the opportunity to understand as much as possible about the woman who is soon to be the source of raw material for the cheese. All mammals (including humans) develop antibodies to fight the pathogens in their local environment, so to really get the most out of milk's immunoprotective properties, it is best to find a local provider. If local networking fails, one can always turn to the Internet. A number of websites have popped up in recent years on which people buy, sell, trade, and donate their milk. After perusing ads, one can contact the most interesting women to find out more, to negotiate terms, and, possibly, to buy their goods.

Of course, one obvious source has not yet been discussed: one's own body. Inducing lactation is a possibility for most women, regardless of age. Some women can induce lactation (though not all will be successful) by regularly stimulating their nipples, with or without a breast pump. Another option is injections with human chorionic gonadotropin (hCG) that mimics the effects of pregnancy. Men can also lactate with hCG injections. Side effects of this hormone in men's bodies include increased sperm counts, weight loss, increased muscle mass, and the development of sizable breasts. Stay-at-home fathers have reported successfully breastfeeding their children, demonstrating that it is well within men's physiological reach.[8]

One thing that human milk does not have (or, at least, not in concentrated enough amounts) is a protein group by the name of casein. Caseins are the proteins in cow or goat milk that cause it to coagulate, or curdle, and thereby form the solid substance that is grown into cheese. If one tries to make cheese with solely unaltered human milk, only little bits of solid flakes will form, never coagulating into a single mass. Pure human cheese is, for now, not biochemically possible. Theories exist about technical processes

TIPS FOR BUYING HUMAN MILK ONLINE

How does one go about shopping for human milk online? The most direct route is to use a human milk trading website, which usually operate in the form of public message boards. Anyone seeking to buy human milk can post a notice or browse offers posted by women selling their milk. These message boards are a way to establish initial communication; further exchanges with potential milk providers tend to take place through more private channels, such as email. Trading in human milk does require a certain degree of trust and personal comfort, so every transaction should be handled in a way that ensures the comfort of all parties involved. Best practices call for full disclosure of all participants so that everyone is operating under informed consent.

One of the most popular sites, OnlyTheBreast.com, advertises itself as "a community for moms to buy, sell, and donate natural breast milk." There, ads directed to men, who self-identify as "lactation fetishists," appear side by side with notices such as one from a "healthy Christian Mama with plenty to pump" who is offering her milk for $1.50 an ounce.

One may wish to screen prospective milk providers with a health and lifestyle questionnaire. One may wish to consider the conditions under which the human milk provider is working and trading in body fluids. Significant time, labor, and equipment go into the pumping and safe storing of human milk. Exploited bodies may not produce the best milk for a rich cheese. It is also perfectly acceptable—and, in fact, advisable—to request recent blood work, including tests for HIV I and II, hepatitis B, hepatitis C, HTLV I and II, and syphilis. Many women selling their milk offer evidence of this blood work of their own accord. Diet is also an important consideration, and many online milk providers advertise their status as vegans, vegetarians, or largely organic eaters. The cost of milk can vary depending on the quality of the mother's diet and the amount of health and personal information she provides.

that may make 100 percent genuine human cheese a reality in the future. Research in the area, however, has been limited.[9]

I use goat's milk, a source of casein proteins, to help make human cheese. Just as the enlightened cheese maker should consider the entangled histories swirling in milk obtained from a cheerful human neighbor's breast, one might also take a minute to think about the health, welfare, and diet of the pretty doe goat who provides her milk for the cheese. Perhaps the well-being of the microscopic zygote fungus (*Mucor miehei*), a living coagulant that has

RECIPE FIGURE 2.2 Making human cheese with ordinary kitchen equipment. Photograph by Shimpei Takeda (2011). See multispecies-salon.org/simun.

come to replace rennet from calf gastric juice in transforming milk into a more solid form, should also be considered.

"There is no way to eat and not to kill," Haraway reminds us, "no way to pretend innocence. . . . Because eating and killing cannot be hygienically separated does *not* mean that just any way of eating and killing is fine, merely a matter of taste and culture."[10] My recipe for human cheese makes ethical and agential cuts (see chapter 7). While buying into certain biopolitical regimes—lively networks of human milk providers, goatherds, and zygote fungus growers—it opts out of others (namely, the institutions trading in the juices of slaughtered calves). In a word, making good human cheese involves *microbiopolitical* circuits of matter and meaning. Cheese making methods should perhaps be governed by Joe Dumit's dictum for the use of microbiopolitical tactics. "Never think you know all of the species involved," Dumit cautions. "Never think you speak for all of yourself."[11]

HUMAN-GOAT BLEND (A SIMPLE FRESH CHEESE)

Ingredients
½ gal. human milk
½ gal. goat milk
¼ tablet vegetarian rennet[12]
2 t. salt

Preparation
Carefully consider and decide whether you will be pasteurizing the human milk. Sterilize all utensils including pots, jars, and spoons, by boiling in water for at least twenty minutes. Thaw or bring the milk to room temperature. Prepare a fresh cheesecloth.

1. (optional) Pasteurize the human milk using either a home Holder pasteurization kit or the flash heating double-boil method. You can make cheese without this step, but it is recommended that you pasteurize the milk unless you are sure the milk provider is free of any communicable viruses. For flash heating, pour the human milk into a sterilized glass jar and place the glass jar in a pot of water. Warm up the pot over low heat, stirring milk frequently. Bring the human milk to 163 degrees Fahrenheit—bubbles on the edge of the pot are a good indicator of achieving the right temperature. Keep the milk above 132 degrees Fahrenheit for six minutes.

2. Pour human milk into a sterilized pot over low heat. Slowly pour in the goat milk, stirring as you pour. Continue to stir every few minutes, slowly bringing the blended milks to 180–85 degrees Fahrenheit.

3. Take the pot of milk off the burner and place in a larger pot filled with ice water. Let cool to 125 degrees Fahrenheit.

4. Stir in 2 t. salt.

5. Dilute ¼ rennet tablet in a splash of water.

6. Pour the rennet mixture into the milk slowly, stirring the milk the entire time. You want to make sure that the rennet is added so that it evenly distributes in the milk because it acts fast and can cause some parts of the milk to coagulate before you have time to thoroughly mix it.

7. Cover the pot with a dry, clean dish towel and let the milk stand undisturbed for about fifteen minutes, until it has visibly thickened.

8. With a wooden spoon, make a few large cuts into the coagulated surface of the milk. Stir quickly for fifteen seconds to break up the solids.

9. With a slotted spoon, gently scoop out the curds into a colander lined with cheesecloth. Place the colander inside a larger pan so the whey can drain freely. Allow excess whey to drain for about one hour.

10. Lift the cheesecloth up by four corners and twist it gently. If the liquid running out of the cloth is clear, allow more time to drain. Once the liquid runs milky—you're done. You've just made human-goat cheese. For best taste, consume within three to four days.

EATING HUMAN-GOAT CHEESE

This human-goat blend is delicious spread on a cracker, smothered in honey, or eaten straight with a spoon. Light and rather sweet, yet undeniably complex, it nourishes our bodies and nourishes our indigestion (as Haraway would have it). Cheese from human milk does make logical sense, yet many find it to be completely "out of place." As Haraway writes in chapter 7 of this volume, "To be out of place is often to be in danger and sometimes also to be free, in the open, not yet nailed by value and purpose but full of pastpresents." It is this freedom to eat cheese from humans, to experience indigestion from

its taste, to explore meanings attached to the making and consuming of lively foods from other species' milk. By substituting "the other" species with our own, we suddenly gain a molecular shift in perspective—this is what human cheese is all about. It is possible to suddenly denature "cheese"—an everyday food—simply by making it human. With this denaturing shift, it becomes a congealed thing worthy of our attention, our consideration, our care, for, according to Haraway, "To care is to know how to nurture quiet country through the often unexpected generations, not to point toward future utopia or dystopia. To care is wet, emotional, messy, and demanding of the best thinking one has ever done." Thus, human cheese invites "the risk of response, of becoming someone one was not" before the encounter.

A warning, however: One will find that some people are resistant to trying a taste.

NOTES

Epigraphs: Calvino, *Mr. Palomar*, 72; McGee, *On Food and Cooking*, 58.

1. Haraway, *The Companion Species Manifesto*.

2. The dominant moral code that governs eating in America is strictly anthropocentric, according to Heather Paxson. "Morality lies in the victory of the self over the body. Righteous means exercising self-control in eating to be thin." Paxson views the Slow Food Movement as a turn away from these dominant sensibilities. The ethics of eating is being expanded to consider effects on multispecies communities. "If a critical mass of Americans came to regard eating as a morally charged practice with obligations and consequences beyond our own individual well-being," writes Paxson, "we might, as a society, come to read differently, less narcissistically, the moral implications of our own and others' bodies": Paxson, "Slow Food in a Fat Society," 17.

3. Da Costa and Philip, *Tactical Biopolitics*, xvii–xxii.

4. Pasteurizing human milk is an important precaution to take if there are any doubts about the viral status of the milk provider. There are two common ways to pasteurize human milk at home. Holder pasteurization, the method used by human milk banks and for the pasteurization of cow milk, involves heating the milk to 144.5 degrees Fahrenheit (62.5 degrees Celsius) for thirty minutes. This can be done with a home pasteurization kit. Another method available is flash heating, a simple procedure that does not require resources beyond a fire, some water, and a couple of containers. It requires that the milk be quickly heated using the double-boil method (boiling milk in a glass jar inside a pot of boiling water), bringing the milk to a peak temperature of 163 degrees Fahrenheit (72.9 degrees Celsius) and kept above 132 degrees Fahrenheit (56 degrees Celsius) for more than six minutes.

A recent study shows that flash heating is more effective than the typical Holder method in protecting the anti-infective and nutritional properties of human milk while inactivating the HIV virus. Israel-Ballard et al., "Viral Safety of Flash-Heated Breast Milk"; Chantry et al., "Effects of Lipolysis or Heat Treatment on HIV-1 Provirus in Breastmilk."

5. Landrigan et al., "Chemical Contaminants in Breast Milk and Their Impacts on Children's Health."

6. Steingraber, *Having Faith*.

7. "A Swedish study concluded that one American woman who breastfed her twins for three years dropped her body burden of dioxins by 69 percent": Giles, *Fresh Milk*, 106.

8. Diamond, "Father's Milk."

9. The only known thorough research on the coagulation of human milk was conducted by William D. Moore in 1849. "I shall proceed to consider some of the leading characteristics of healthy human milk," writes Moore, "especially those in which it differs from the mammary secretion of the animals whose milk forms in these countries, either ordinarily or occasionally, part of the food of man; and as one of the most striking of these differences is its behavior in relation to heat and acids, the disputed question of its coagulability will form the principal subject of this paper": Moore, "On the Coagulability of Human Milk," 276. Some additional work is cited in Heinemann, *Milk*.

10. Haraway writes about how we are "becoming with" other species in many different spaces of intersection and attachment. Eating is one such crucial site. "In eating we are most inside the differential relationalities that make us who and what we are and that materialize what we must do if response and regard are to have any meaning personally and politically. There is no way to eat and not to kill, no way to eat and not to become with other mortal beings to whom we are accountable, no way to pretend innocence and transcendence or a final peace": Haraway, *When Species Meet*, 295.

11. Dumit, "Foreword," xii.

12. The vegetarian rennet I use involves *Mucor miehei* (a microscopic fungus), magnesium salt, and microcrystalline cellulose (a refined product derived from fibrous plants). Rennet can be also made from plants (although plant-based rennet is not available commercially in the United States). Traditionally, rennet was made from an enzyme extracted from the gastric juice of a calf. Since its approval in 1990, the most commonly used rennet has become the significantly cheaper genetically modified rennet, in which the DNA of the enzyme derived from calf gastric juice is inserted into a yeast cell.

RECIPE 3

MULTISPECIES COMMUNITIES

Eben Kirksey

Fuzzy softball-size balls were scattered in the bare dirt of an expansive yard outside the Ironworks, a warehouse that had been hastily retrofit as a gallery for the opening night of the Multispecies Salon in New Orleans. These Technicolor wool sculptures, illuminated by a small desk lamp, were underfoot as small, well-dressed children weaved among them and then hunkered down on the exposed gravel. Knee-high metallic spheres, SWARM orb robots, lurched through the grass a few yards away. Their flashing lights and prerecorded sounds drew the attention of adults. Children were captivated by the smaller, colorful wool balls. They picked the balls up and started rolling them around on the ground. Both the children and the artworks became covered with grit and dust.

These sculptures, Thneeds Reseeds, were created by Deanna Pindell in the hope of exposing and derailing dominant regimes for managing forest life.[1] Imagining a way to reseed the clear-cut forested landscapes near her home on the Olympic Peninsula of Washington State, Pindell began collecting multicolored wool sweaters—old and funky things that were no longer fashionable to wear. Pindell posted a message on Freecycle, a website promoting waste reduction to "save the landscape from being taken over by landfills," to gather raw materials. "Wanted: Old worn-out 100% wool sweaters. I will cut them up for ECO-projects. . . . Holes and stains are okay. Any color, any size."[2] Refashioning the form of wooly commodities, the excess of late capitalism, she shrank the donated sweaters in her drier. Using a time-tested process of "felting," she made brightly colored habitat for forest plants

RECIPE FIGURES 3.1 (*above*) and **3.2** (*opposite*) Thneeds Reseeds were small woolen sculptures displayed by Deanna Pindell at the Multispecies Salon in New Orleans (2010). Photographs by Eben Kirksey. See multispecies-salon.org/communities.

and animals. Chicken wire, leached of rust-preventing chemicals, became the matrix supporting her felted balls. Pindell created small openings in the Thneeds Reseeds so that forest mice, voles, and salamanders might live inside. She also hoped that the wool balls would become moth-eaten; that they would become food for the insect community.

"A thneed's a fine something that all people need," in the words of the Old Onceler, a haunting specter of dead capital in *The Lorax*, the classic childhood tale by Dr. Seuss. "It's a shirt. It's a sock. It's a glove, it's a hat. But it has other uses, yes, far beyond that!" By knitting thneeds, multipurpose sweaters, the Old Onceler hopes to get mighty rich. Speaking for nature, the hero of the story persistently tries to interrupt these plans: "I'm the Lorax, who speaks for the trees, which you seem to be chopping as fast as you please. But I'm also in charge of the brown bar-ba-loots, who played in the shade in their bar-ba-loot suits, and happily lived, eating Truffula fruits."

Bruno Latour has recently rearticulated the refrain of the Lorax. Calling on scholars of science and society to give democratic rights to "nonhumans," Latour has suggested that we construct *speech prosthetics*: "millions of subtle mechanisms capable of adding new voices to the chorus."[3] The Lorax attempted to speak for a multitude of creatures living among the Truffula trees. But ultimately, this tragic figure failed to save the forest from being clear-cut.[4]

Rather than simply repeat failed truth-telling strategies or construct speech prosthetics for particular species, Pindell has worked to generate livable futures in the aftermath of ecological disasters. Multispecies ethnographers have recently taken an "ontological turn," departing from a foundational distinction between nature and culture, humans and nonhumans, at the base of Euro-American epistemology.[5] Tracing the vector of a parallel turn, Pindell and other artists operating in biological and ecological domains have begun to explore novel modes of care for beings in multispecies worlds.[6] The Thneeds Reseeds are intended to be agential things in the world, tools for enlisting multiple species in the healing of damaged ecosystems or even generating new kinds of flourishing.[7] Pindell's work is a proposal for living in blasted landscapes—a proposal intended not to say what is or what ought to be but meant to destabilize dominant regimes of calculation and control, meant to arouse a slightly different awareness of the problems, desires, and situations mobilizing us and our companion species.[8]

When she first moved to the Olympic Peninsula, Pindell found that struggles by environmental advocates to save particular patches of forest were taking place alongside struggles by loggers who were trying desperately to keep

RECIPE FIGURE 3.3 Silvery bryum moss growing with multiple other plant species between cobblestones on a street in France. Courtesy of Abalg, an avid user of the Wikimedia Commons. See multispecies-salon.org/communities.

their jobs, to heat their homes. As activists lost steam, timber companies cut the forest and moved on—leaving devastated ecosystems and unemployed people in their wake. "Every time I passed a clear-cut forest," Pindell told me, "I felt a sense of loss, a sense of mourning."

Rather than dwell on tragedy, Pindell has added a sense of irony into her artwork. Seeing that the oppositional politics of activists were failing, she began reworking the ideas of metamorphosis, remediation, and sanctuary.[9] Dreaming about seeding abandoned lands with multicolored wool balls, she began thinking about how to enlist multiple species in enlivening devastated spaces. Pindell played with the tale of the Lorax to invent a novel technology of interspecies care and cultivation.

Initially, the Thneeds Reseeds were designed with one particular species in mind: *Bryum argenteum*, silvery bryum moss, one of the most tenacious and widespread mosses in the world. It is found in all sorts of seemingly hostile environments—from the tarmacs of New York City airports to the tiled roofs of Quito, Ecuador. Pindell hoped that giving this moss a moist substrate would enable it to become a "first responder" from the plant kingdom

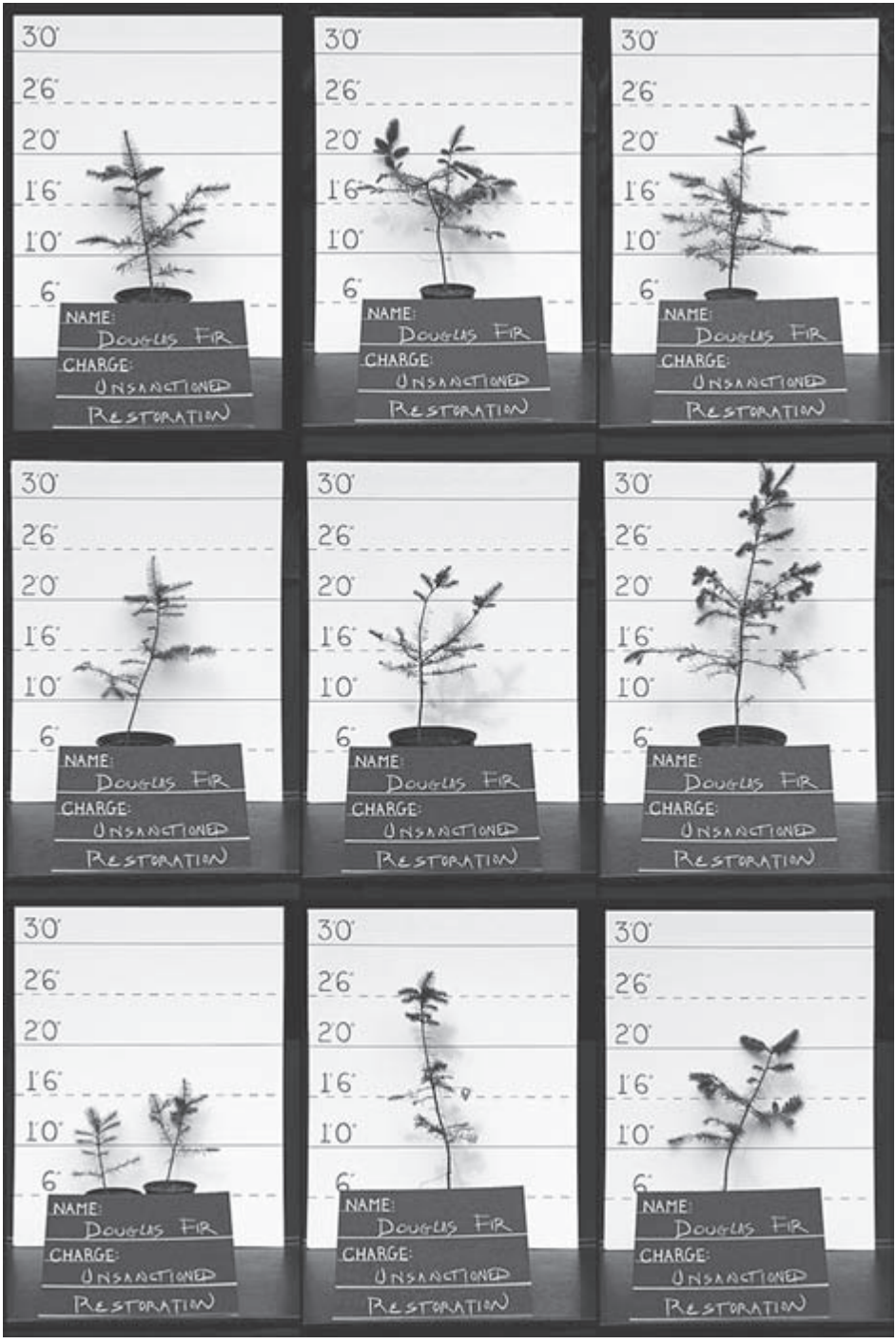
in clear-cut forests. The spores of silvery bryum are abundant in the aerial plankton—the cloud of spores, pollen, and insects that circulates the globe at altitudes up to fifteen thousand feet.[10]

Moss spores are raining down in the air all around us, looking for suitable places to germinate—solid substrates with enough light and water. Pindell designed the Thneeds to trap rain, to hold on to moisture that otherwise would evaporate in a landscape where the forest canopy had been removed. *Gathering Moss: A Natural and Cultural History*, by the bryologist Robin Wall Kimmerer, initially gave Pindell the idea of using silvergreen bryum to help the forest regenerate. At an abandoned iron mine, Kimmerer found that tree seeds grew and survived best on huge mounds of tailings when they lived in partnership with moss.[11]

Pindell sent twenty-one Thneeds to the Multispecies Salon. Her installation was framed by a playful recipe:

> THNEEDS RESEEDS
>
> To restore your clear-cut forest:
>
> 1. Break the mosses into fragments.
>
> 2. Mix the moss with buttermilk.
>
> 3. Place Thneeds in clear-cut.
>
> 4. Keep the Thneeds moist with buttermilk until tree seedlings can take hold.
>
> *Note:* Enough Thneeds for one square meter of forest.

RECIPE FIGURE 3.4 "Unsanctioned Restoration" is a companion project to Deanna Pindell's "Thneeds Reseeds." She conducts this ongoing performance art piece in collaboration with Douglas fir trees. With these "mug shots" she has set out to document the lives of "youthful delinquents" who grew up in unfortunate circumstances—germinating underneath power lines, or in lots slated for development. Pindell rescued and nurtured these yearlings, replanting them along eroding hillsides and stream banks, where trees are needed to protect the watershed. In these new habitats she helps them be successful and useful to their ecosystem and human society. Deanna Pindell, "Unsanctioned Restoration," Archival digital ink print on canvas. 36" × 24," 2012. Photograph by Joann Seiburg Baker. See multispecies-salon.org/communities.


30"
26"
20"
16"
10"
6"
NAME:
DOUGLAS FIR
CHARGE:
UNSANCTIONED
RESTORATION

If the scale of Pindell's intervention, one square meter, is a tragic joke, she hopes her piece will help inspire other people to develop their own ideas about enlivening abandoned spaces. If a multitude of people each begin caring for small plots of ecologically devastated land—say, one square meter apiece—the world will certainly become replete with biocultural diversity. It will become a livelier place.

When I visited Pindell's double-wide mobile home, at the end of a short dirt road near a little one-light town on the Olympic Peninsula known as Chimacum, she invited me to take a short walk. While poking along the edge of a busy road, as semitrucks zoomed by carrying freshly cut Douglas firs, Pindell told me that she has not actually seeded any clear-cuts with her Thneeds. Rather than manufacture brightly colored wool balls on an industrial scale, and spread these strange sculptures in landscapes that have been blasted by capitalism, she hopes her art will inspire people to develop new practices of interspecies care. Pindell hopes that her work will inspire others to get involved in do-it-yourself (DIY) bioculture projects.[12]

My stroll with Pindell took us to a recently abandoned gravel pit—a place that has been turned into a public park with picnic tables, a baseball diamond, and basketball courts. Pindell showed me a half-dozen Douglas fir seedlings she had planted around the margins of the repurposed mine. Transplanting the seedlings from places where they were unwanted—under a roadside telephone poll where lawnmowers regularly work, from next to her own house where the growing trees would have shaded out her vegetable garden—she is trying to diversify this municipal park, a landscape that is now dominated by a monoculture of grass. Sauntering out every afternoon with her dog, she routinely inspects and cares for the transplanted seedlings—hoping that they will go unnoticed—or, at least, be tolerated—by the park authorities and maintenance crews. Her modest attempts at "guerrilla bioremediation" in the park offers an opportunity to think about the possibilities contained in microbiopolitical interventions. Establishing local cycles of matter and meaning on a micro scale, subverting standard practices, is a means of reworking dominant strategies for managing life.[13]

Pindell has grounded her visions of biocultural hope in living figures. Knitting particular species into the fabric of lively futures for Pacific Northwest forests, she has congealed her imaginings of postindustrial futures in actual material objects. Her small sculptures prefigure coming changes and contain a radical openness to unruly possibilities involving multiple species. Pindell is cultivating a space for surprises beyond the reach of her own imaginative horizons. The Thneeds Reseeds are an open invitation to a multitude

of other life forms, and creative human agents, who might start exploring new ways of being with others in the world.[14]

NOTES

1. Da Costa and Philip, *Tactical Biopolitics*, xviii.

2. "Jefferson County Washington Freecycle," accessed September 15, 2011. http://groups.yahoo.com/group/JeffersonCoFreecycle/message/25248.

3. Latour, *Politics of Nature*, 64, 69.

4. People who speak for nature run the risk of becoming ventriloquists. Other species of plants, animals, and microbes can easily become projection screens for anthropocentric concerns. Perhaps initiatives to build new speech prosthetics, to bring the voices of other species into play, also always generate constitutive outsiders who are unrepresented in realms of human discourse: see Kirksey, "Living with Parasites in Palo Verde National Park," 25–26.

5. Candea, "I Fell in Love with Carlos the Meerkat," 243; Kirksey and Helmreich, "The Emergence of Multispecies Ethnography," 553.

6. See, e.g., Bureaud, "The Ethics and Aesthetics of Biological Art," 39; Dumit, "Foreword," xii; Gablik, *The Reenchantment of Art*, 7; Zurr, "Complicating Notions of Life," 402.

7. See chapter 7 in this volume.

8. Here I am in dialogue with the "Cosmopolitical Proposal" of Isabelle Stengers, who asks, "How can we present a proposal intended not to say what is, or what ought to be, but to provoke thought, a proposal that requires no other verification than the way in which it is able to 'slow down' reasoning and create an opportunity to arouse a slightly different awareness of the problems and situations mobilizing us?": Stengers, "The Cosmopolitical Proposal," 994. See also Despret, "The Body We Care For," 122.

9. Failed oppositional politics of an early environmental movement in Great Britain, a struggle to stop the Thirlmere Scheme to build a dam, has been described by Harriet Ritvo. "The outline of the story has become so familiar as to seem predictable," Ritvo writes. "Once the Manchester Corporation (the city's governing body) set its sights on Thirlmere, the lake's fate was sealed": Ritvo, *The Dawn of Green*, 3. The organized campaign of resistance has become a kind of template for subsequent environmental struggles.

10. See "'A' for Air," in Raffles, *The Illustrated Insectopedia*, 5–12; Kimmerer, *Gathering Moss*, 92.

11. Kimmerer, *Gathering Moss*, 50.

12. Da Costa and Philip, *Tactical Biopolitics*, xvii.

13. Paxson, "Post-Pasteurian Cultures," 40; Kirksey and Helmreich, "The Emergence of Multispecies Ethnography," 560. See also the interlude and chapter 4 in this volume.

14. Despret, "The Body We Care For," 122; Haraway, *When Species Meet*, 16; Kirksey et al., "Poaching at the Multispecies Salon," 130.

RECIPE 4

BITTER MEDICINE IS STRONGER

Linda Noel, Christine Hamilton,
Anna Rodriguez, Angela James, Nathan Rich,
David S. Edmunds, and Kim TallBear

It may be tempting to think of acorn harvesting, an iconic practice for the Pomo people of Northern California, as an element of "lost culture." Yet knowledge of making acorn mush exists in the minds of elders and those who use mixed methods, blending time-tested practices with contemporary adaptations. In writing down a recipe, much more than measurement and ingredients is involved. We must consider the path both native people and oak trees have taken (or been herded into) over the decades. And we must consider the roles played by oaks, acorns, and the mush that strikes our palates in an ongoing healing of the land and its many long-standing inhabitants.

Oaks and Pomo people have shared what we now call Northern California for at least six thousand years, by academic reckoning, and longer if we listen to tribal elders. Movements across the land, from the valleys and hills surrounding Clear Lake to the ocean to the west, can be traced through the genetics of promiscuous oaks and the artifacts and stories of small and distinct bands of Pomo people.[1] Together, these entangled networks of matter and meaning point to dynamic relationships among people, among oaks, and between the two groups of beings.[2] Grindstone rocks, covered in smooth depressions where acorns were cracked and ground, mark clearly where human and acorn came together. Blackened middens are traces of where Pomos may have helped oaks thrive with controlled burning of conifers.

Cries of "gold" in the area changed the dynamics considerably. By the 1850s, calls for the extermination of Indians were everywhere, and white settlers traded Indian heads for payment by local governments.[3] Ranchers

RECIPE FIGURE 4.1 Acorns and oak leaves on display at the Multispecies Salon in San Francisco. Photograph by Eben Kirksey. See multispecies-salon.org/acorn-mush.

grabbed Indian men, women, and children for forced labor, in part to clear away oaks and other trees to open rangeland. Official genocide gave way to displacement, land and resource alienation, social isolation, and repression of cultural practices. Well into the 1960s, one could still find "no dogs or Indians allowed" in storefront windows in Mendocino County. Meanwhile, ranches gave way to orchards and, later, vineyards, leaving still less space for the odd oak tree and more fences between Pomo people and those oaks.

But Pomo people and their relations, the oaks, have hung on. A reservoir of biological, social, and cultural strength has enabled them to ride out together a century and a half of extreme hardship. Providing mutual support, both are reclaiming land lost to them and are together more often again. It is not too much to imagine a future in which Pomo people and oaks, companions for so long, encounter each other daily in relationships of sustenance and care, with both exhibiting vigor and diversity.[4]

Acorn mush—like the stories of Bloody Run or Bloody Island told to young Pomo by their parents and grandparents, stories of massacres, forced marches, and internment—is bitter. The old women whose words animate this recipe and its meaning argue over how bitter it must be, but they all call

it medicine. They laugh at the children who want it sweeter, who do not understand the balance that Pomo people expect and value between sweet and bitter, comfort and pain, bounty and deprivation. The oldest leach the acorns of just enough tannin to avoid stomachaches, leaving enough "toxin" to heal them of the legacy of settler violence. This bitter remedy, although less stark, recalls Charles Eastman's account in *Soul of the Indian* (1911) of the Sundance ceremony among Lakota becoming more difficult. Piercings became more numerous and extreme as a reaction to violent events.[5] Bitter medicine heals in a bitter time.

Acorn mush is microbiopolitical: It is a partial remedy for industrial agriculture, the homogenization and marketing of everything edible.[6] Acorns are generally traded and not sold. Pomo collectors sort through many wormy and spoiled acorns to get those we can eat. Collectors recognize differences among stands of oaks and even individual trees in the types of acorns they produce and their quality. They see in acorns and oaks a way back to older practices—or, at least, a way for older and newer approaches to articulate with one another.[7] Those who eat acorn mush value the labor and skill of the collectors, whom they generally know, and together they engage in the creation of a biosocial community. Acorn mush cannot be bought on a trip to a chain grocery store. It can be, at its best, an affirmation of a Pomo way of getting food that declares, "We are still here," oak and human alike, and getting stronger.

Our recipe is the result of a compromise between Pomo women who gathered around a table at the Pinoleville Pomo Nation offices. They sat and talked together about oaks and acorns, about mush and recipes. They laughed at the differences between Pomo bands and families—their varying tastes in mush. The women discussed their favorite acorn gathering sites and which species of oaks they prefer. Linda Noel's mother makes the mush for the annual Big Time celebration, the primary Pinoleville Pomo Nation social gathering. She had the largest say in articulating this recipe:

> 1. Gather acorns in the fall (as they fall) from black oak, white oak, and tan oak. Watch for changes in bird activity and the color of leaves to know when to collect. Share, or don't, your information about trees that are giving generously in a given year with your human neighbors. The flicker, woodpecker, and deer have already located their favorite trees. Remember to share with them—we need them for feathers and meat. We are less sympathetic to feral

pigs that gobble up the bounty. Place the acorns in a secure location. In the old days, we had granaries. Now we keep them in a five-gallon bucket or wicker basket.

2. Dry the acorns by letting them sit in the sun for a week. Crack and remove the shells. Here is where the hard work begins.

3. Clean the acorns with a small knife to get the remaining inedible parts out—the bits of shell and skin surrounding the kernel. It is a time of work but can also be a time of visiting, sitting outside, and noticing clouds passing by, the color of the day, the curious woodpeckers looking to get in on the action.

4. Grind the acorns into flour. We used to sit on huge rocks with depressions made by generations of pounding. Now we use a meat grinder and flour sifter, quick and easy for our lifestyles today. We often do this alone, as did our generations past. These are moments of reflection (while we sweat).

5. Construct a mound. We once used sand along the creek's edge and held the acorn flour in a pit covered with wild grape leaves. Now an old tire will do or anything that can securely hold a piece of cloth, preferably cheesecloth. But we prefer a mound of sand that drains slowly.

6. Stretch cloth over the mound so it can hold the acorn flour and place the flour on the cloth.

7. Place small cedar (*calocedrus decurrens*) branches over the flour to give flavor to the mush.

8. Pour water over the cedar and the acorn flour to leach out the bitterness. If you leach more, you lose more bitterness. Some of the old women like the mush bitter, so be careful not to leach too much—we do not want "Cream of Wheat." The bitterness is medicine, after all.

9. Dip water out of a bucket and slowly pour it over the cedar branches and flour many times. Do this for several hours, as needed, occasionally tasting the flour that is becoming more like dough. When we did this by the creek, we would just take creek water. Make sure you have a good water supply.

10. Taste and leach until you get the right amount of bitterness. Some like acorn mush quite bitter; others don't. Older ones tend to like the bitterness much more than do young ones, but this also differs by family and community. Anna says that bitter is stronger medicine and bitterness in life makes you stronger.

11. Cook the dough, adding water to control thickness. In the old days, we made baskets specifically for cooking mush. Rocks were heated in an outdoor fire, and with two branches the rocks were dumped into the mush held by the baskets. After the mush bubbled, the rocks were removed. We now use a gas stove at the Big Time event, stirring the mush regularly and keeping the heat low enough not to burn the mush.

12. Add another branch of cedar (*calocedrus decurrens*) to the mixture for flavor.

13. Stir constantly. As the mush thickens, it will stick to the pot.

14. Remove the cedar and serve the mush in small portions.

Mush goes well with cooked meat and fish. Today, we sometimes eat it with bread made from "commods." The irony of juxtaposing US Department of Agriculture commodities, mass-produced canned meat and beans from an unknown Midwestern location, with our self-collected and prepared bowls of localized mush is not lost on Pomo people. But we are full of contradictions, aren't we?

POMO AND OAK RECOVERY

> I don't mind being "close to nature." But I know what *they* mean when they say that, and it's not what I mean.
> —Linda Noel, Koyungkawi poet and acorn mush maker

The conversation at the Pomo Nation offices shifts from recipes to efforts to nurture more oaks—or, in contemporary natural resource management parlance, oak restoration. It is tribal staff members who now speak to the Pomo women, explaining what they are doing in their daily work on reservation land and why.

We begin with a first step, the retrieval of an oak seedling started from an acorn that fell in the soil behind our office. The soil was compacted and poisoned by heavy metals and dense petroleum hydrocarbons left by wrecking yards and double-wide trailers that made themselves at home during the termination era for the Pinoleville Pomo Nation. The seedling is now more at risk from the shoes of playing children or tribal staff gaming the time clock, standing in the shade. The seed germinated and sent up its first stem and leaves in the spring of 2008. It competed with poison oak and blackberry, which have also taken refuge in the narrow woodland on the hill behind us, caught between wrecking yard and road.

Our former housing director, who used to work for Masonite—the once great consumer of local timber, now defunct—suggested we put the oak seedling in a pot and bring it along to our newly built greenhouse. He was afraid that the maintenance guys would kill it with their weed eater. And anyway, it could not grow to maturity where it germinated. There was not enough space between the hill and the office for a fully mature oak.

Even though few people remember how to make mush free of stomach-twisting compounds, everyone remembers that oaks fed Pomos back in the day. The local organic brew pub has expressed interest in serving acorn mush if tribal citizens will produce it. The oak is also about healing race. Seeing more oaks makes tribal elders happy, although oaks compete for space with fruit trees and alders (good for smoking fish). Pomo people feel hopeful about their own prospects, it seems to us, when they know we are nurturing oaks. There is gratitude to oaks and a shared history, a mutual dependence.

The oaks also participate in the Pinoleville Pomo Nation's scientific idioms of recovery. They represent "native species." The more local, the better. Some native plant experts—from forest company professionals trained in distant universities to self-taught lovers of local landscapes—advise that

only genetic stock from within five miles of the tribe's lands really counts as "native." We try to meet this standard, but such notions of local purity and hard categorizations have disquieting associations. Pomos and oaks were both travelers and mixers, cosmopolitans in their own ways. We will, on occasion, go to the local nursery to buy an oak, a taller one, further along in its development, if it meets a need. But the locals, over time, have demonstrated to us their superior viability. So we now dig up seedlings that begin in our back yards, taking them only a short distance to an area recovered from the wrecking yard, cleaned of old trailers and their appliances and furniture, household trash, and the oak-unfriendly items people call solvents and disinfectants. In the cleaned area, the oaks cast shade on a creek to which we hope fish will return one day, too. The short trip is better for the seedlings than a long trip from the nursery anyway. We imagine the growing trees will like having the water nearby, as our years become drier. But they will let us know if it is too wet. Their leaves will fall, and their branch tips will blacken. We will have to protect them from invasive bamboo brought by the US Army Corps of Engineers to stabilize the banks of our local waterways.

A Pomo-oak alliance represents a shared politics of resistance during the colonial era, when white settlers brought plants, animals, and diseases that damaged Pomo and local vegetation alike. It is far from a perfect alliance: The Pomo only now are beginning to make mush again from the acorns, and the oaks do not like the pavement around Pomo buildings or the trash that drips who knows what alien chemical onto the roots. But the alliance has value. The tribe will mark the recovery of land with oaks as a potent symbol of Pomo culture. The oaks will profit from tribal sovereignty and the stories Pomo tell about history, culture, and the role of acorns in their lives. To threaten oaks and acorns is to threaten Pomo, and we will protect each other.

A more general concern about vanishing species (and cultures) brings environmentalists to the alliance, whether they are from federal agencies or conscious local landowners, such as our logging company neighbors and the irrigation shop across the creek. Acorns will bring other fauna, especially the deer that we want to see more of, too. We have to figure out how to advance the influence of this kind of multispecies alliance. We feel danger on the horizon, and elders speak of difficult times ahead.

As we plant the oaks, we think of new ways to regenerate tribe and tree. We have gained access to a patch of oak woodland now, thanks to the generosity of our logging company neighbors and, perhaps, institutional pressure from the Forest Stewardship Council (FSC), which indigenous peoples have helped push toward a reckoning of the effects of forestry on those with

RECIPE FIGURE 4.2 A barren oak tree silhouetted against the sunset. Photograph courtesy of CopyrightFreePhotos. See multispecies-salon.org/acorn-mush.

deep, complex, and original ties to places.[8] This is a site where Pomos once camped, and we feel the presence of good spirits there. We pray and listen and feel for their approval of what we call, for our funders, a "restoration" project. It is a bit different from that, though. Our restoration cannot focus on mitigating the ravages of the agro-industrial economy and the housing, roads, and infrastructure entangled with it. We cannot seal away "pristine" nature to ease the psychological burdens of our overstimulated neighbors, or even focus on the hydrology or climate-related services of a protected, "natural" landscape, as some funders would have it. We are in a different historical moment. We need to plant more densely, to water more regularly, to weed and burn and harvest in one small spot rather than over the vaster expanses where Pomo used to travel. We need to get lots of basketry and arbor materials, lots of medicine, and lots of food out of this small patch. We need a freshly cultured landscape. Oaks will be at the center of these efforts.

For now, the acorns are scarce here on forest company land. We must go elsewhere to fill our burlap bags. And there is another complication: We look for the tan oak stands that are weeds to the forest company. These produce Pomos' preferred acorns. However, we must plant other species, valley and

black oaks, at the old village site, as these are not a threat to the forest company's moneymaking trees. Yet we continue to search the tan oak stand for acorns outside our project site. These are the ones the older people like. We now serve them again at social events, such as the Big Time, and we can see parents and grandparents talk to children about the flavors. Some kids are drawn to the taste—the ones with older spirits in them, everyone remarks. But the tribe in general is taking up again the practice of eating this food with respect and gratitude.

We have ideas for producing and enjoying acorns on a grander scale. We are making bread and soup as well as mush. We think about preserving acorn products for shipping and introducing them to local schools and businesses. There is some danger here: Will we harvest with reverence if we produce at this scale? Will we know the individual trees and how much and when they produce, when they need trimming or protecting from parasites, when they need to rest and recover from our attentions? We hope that expansion will bring more tribal people and others into relationships with oaks and acorns but in a way that strengthens older tribal ways of being in the world, harvesting modestly and mindfully, rather than bringing oaks and acorns into a commercial exchange that ravages the oaks and creates more spiritual distance between us and our ancestors. We need to proceed carefully, in a Pomo way.[9]

So much of the landscape is greedily secured behind fences, material and social, but we have identified a few generous trees and groves where we can collect the best acorns. We have gone and sung prayers to the oaks, thanking them and wishing them well, and have filled our bags. We know an elder who makes good mush and who is willing to show us how. The kids have learned to crack the acorn shells, and we have an old-style grinding rock and a blender to make flour. We have the pots, the sand, the cedar boughs for leaching, and the flame for cooking.

If we produce the acorns, if we share the recipes, will our readers join us in a different kind of food way? Will they make space for mush, for acorns, and for Pomo people in their lives?

NOTES

1. Dodd, "Promiscuity in Oak Woodlands."
2. Margolin, *The Way We Lived*.

3. This history is only recently acknowledged by the state of California: see "Bloody Island," accessed January 13, 2013, http://www.hmdb.org.

4. In *When Species Meet*, Donna Haraway teases out many of the (potential, emerging) qualities of human–non-human relations, insights that are not at all strange to most Native Americans.

5. Eastman, *The Soul of the Indian*.

6. Pomo-acorn relations resonate with Heather Paxson's exploration of the politics of locally grounded, artisanal food production that cannot easily be homogenized and scaled up and sanitized. Her notion of microbiopolitics embraces life with other species—bacteria particularly—that involves pleasure and risk, nourishment and discomfort, labor and reward: see Paxson, "Post-Pasteurian Cultures." See also the interlude in this volume.

7. Clifford, "Indigenous Articulations."

8. The Forest Stewardship Council (FSC) includes the protection of indigenous people's rights among its principles and criteria. The forestry company with which the Pinoleville Pomo Nation works is certified by the FSC. Tribal staff have been interviewed about the company's relations with indigenous peoples, and the ensuing report calls on the company to expand relations with other tribes and advance co-management projects. The FSC's discussion of its commitments to indigenous peoples is at http://www.fsc.org, accessed January 13, 2013. It should be noted, however, that many people feel there is much room for improvement in the FSC's work: see, e.g., FSC Watch, accessed January 13, 2013, http://www.fsc-watch.org. In the end, the Pinoleville Pomo Nation would like to manage oak woodlands for itself rather than through a company.

9. Contingencies govern the coming together of new groups: marketers and oaks, consumers and mush makers, Pomo and non-Pomo in the case of all of us who wrote this essay and who are involved in oak-related work. But if we proceed slowly, keeping relationships among Pomos and oaks at the center of our thinking, we dare hope that a "coalescence," as Anna Tsing and Elizabeth Pollman call it, will emerge that can change local landscapes and histories for the better and perhaps even model something for the wider world: Tsing and Pollman, "Global Futures."

CHAPTER 4

LIFE CYCLE OF A COMMON WEED

Caitlin Berrigan

It was like a scene from *Repo Man* (1984) in which all of the products are brandless and packaged with the same blue-on-white text, indicating exactly what they are and nothing else: milk, beer, corn flakes. The hardware and garden supply in my farm community sold forty pound bags labeled "DRIED BLOOD" in generic red-on-white. The huge bags were piled by the door, as if to remind you to grab one on your way out among other sundries such as chewing gum, flashlights, and pocket screwdrivers. I marveled to think that more than my own body weight in dried blood slouched by the cash registers. What was it for, anyway? My mother, an amateur botanist, explained that blood is a fertilizer high in nitrogen and can be dried and sold as a byproduct of industrial slaughterhouses. Blood is not new to agricultural systems. Lush gardens sprouted with the blood of slain beasts appear in the Talmud and in twelfth-century Persian poetry.[1] The blood of mortal wounds from protagonists of ancient Greek tales gave rise to hyacinths, violets, crocuses, and mythological plants such as the Prometheion and the *moly*.[2] I am enamored of blood as a substance and as a symbol of vitality. But as a lifelong carrier of the hepatitis C virus, my own blood carries with it the sinister potential of seeding another person with disease. I was intrigued that my own blood—hazardous to humans—could nonetheless be useful to plants.

This nugget of horticultural information lay dormant until the concept for an artwork germinated years later: *Life Cycle of a Common Weed*. The idea is to stage an encounter between plants and humans involving the exchange of nutrients. Blood from a human body nourishes dandelions with nitrogen.

In turn, the root and leaves of the dandelion provide nutritious and medicinal sustenance to the human. The artwork exists as a performance, visual documentation, an event, and a perpetual cultivation. In the narrative that follows, I describe the emergence of this project from a web of embodied knowledges, multispecies encounters, cultural symbols and practices, dialogues, and lateral transfers. I infect the philosophical abstractions of the artist's statement genre with a situated auto-ethnography that joins the artwork to nodes of questions and contexts but by no means circumscribes its entire network of connectivity.

A growing fatigue with the militancy used to address human-viral encounters led me to develop a series of artworks, including *Viral Confections*, *Tea Party to Befriend a Virus*, and *The Knit Virus* (2006–2008). These sculptural works are activated in public settings to invite nondidactic discussion about chronic illness, hepatitis C, art and medicine. The arrangement facilitates free-form, public conversation about matters typically confined to private medical settings. The artworks engage what the anthropologist Heather Paxson calls a "post-Pasteurian" *microbiopolitics*. Paxson extends Foucault's concept of biopolitics to describe the "potentialities of collaborative human and microbial culture practices" among artisanal cheese makers who cultivate the triumph of tasty and edible bacteria over pathogenic ones.[3] Beyond cheese, Paxson's microbiopolitics imply the structuring of interspecies transactions. They are at once intimately *micropolitical* in the sense of Gilles Deleuze and Félix Guattari's detailed, supple movements of power and subversion that complement the rigid centralization of *macropolitics* and *microbiological* in scale, extending out into the molar realm of populations through globalized trade and travel, where the (micro) biopolitical becomes a geopolitical concern of sovereign powers.[4] In resistance to this sovereign language, I am interested in delineating a micropolitical space to air the complicated antagonisms, codependencies, and evolutions in our relationships to pathogens. The friend-or-foe model hardly suffices for human interrelations. How could it suffice for human-microbial relations? Fear-inducing and xenophobic language used to describe disease frightens people away from learning how to coexist safely and intentionally with microbes. In these artworks, I seek not to normalize viral encounters but to amplify them so that microbial "actors" must be recognized as part of what being in the world is about.[5]

Life Cycle of a Common Weed emerged from my prior work about coexistence with microbes. It also germinated from my routine of self-care and my body's inability to respond to biomedical pharmaceuticals. Raised by working-class, back-to-the-land white hippies, I was taught at a young age

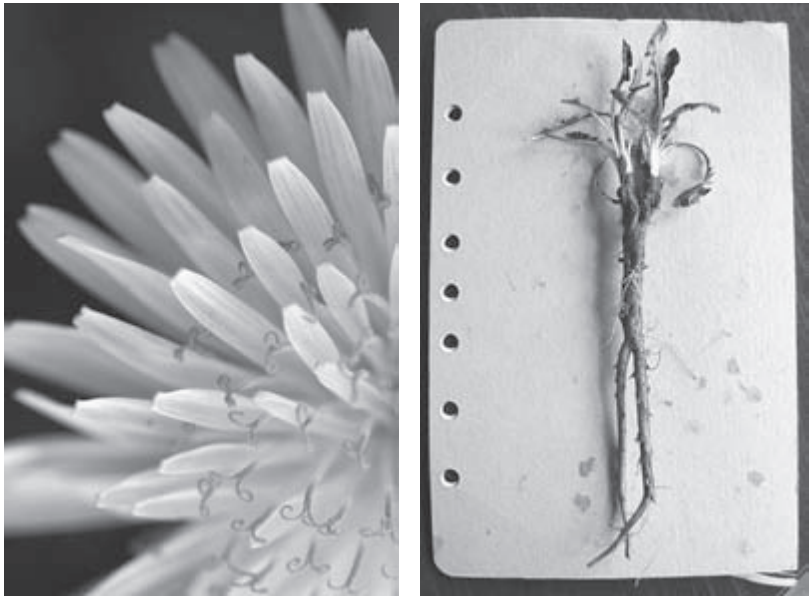
to forage for herbal remedies in the redwood forest as well as at the grocery store—operated by a lesbian commune. Among the therapeutic plants to treat hepatitis C is the common dandelion, *Taraxacum officinale*.

Despite its place in pharmacopeias of many centuries, the dandelion is listed among weeds by the US Federal Government.[6] A PubMed search for "*Taraxacum officinale*" produces as many studies on the therapeutic effects of dandelions for humans as it does the efficacy of various herbicides on them. A prolific weed that contaminates lawns in one context, the dandelion is a rarified medicinal commodity in another. The dialectic of the dandelion matches the dialectic of blood, which may be a contaminant in one context and a rich source of nutrition in another. My artwork involves feeding virally contaminated blood to dandelions as a cultivation of reciprocity. The disputed merits of the materials foreground how relating to bodies and diseases are just as complex, codependent and antagonistic—layered with tenderness and brutality.

CONTAGION AND CULTIVATION

Hepatitis C is a blood-borne virus that, according to the World Health Organization, accounts for chronic liver illness in approximately 3 percent of the world's population, or an estimated 185 million people.[7] Among the top ten causes of death in Americans age twenty-four to seventy-four, hepatitis C kills at least fifteen thousand people per year in the United States.[8] There is no vaccine. It is the most common, chronic, blood-borne viral infection in the United States. But the virus is not widely understood by the public. With a confusing and bland name, hepatitis C affects motley demographics: people with a history of injection drug use, health and emergency workers, veterans, incarcerated people, patients who underwent blood transfusion or kidney dialysis prior to 1992. No other forms of social identity or class are dominant among these groups that might otherwise band them together. A collective identity grounded in a shared, technoscientific biological experience—what Paul Rabinow names *biosociality*—has not appeared for hepatitis C.[9] There is no biosocial patient advocacy group proportionate to the magnitude of the epidemic. Hepatitis C is distributed and heterogeneous. It is, for example, racially complicated, as white men represent the quantitative majority of those infected, while the greatest prevalence is among African American men.[10]

Nor does hepatitis C have what the cultural historian Priscilla Wald calls an "outbreak narrative," like the "emerging infections" that sent fris-



FIGURES 4.1–4.2 Dandelion flower photograph by Andrew Magill (http://www.flickr.com/people/amagill/) and roots by Damon Taylor (http://www.flickr.com/photos/ocean_of_stars).

sons around the globe at the end of the twentieth century and beginning of the twenty-first century, foretelling apocalypse accomplished by microbial agents. Xenophobic narratives surrounded the emergence of the human immunodeficiency virus (HIV), severe acute respiratory syndrome (SARS), ebola, the West Nile virus, bird flu, and H1N1 swine flu. Hepatitis C, by contrast, has had a slow and insidious emergence over twenty years, with research that has been correspondingly sluggish. Like the dandelion, hepatitis C is relatively inconspicuous, yet it is all around you once you look. It is this ubiquitous, weedy quality of the hepatitis C virus that I wish to instrumentalize in my artwork. Lacking an outbreak narrative, hepatitis C could perhaps serve as a model for being–with microbes once their outbreak narratives have cooled into complacency. Often reinforcing social stigmas, xenophobia, and moralized behavior, the outbreak narrative favors rhetoric of battle, fear, and heroic drug innovation. Yet questions of contagion, proximity, communication, and communicability remain underexamined. Wald reminds us, "The interactions that make us sick also constitute us as a community," and diseases dramatize "the most basic of human narratives: the necessity and danger of human contact."[11] Issues of commingling and becoming in ongoing

The common dandelion, *Taraxacum officinale*, populates sidewalks, industrial wastelands, fields and manicured lawns. Each part of the dandelion is edible. The long, brittle taproot and leaves contain the richest nutrients, and can be processed for tea and herbal remedies. Dandelion is a safe and popular medicinal plant that promotes the flow of bile and reduces inflammation in the liver and gallbladder. It is higher in beta-carotene than carrots, has more iron and calcium than spinach, contains many B vitamins as well as biotin, inositol, potassium, phosphorus, magnesium, zinc and insulin. Dandelion root is a helpful remedy for hepatitis C, other liver conditions, kidney disease, diabetes, hypoglycemia, and stress (Brill and Dean 1994; Balch and Balch 2000). Native to Europe and Asia, the dandelion is widely recognized as a medicinal plant, first noted in tenth-century Persian medical manuals (Kowalchick and Hylton, 1998, 141). European colonists intentionally introduced dandelions into the United States (circa seventeenth century) to stave off scurvy and malnutrition at the end of the winter (Gade 1991; Mack and Erneberg 2002; Mack 2003). Dandelions propagate easily in human-modified landscapes, swiftly proliferating in the disturbed soil of lawns and empty urban lots. It is non-invasive, as it does not prohibit the growth of other plants. Today, over half a million pounds of herbicides are purchased in the United States, most of which are applied to dandelions and other unwanted plants, in the country's largest irrigated crop: the lawn (Kiely et al., 20). Dandelions are among the key targets of chemical industry advertising campaigns, such as ads that tell consumers "Don't Eat 'Em Defeat 'Em."

social-viral encounters outlive the outbreak narrative. These are the questions I sought to interrogate with art.

Life Cycle of a Common Weed is thus a gesture of reciprocity in which I cultivate dandelions and fertilize them with my own blood. Blood containing human pathogens remains a good fertilizer for plants. I can give to the dandelions what would be a danger to any human, emphasizing the fertility of contaminated blood and the nourishment of weeds in a reciprocal plant-human exchange of sustenance. The standard Western treatment for hepatitis C has changed little in the past fifteen years. It remains expensive and is only about 50 percent effective.[12] *Life Cycle of a Common Weed* is my microbiopolitical tactic to circumnavigate Western medicinal orthodoxy and corporate interests.[13] The artwork returns biomedicine to the weeds as a way to reconsider our relationship to viruses, the material possibilities of our own bodies, and vegetal empathy. I created a system of exchange on the margins of biomedicine, subverting and complementing the biopolitical role of

clinical medicine and even alternative remedies. It was therefore important to the symbolic intentions of the project that I learn how to draw my own blood with venipuncture. Acquiring this knowledge necessitated maneuvering within medical territory that patients do not typically traverse.

A generous friend in medical school taught me venipuncture in her apartment-style dorm. The apartment was packed with pharmaceutical swag, from Viagra soap dispensers to folding Levitra ballpoint pens that erect to full stature with the touch of a button. Doctors are notorious for their own illicit drug use; thus, the apartment was regularly stocked with sharps disposal containers to protect sanitation workers from needle sticks when handling the garbage. Despite the elusiveness of my veins and the frustration they have caused many phlebotomists, I managed to draw a tube of blood on the first try. Soon I was a self-sufficient phlebotomist and patient of my own becoming.

Creating an illusion of self-sufficiency, I form a circuit in *Life Cycle of a Common Weed* between two parties: the plants and me. I want to emphasize a kind of DIY, micro back-to-the-land form of medication; to close off social and political indifference, pharmaceutical profiteering, and the tired rhetoric of battling disease. The dandelion, a disparaged weed, has much to offer the stigmatized person with disease. Rather than being stamped out with pesticides, it is allowed to flourish in a cycle of mutual cultivation. *Life Cycle of a Common Weed* is what I call a "pathetic political gesture." Genuine in its reach toward empathy and self-care, this intervention is inevitably deficient. I find parallels in *Flood: A Volunteer Network for Active Participation in Healthcare*, an indoor hydroponic garden initiated by the art collective Haha from 1992 to 1995 that provided bacteria-free greens to immunocompromised people living with HIV. In the absence of effective treatment and feeling the urgent need to *do* something, the community mobilized in this gesture, as much a means to cultivate plants (after all, not that many) as a way to cultivate dialogue, community engagement, and empathy. *Flood* and *Life Cycle of a Common Weed* share the ethos of what the interdisciplinary researchers Beatriz da Costa and Kavita Philip call "tactical biopolitics" to renegotiate bio-power within the art context.[14] As artist Laurie Palmer reflects, *Flood* was "somewhere between usefulness and metaphor."[15] The intention of *Life Cycle of a Common Weed* is to catalyse the usefulness of metaphor.

As *Life Cycle of a Common Weed* entered the public realm, this small, closed transaction modestly began to disrupt the everyday biopolitical order and codes of taboo that regulate bodies and their microbiological traces. I held a residency in 2007 at the Rensselaer Polytechnic Institute's Center for Biotechnology and Interdisciplinary Studies, at the invitation of the BioArts

FIGURE 4.3 *Life Cycle of a Common Weed* (2009), Caitlin Berrigan. Public fertilization of dandelions with human blood in exchange for a dandelion sprout. Mills Gallery, Boston. Photograph by Caitlin Berrigan.

Initiative. Spearheaded by the artists Kathy High, Daniela Kostova, and Rich Pell, the initiative began as the first formalized collaboration between art and biotechnology in the United States, aligned with the practices of artists such as the Critical Art Ensemble, Adam Zaretsky, and the Tissue Culture and Art Project.[16] These artists, among others, have worked directly with biotechnical materials and processes to question modes of biopower from within and on the margins of institutions. My performance documents were exhibited alongside large geodesic dome viral capsids and a few pots of foraged urban dandelions. I held *Tea Parties to Befriend a Virus* inside the viral domes and served chocolates in the shape of the hepatitis C virus. The tea parties occasioned the first multidisciplinary socializing in the new Biotech Center, attended by undergraduates, administrative staff, researchers, artists, and scientific technicians. One conversation included a scientist who lovingly shared details of her twenty-year research fascination with the virulence of hepatitis B. Another scientist, who studies the chemistry of the lipid surface of hepatitis C, said this was the first time he had seen the visual structure of the virus. Some attendees who had family with hepatitis C were eager to learn about its health effects but had been afraid to ask. The dialogue was loose, distributed, and enduring.

Yet for some people in the building, the photographs of me drawing my blood with a butterfly needle provoked concern, and rumors began to circulate that I had tainted the chocolates with hepatitis C; that I carried HIV; that I was a drug user; that the viral domes were potential sites of infection. Anxiety about the spatialization of real bodies and biota touched a delicate nerve—even in a center of scientific research. The officer of biosafety paid me a visit, accompanied by the operations director. "When was the last time those dandelions had blood?" he demanded to know. He asserted that the dandelions violated the biocontainment protocol of the center's laboratories, despite the fact that the public area where the plants were exhibited was subject to rules of hygiene, but not those of lab safety.[17] Despite my careful explanation that transmission of hepatitis C occurs through direct blood-to-blood contact and not via potted plants, it was clear that fear was the issue, not safety. When he threatened to shut down the exhibition, I admitted that the dandelions had not yet been fertilized with my blood. After some debate about whether the project was a lie or a metaphor, the exhibition was allowed to continue.

Squeamishness toward needles aside, *Life Cycle of a Common Weed* is rather benign as performance art. Artists such as Marina Abramovic, Orlan, Ron Athey, Ana Mendieta, and others extend the possibilities of bodies in far more painful and voluminously bloody public performances. Ritual, catharsis, taboo and the sacred all figure strongly into the work of these performance artists. The art context, as an institutional framework and a public space, can be the stage of conflicting biopolitical agendas. Bodies and biota are configured according to what Mary Douglas calls "a systematic ordering and classification of matter," and practices that are a "contravention of that order" become threateningly ambiguous. Such "matter out of place" (art, questionably pathogenic blood, fluids, weeds) is managed through the symbolic system of taboo, which "confronts the ambiguous and shunts it into the category of the sacred."[18] The sacred space of ritual and ceremony is the designated site within the symbolic system where a subject becomes, according to Victor Turner, "undifferentiated raw material"—an ambiguous figure undergoing cathartic transformation.[19] In the sense that the "shock of the new" is a ritual under modernity, the contemporary art context operates as a designated sacred space as it explores, exposes, and reconfigures the taboo. In making explicit the perimeters of normalcy and comfort, the performance of the taboo and the dramatization of ambiguity offer the catharsis of transgression within the delimited zone of art exhibition.

In *Life Cycle of a Common Weed*, I confront ambiguous "matter out of

place" and shunt it into the category of the everyday by de-sensationalizing the act of opening up the body and reappropriating it in a quotidian act of plant cultivation. During the incident at the Rensselaer Polytechnic Institute's Biotech Center, my intervention questioned the boundaries among territories where permeable human bodies, microbes, and vegetal matter all circulate. *Life Cycle of a Common Weed* is not a cathartic and sensational transgression of taboos. Instead, it embodies a kind of relational aesthetic of "matter out of place" by serving as "the linking element, a principle of dynamic agglutination" in the realms of human-microbial-social relations.[20] The project engages the relational aspects of biopolitics by giving rise to anxieties about the containment of bodies, fluids, and infections, even as these fears may have little to do with actual danger. Potted dandelions fertilized with blood in the center's lobby may not have violated protocol and may have been no more threatening than the disposal bins for sanitary napkins in their restrooms. But the dandelions disrupt the spatial circulation of risk. Defined boundaries—public-private, my body-your body, viral-human—become less distinct upon closer examination. *Life Cycle of a Common Weed* may not transgress those material boundaries, but it turns the gaze toward a micropolitical "zone of indiscernibility" populated by slippages, ambiguities, and lines of escape from power.[21]

The incident at Rensselaer Polytechnic Institute indicated that my project is not a closed, private transaction between the plants and me but, instead, a site for the private and public to converge and make apparent the biopolitics of boundaries and relations. It became an opportunity to create a micropolitical, post-Pasteurian revision of the outbreak narrative that contended with other people, microbial actors and vegetal agents moving through space. I decided that it was important to invite other bodies into this system of circulation. *Life Cycle of a Common Weed* then became another transaction, one in which the public was solicited to fertilize the dandelions with their blood in exchange for dialogue, dandelion root tea, and seedlings.

BECOMING ENDOGENOUS

As a collective activity, drawing out blood from our bodies and feeding it to weeds facilitates lateral transfers on several different levels, including communication, contagion, interspecies mingling, and incorporation. Venous blood is not an excretion or a secretion but a fluid whose flow is induced only by bodily disruption.[22] Such disruption initiates subjective disturbances and places us in a zone of uncertainty and anxiety, a productive liminal space.[23]

An aesthetic of pathetic absurdity pervades *Life Cycle of a Common Weed*, encapsulating a genuine desire for transformation in the face of apparent insurmountability. I am not farming humans for dandelions, and a small prick from the finger is not quite equivalent to being uprooted, chopped, toasted, and made into tea. Yet the caring gesture of intentional blood transfusion to a weed provokes conversation about the possibility of empathic interspecies encounter. Empathy describes a stepping outside of oneself that enables an imaginative alter-subjectivity. I imagine the dandelion as a reciprocal empathic subject that offers its own vegetal matter as a disproportionate remedy for a diseased person within a vacuum of social responsibility and care. Nevertheless, this encounter is not without antagonism, inevitably becoming embroiled in the fruitful dialectic of consumption. *Life Cycle of a Common Weed* entails the eventual and complete destruction of the dandelion as autonomous plant for its use as nutrition, exactly the dilemma of human exceptionalism and interspecies encounter problematized when Donna Haraway writes, "Trying to make a living, critters eat critters but can only partly digest one another. Quite a lot of indigestion, not to mention excretion, is the natural result, some of which is the vehicle for new sorts of complex patternings of ones and manys in entangled association."[24] The mutuality of these associations is what Haraway calls "becoming with," an expansion of Deleuze and Guattari's concept of "becoming" through alliance as opposed to filiation.[25] Yet "becoming with" encompasses interspecies antagonisms and the conundrum of human exceptionalism.

One of the key dyspeptic elements in the *Life Cycle of a Common Weed* transaction is the viral matter *not* incorporated by the plants. The symbolism of the blood as a gift (rather than poison) persists because human viruses do not (so far) infect plants. As agents of evolution, viruses can perform lateral genetic transfers among unrelated organisms.[26] After the human genome was sequenced in 2003, endogenous retroviruses were found to account for 8 percent of the volume of human genetic material as parasitic symbionts that laterally integrated with humans.[27] The anthropologist Stefan Helmreich describes viruses as "alien to vitality yet enmeshed with it." In an antagonistic, transductive becoming with across the interspecies evolutionary bramble, "viral genes usher the liminal, putatively nonliving, into the genetic center of 'life' itself."[28] Helmreich proposes a "symbiopolitics" to rethink the social relations of micro- and macrobial worlds.

It is this liminal, unseen, exogenous other that I ask us to consider "becoming with" in *Life Cycle of a Common Weed*. We are not battling disease but enmeshed with it. Contagion is everywhere as our permeable selves come

into proximity with one another and potential contaminations. In supervising the circulation of the unseen within a fluid world, which boundaries do we claim? Acknowledging the liminal presence of viruses and contagion is to dissolve the molar scale of plant-human transaction to the micro scale. Deleuze and Guattari argue that desire and proximity, the force of "becomings," are "already molecular."[29] "Becoming molecular" is to become particulate in our interrelations, to frame social relations symbio-politically. I formulated *Life Cycle of a Common Weed* as a zone of proximity for material, corporeal transaction, as well as for intersubjective empathic encounter and dialogical transformation. The audience must be enlisted in this material exchange of blood and plants. Within these circuits of consumption and digestion, the dialogical exchange doubles with vertigo as the audience itself becomes a medium within the artwork. This piece involves "becoming endogenous," whereby the audience and the artwork become indistinguishable.

The first public enactment of *Life Cycle of a Common Weed* took place at the Multispecies Salon in San Francisco, 2008. After serving dandelion root tea and sharing information about the cultivation and consumption of this nutritious weed, I invited members of the audience to fertilize pots of live dandelions with their blood. I provided each of the ten volunteers with over-the-counter implements used by diabetics to measure glucose: cleansing pads and a sterile lancet. I demonstrated how to massage fingers to increase circulation to the tips, swab the skin with alcohol, administer the lancet, and squeeze a few drops of blood into a small cup of water to dilute the potent substance. One person found the hygiene excessive and wanted people to share plastic cups to avoid being wasteful. (I had to refuse.) To de-sensationalize the procedure was the goal, not to normalize or be complacent about the real potential for infection if safety protocols were not followed. Once all the volunteers had squirted their drops of blood into individual cups and packaged up their tiny wounds, I pooled the collections of blood in a single cup and poured it all unceremoniously into a pot of dandelions. One woman, Linda Noel, went home to share the health benefits of dandelion tea with the Pomo people of Northern California, where diabetes is an ongoing problem.

TACTICS OF ANXIETY

During an exhibition opening a year later, at the Boston Center for the Arts Mills Gallery in 2009, the crowd lingered by the food table near dandelions in a large, sculptural planter. Someone read the artwork label that listed "small quantities of human blood" among the materials and said, "Oh there's

blood in there. Maybe viruses." In response, people gently cupped their hands over their drinks, as if the blood had pervaded the air and fluid around them. *Life Cycle of a Common Weed* thus produced anxiety as biotic material was eaten and transformed and as the virus—the exogenous other with unknown metamorphic and biotic potential—lurked in the environment. Both the disruption of boundary formations and the liminal presence of contagion produced anxiety. The HIV/AIDS epidemic in the age of microbiology had brought awareness to the porosity of bodies, while leaving incomplete the detailed knowledge of disease etiologies and access to their prevention. We can identify the virus as an agent, but to speak for this intimate alien as a subject would be illusory. The viral, in between living and dead, occupies the liminal zone of imagination. As it opens into this zone, anxiety has productive political potential (see plates 5 and 6).

I am more interested in disruption as an artistic strategy rather than in the catharsis of shock. The intention to shock is manipulative, funneling the audience to one margin or another and narrowing the nuance of response. More often than not, the most interesting issues raised by shocking artworks are silenced because the audience is preoccupied with the emotional tumult of offense, or the smugness of identifying with the naughty perpetrator, or disinterest because the artwork is not extreme enough. Polarization fails to recognize the tendency of individuals to waver, to be hypocritical and uncertain, to fail even amid our best intentions, to be stumped. Certainly, *épater la bourgeoisie* is sometimes the necessary and effective approach, and shock is entirely subjective. But for the insidiousness of everyday biopolitics, anxiety and ambiguity are richer political territory.

In the sense that catharsis is the expulsion of excrement, or, as the *Oxford English Dictionary* defines it, the "purification of the emotions through vicarious experience," *noncatharsis* is the interminable suspense of the purgation of tension.[30] Anxiety is a noncathartic feeling that has had no legacy of inspiring Greek tragedies, operas, or epic novels. Unlike anger or sorrow, the incoherent tensions of anxiety lack cathartic release. Anxiety is among the literary theorist Sianne Ngai's taxonomy of "ugly feelings" that "could be said to give rise to a noncathartic aesthetic: art that produces and foregrounds a failure of emotional release (another form of suspended 'action') and does so as a kind of politics." Ngai traces the spatialization of anxiety not as a matter of interiority, but as a vertiginous in-between of unarticulated insides and outsides. The self-reflective agitation of anxiety, she argues with some contempt, has become the "distinctive 'feeling-tone' of intellectual inquiry itself" in the modern era.[31] Anxious intellectual inquiry turns rationality into an

inconclusive oscillation. It is the antecedent to absurdity, which is similarly noncathartic in its complete suspension of reason and failure to cohere.

Artworks that reveal the boundaries of our anxiety without pushing us to one edge or another instead make us sit with ourselves in a festering confusion. Such artworks might bring us to a becoming with, an openness to transformation through contact, contagion, and encounter. Although I hope to have developed a site of potential with concern and responsibility, the cathartic resolution of intellectual inquiry is left with the audience. The artwork may not bring about satisfaction or offer the opportunity to absolve guilt. But in revealing layers of ambiguous emotions, it opens a space to confront uncertainty and to engender responsibly in an embroiled world of permeable, distributed biota.

RECIPROCITY AND ALLIANCE

Two days before a public fertilization at the Mills Gallery, I received an apologetic message from the curator, informing me that he had decided to cancel the event: "I just heard back from someone from the Department of Public Health, and it is illegal to handle human blood if you are not a certified nurse. And also an inspector from the Department of Public Health *must* be present. I'm really sorry, um, give me a call, please." Naturally, I was confused but not surprised. I responded, "I do not, by any means, wish to do any illegal activity or endanger anyone, which is why I carefully researched these methods and their uses. I am still unclear about what is specifically illegal about my proposal." Disappointed but optimistic, I imagined that an interesting bureaucratic dialogue might emerge that would ensnarl spatial fluid trafficking within public and private spaces and institutional unintelligibles. Instead, the curator admitted that his own anxieties had prevented him from discussing the event with the board of the nonprofit gallery. The blood fertilization was one potential liability among many in an exhibition that already contained frozen spit, fire code hazards, false alarms, a moving column, live plants, and a sharp sword. He had simply gotten uneasy and, at the last minute, contacted the Department of Public Health. After discussing the procedure again, it was clear that nothing was illegal or unsafe. He courteously gave me the option to proceed, with the understanding that it would put him in a potentially "awkward" position. Despite the dangers of hitting a nerve in the institutional ganglia, I persisted with actualizing the event.

Life Cycle of a Common Weed is not just about laying bare the fastidious micro workings of biopolitics within institutions. Rather, this anxiety-producing

zone of contagion is a potential site for intimacy, alliances, and reciprocity. It needs the audience for its realization. At the public fertilization event at the Mills Gallery, I collected drops of blood from volunteers one at a time, including the curator. I provided each participant with the same over-the-counter implements we used in the Multispecies Salon. Some were nervous and asked me to do it for them (as a certified yet uninsured phlebotomist, I could not take on the liability), while others were confidently well versed in these medical gestures. Within the unfamiliarity of these actions, there was much room for thoughtful meandering. Some asked which viruses could be airborne and how; the differences among hepatitis A, B, and C; whether mad cow disease could be communicated through plants; whether viruses enjoyed the climate of soil. Many participants asked detailed questions about bodily fluids as plant fertilizers, from which long conversations ensued about techniques in gardening, foraging, urban subsistence farming, *Little Shop of Horrors*, and *Soylent Green*. After pouring their diluted blood into the lush planter full of dandelions, participants received a small cup of dirt with dandelion seeds to grow at home. Many were careful to choose which of the dandelions in the planter looked like they needed the most attention. Some suggested that I should have just left the dandelions in their weedy lots, where they would have been happier. Several weeks later, some participants sent photographs of freshly sprouted dandelion greens sunning in windowsills.

The material and symbolic cominglings of the audience with the artwork can form shifting relations among the audience members themselves and with me, as the administrator of the gesture. Giving blood has a symbolically rich history linked to nation building and can facilitate social transactions and alliances outside hereditary "blood bonds."[32] The overwhelming response of blood donation after the events of September 11, 2001, in New York attests to the identification of self within the substance of blood—the gift of one's own vitality for another. Yet many human substances such as placenta, hair, blood, organs, eggs, tissue samples, and umbilical cord blood are entrenched in global circuits of commerce that belie the notion of the "gift."[33] Narratives of altruism and civic participation, which bestow virtues on the giver, promote the extraction of blood even if, as Catherine Waldby and Robert Mitchell suggest, the process of fractioning blood "maximized the use value of the donation but also diluted its ontological and civic value, making it more like a pharmaceutical substance and less like a gift from one citizen to another."[34] Yet this does little to change the dynamics of blood donation on the supply side, as powerful imagery of the gift persists.

In his study of blood donation in Denmark, the anthropologist Steffen

Dalsgaard probes the "strategies of reciprocity" used to maintain a stable base of blood donors. In the absence of a one-to-one transaction of whole blood to a patient in need, and excepting moments of crisis such as 9/11, what maintains donors' motivation? Dalsgaard identifies how a connection is established with the grateful and hospitable nurses, who acknowledge donors as whole beings, provide juice and chocolate, and serve as surrogates of reciprocity by accepting the blood donation. The latter is critical, Dalsgaard argues, because "the donor is accepted when his or her gift is accepted, and a certain degree of reciprocity is intrinsic in the acceptance and reception itself. This is why it is said that giving is a gift in itself."[35] The human staff that constitute the medical arena are the symbolic and material mediators of fluid transfers enabled by technoscientific advances. In a philosophical account of his own liver transplant precipitated by hepatitis C, Francisco Varela describes the entanglement of the medical "team," the technoscientific stewards, with his embodied experience and the offered body, the organ that "came tumbling down a complex social network from a recently dead body to land into my insides in that fateful evening."[36]

In *Life Cycle of a Common Weed*, I am the pivot of reciprocity between the public and the dandelions. My role in creating a safe, welcoming environment and clear, methodical instruction helps to establish trust. Pedagogy is integrated into the activity itself, showing by doing requisite biosafety procedures, acknowledging each member of the audience as a whole person, accepting the gift of his or her participation, explaining the mutually nutritious properties of blood and dandelions, and allowing ample opportunity for questions and discussion among the participants. If willing, the audience contributes its curiosity and altruism to accomplish my artistic intentions. The work finds its way into the bodies of the audience, resolving the material and conceptual transfer to create a third space in which the boundary between the artwork and the audience is itself permeable and indistinct. In its non-catharsis, the tension of *Life Cycle of a Common Weed* expands outside the event as fresh attention is brought to bear on microbial exchanges, weeds, and pre-articulate political agencies. Such expansion is principally expressed as a "strategy of reciprocity," whereby the artwork is a dialogical encounter to forge alliances among people—however temporary—in which mutual acknowledgment may form the basis for resistive micropolitical interventions and knowledge production within viral biopolitics.

NOTES

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1. Stanley, *Mothers and Daughters of Invention*; Bynum, *Wonderful Blood*; Khayyám and Powell, *Quatrains from Omar Khayyám*.

2. Conticelli, "Sanguis Suavis," 55–63.

3. Paxson, "Post-Pasteurian Cultures"; Foucault, *The Birth of the Clinic*.

4. Deleuze and Guattari, *A Thousand Plateaus*, 208–31; see Braun, "Biopolitics and the Molecularization of Life," 6–28.

5. See Latour, *Reassembling the Social*.

6. USDA, 2009.

7. WHO 1997, 2014.

8. St. John and Sandt, "The Hepatitis C Crisis."

9. Rabinow, *Essays on the Anthropology of Reason*.

10. Manos et al., "Limitations of Conventionally Derived Chronic Liver Disease Mortality Rates"; St. John and Sandt, "The Hepatitis C Crisis"; Fleckenstein, "Chronic Hepatitis C in African Americans and Other Minority Groups."

11. Wald, *Contagious*.

12. As this book goes to press, significant changes to the treatment of hepatitis C are taking place with the introduction of highly effective, oral medication. The high cost of treatment remains a pressing political issue (WHO 2014). See the World Health Organization, Guidelines for the screening, care and treatment of persons with hepatitis C infection.

13. Paxson, "Post-Pasteurian Cultures"; Dumit, "Foreword."

14. da Costa and Philip, *Tactical Biopolitics*.

15. Palmer, *With Love from Haha*, 65

16. Kac, *Signs of Life*; Hauser, *Sk-interfaces*; Pandilovski, *Art in the Biotech Era*.

17. See US Department of Health and Human Services, *Biosafety in Microbiological and Biomedical Laboratories*.

18. Douglas, *Purity and Danger*, xi, 44.

19. Turner, *The Forest of Symbols*, 98.

20. See Bourriaud, *Relational Aesthetics*, 21; Bishop, "Antagonism and Relational Aesthetics."

21. Deleuze and Guattari, *A Thousand Plateaus*, 226.

22. Farage and Maibach, *The Vulva*, 150–60.

23. Turner, *The Forest of Symbols*.

24. Haraway, *When Species Meet*, 31.

25. Deleuze and Guattari, *A Thousand Plateaus*, 234.

26. Margulis and Sagan, *Acquiring Genomes*.

27. Ryan, "Human Endogenous Retroviruses in Health and Disease."

28. Helmreich, *Alien Ocean*, 192.

29. Deleuze and Guattari, *A Thousand Plateaus*, 272.

30. Catharsis, *Oxford English Dictionary*, available online: http://www.oed.com.

31. Ngai, *Ugly Feelings*, 9, 215.

32. Titmuss, *The Gift Relationship*; Starr, *Blood*; Walby and Mitchell, *Tissue Economies*. See Weston, "Kinship, Controversy, and the Sharing of Substance."

33. Scheper-Hughes, *Commodifying Bodies*; Walby and Mitchell, *Tissue Economies*; Landecker, *Culturing Life*; Cooper, *Life as Surplus*.

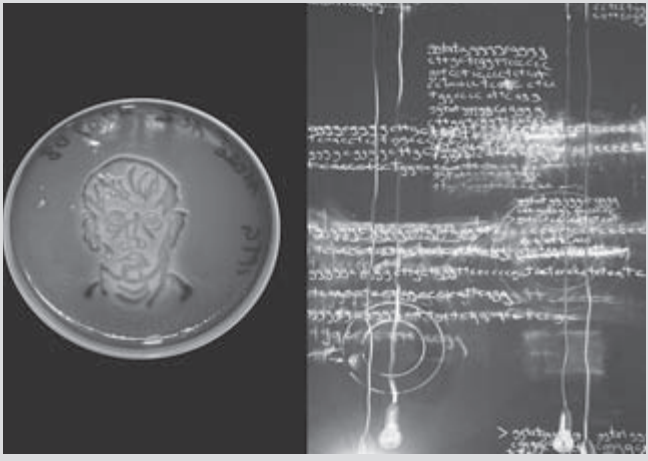
34. Walby and Mitchell, *Tissue Economies*, 43–44.

35. Dalsgaard, "I Do It for the Chocolate," 112.

35. Varela, "Intimate Distances," 260.

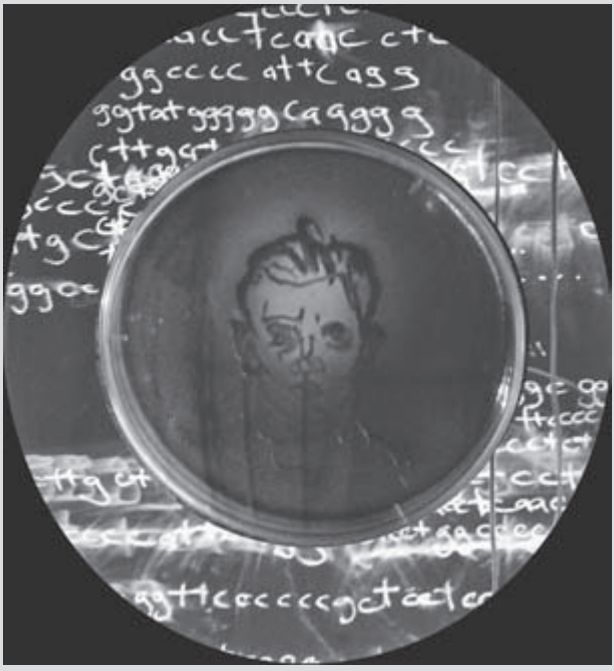
PART III

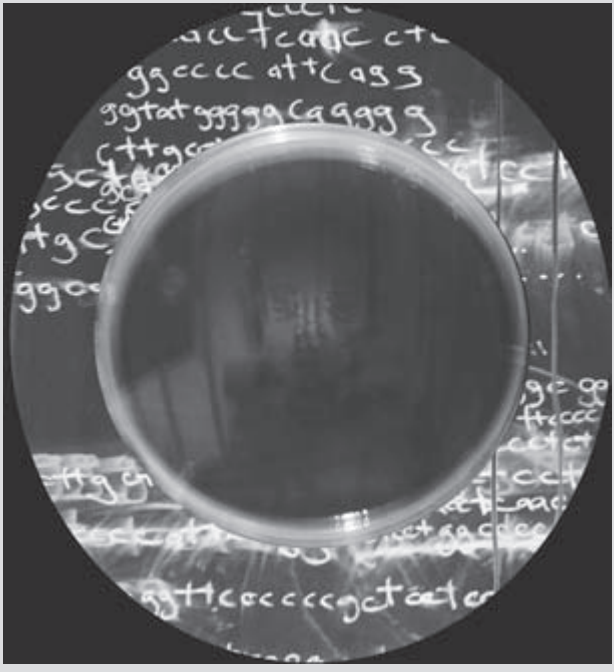
LIFE AND BIOTECHNOLOGY



THE FACTS OF LIFE are becoming increasingly malleable in the age of biotechnology. We conducted a biodiversity survey at the Multispecies Salon to take inventory of organisms that have been created by humans. The exhibit featured the Australian artist Andre Brodyk's *Alzheimer's Portraits*, in which living bacteria illuminated the faces of patients with Alzheimer's disease as they grew in Petri dishes. The portraits started out bright and distinct. As the paintings aged, they faded into darkness—just like the memory and personality of people afflicted with Alzheimer's. The portraits suggest a longing for lost identities. Brodyk says they depict no one in particular. Dredged from his own uneven memories, they are images of what any of us might become. Ghosts from the past merge into prognostic futures. The transgenic bacteria that Brodyk created to paint the portraits included "non-sense" regions of the human genome—or, in popular parlance, "junk DNA." He isolated a 158-base-pair fragment from the human gene for apolipoprotein E (APOE), a protein that helps to carry fat in the bloodstream. One form of this gene, APOE ε4, is associated with a marginal increase in the risk of developing late-onset Alzheimer's. Instead of using DNA that actually codes for the protein, however, Brodyk chose his fragment from one of the four segments that are regarded as junk, since they have not been ascribed a biological function. Genetic junk interests Brodyk because it lies at the very edge of the boundary between living and inanimate matter. "Can non-coding DNA be given a new lease of life through modern biotech processes?" he asks. The uncertain hopes Brodyk places in these genetic fragments speaks to broader dreams and nightmares that are orbiting around emergent forms of life. Amid speculation about scientific breakthroughs on future horizons, new forms of life are running wild.

FIGURES P.3–P.5 (*overleaf and opposite*) Andre Brodyk, *Alzheimer's Portraits*, mixed media (2009–2013). Courtesy of the artist. See multispecies-salon.org/brodyk.





CHAPTER 5

LIFE IN THE AGE OF BIOTECHNOLOGY

Eben Kirksey, Brandon Costelloe-Kuehn,

and Dorion Sagan

Life has become a multispecies spectacle in the age of biotechnology.[1] Multispecies spectacles, to poach a page from Guy Debord's *The Society of the Spectacle*, involve exploitative "social relations between persons in their work" where not all the "workers" are human persons with contractual rights.[2] Social life, for Debord, is rooted in the "oldest of all social divisions of labor, the specialization of power." Debord suggests that "the spectacle is not a collection of images; rather, it is a social relationship between people that is mediated by images."[3] Spectacles alienate spectators from contemplated objects when illusions are staged that promote false consciousness. Workers who are enlisted in the production of these illusions are also kept separate from one another in *The Society of the Spectacle*—they are united only in the production of common images. Departing from Debord, we explore the specialization of power in biological domains.[4] We give biographical details about hidden laborers—multiple species of animals, plants, and microbes—who sustain the life of humans and creatures we love.[5]

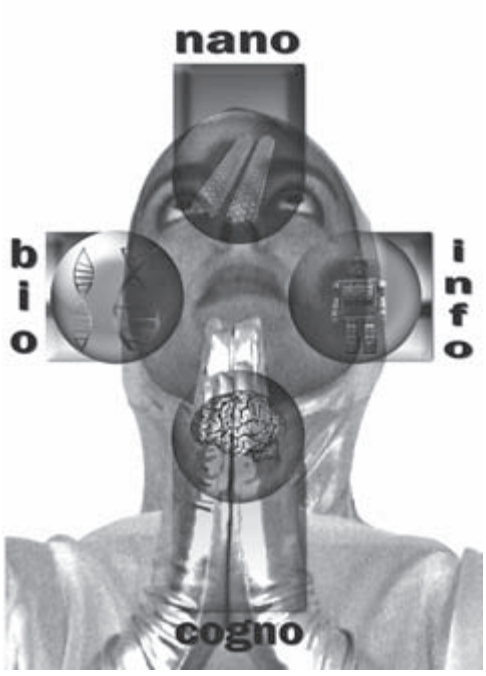
Artists engaged in spectacular warfare at the Multispecies Salon, pitting the logic of the spectacle against itself and exposing and interrupting scientific regimes for managing and producing life.[6] Images purloined from biological laboratories were displayed alongside creatures that had been created by humans and were needy for care. The gallery became an ethnographic para-site where artists, biologists, and anthropologists explored accountability and responsibility in the entanglement of knowing and being. Moderately empowered intellectuals gathered together at Salon events to think through the changing conditions of life in the age of biotechnology.

Gleaning insights from ethnographic encounters in the Salon, we began "following the people" (bioartists plus biologists) and "following the things" (creatures in their care). We will dwell on spectacular works of bioart—pieces that illustrate how multiple species have been united in the production of common images, commodities, and forms of life.[7] Following the impulses of some artists, we will explore the implications of freeing laboratory laborers and letting the products of biotechnology run wild. We will also showcase subtler attempts to dismantle multispecies spectacles. Amid feelings of alienation and illusions of separation, this essay explores an aesthetics of attention, responsibility, and care that has been developed by bioartists who use living entities in their works of art.[8] Amid the proliferation of wild dreams and schemes, fabulous promises by biotechnology boosters, this essay explores sites of modest biocultural hope.

SPECULATIVE FABULATIONS

In April 2011, the Reverend of Nano Bio Info Cogno blessed the opening of the Multispecies Salon in New York City. Her church proclaimed the liturgy driving emergent technologies—nanotechnology, biotechnology, information technology, and cognitive neuroscience—forward into an imagined new millennium. Bringing fantastical prophecy and an outrageous sermon to Manhattan, she ministered to the masses on Fifth Avenue and led scholars in sing-along hymns at the City University of New York (CUNY) Graduate Center. Forcing uneasy encounters with the messianic promises of technology and science, the Reverend generated critical feelings of ambivalence. She celebrated human biological enhancement and brain-computer interfaces by heralding the coming Singularity.

In *The Singularity Is Near*, the futurist Ray Kurzweil envisions a coming event that will usher in an unknowable future, an era beyond our imaginative horizons.[9] Rather than ask us to repent in the historical present to save civilization, Kurzweil asks only that we embrace our destiny.[10] The Reverend's performance generated troubling diffractions by holding a mirror up to Kurzweil's Singularity.[11] Proselytizing on Fifth Avenue, she invited wary bystanders to imagine the ultimate techno-communion: "Upload your consciousness into the computing cloud and leave your meat body behind! Come join the only true religion left on the face of the Earth. People of New York, be saved!" By amplifying and distorting the spectacular claims of modern prophets, the Reverend of Nano Bio Info Cogno exposed pervasive illusions about the potential of technology to bring about salvation.[12] Her gospel exaggerated



FIGURES 5.1–5.2 The Reverend of Nano Bio Info Cogno. Image (*top*) by Praba Pilar; photograph (*bottom*) by Erika Hannes. See multispecies-salon.org/pilar.

and parodied messianic visions. Conflating salvation with biological death, claiming that believers might leave their "meat bodies" behind, the Reverend rearticulated a strangely familiar prophecy about technological rapture.

The Reverend of Nano Bio Info Cogno is an avatar of the Colombian performance artist Praba Pilar. When out of character, Pilar is an articulate critic who is quick to point out how emerging technologies are entrenching divides marked by geography, race, and class.[13] Pilar has an ambivalent relationship to modern medicine: Her own life was saved by a biotechnological miracle in 1999. After completing a four-month treatment with Rebetron, then an experimental drug, she was brought back from death's door. A lethal virus was reduced to undetectable levels in her blood. Rebetron, sold by Schering-Plough, is now the standard of care for people with her condition. Pilar nonetheless is of two minds about the promises heralded by experimental biomedicine. Her older sister also participated in an experimental drug trial—the testing of Methotrexate for the treatment of Crohn's disease. The doses were too high, and her sister died during the trial.[14]

Like many who have participated in pharmaceutical clinical trials, Pilar served as an experimental subject so that patients in waiting might become consumers in waiting. Her personal salvation fueled speculations by entrepreneurs who hoped to make money by marketing a new miracle cure. With respect to similar clinical trials in India, Kaushik Sunder Rajan writes, "Biotechnology occupies a messianic space, of technology and of Life linked through capital."[15] Speculative fictions and fabulations have emerged at the intersection of biological sciences and economic enterprises.[16] Amid the dazzling spectacles in this messianic space we found that pharmaceutical compounds have become ambivalent figures—containing modest personal hopes of future patients and residue of suffering by past experimental subjects. At the Multispecies Salon, we found ethical articulations of capitalism—imaginings by scientists who were responding to critiques of biotechnology and structured social inequality.[17] Spectacular images, which were purloined from a laboratory for display in the art gallery, became evidence of a messianic enterprise oriented toward curing the ills of the global South.

LIVELY CAPITAL, DEADLY CUTS

Kate Lindsay, a project scientist in cell biology at the University of California, Santa Cruz, brought living organisms and laboratory artifacts to the Multispecies Salon that illuminated lively forms of biocapitalism.[18] Some critics, such as Pilar, point to deeply structured social inequalities embedded in bio-

medicine. Lindsay's research was a response to the unjust legacies of history and broader research agendas in the contemporary United States. Working on initiatives to develop cures for river blindness and elephantiasis—both diseases that are restricted to the rural poor of the global South—she dreamed of filling a market niche left open by "blockbuster" drugs that target the ailments of the First World elite. Embodying elements of Donna Haraway's "lively capital," this drug development initiative involved relationships "in which commerce and consciousness, evolution and bioengineering, ethics and utilities were all in play."[19]

River blindness and elephantiasis are both listed by the World Health Organization as "neglected tropical diseases." Both are diseases are caused by *Wolbachia*, a queer bacteria that lives inside slender and threadlike filarial worms. More than 120 million people, primarily in Africa and Southeast Asia, have elephantiasis, a disfiguring disease that can cause extremely inflamed legs, which can grow to the size of an elephant, or massively swollen scrotum. About eighteen million people suffer from river blindness, the second most common cause of blindness in the world. Lindsay's research was guided by ethical commitments to address the ills of these people, as well as by the promise of incorporating her work into emergent economic ventures; she was also drawn to the study of these diseases, however, by surprising multispecies relationships.[20]

Wolbachia bacteria are very abundant microbes that live inside the bodies of invertebrate animals.[21] In addition to causing river blindness and elephantiasis in humans, by entering human bodies via filarial worms, these promiscuous parasites live inside the cells of spiders, insects, mites, crustaceans, and nematodes. They tend to be transmitted vertically, from "mothers" to "children," rather than horizontally by infection. Classic biomedical textbooks contain tales about human sperm and eggs that naturalize patriarchal stereotypes about productive men and wasteful women; the *Wolbachia* literature refracts related tales through the microbe's imagined point of view: "Because males are not transmitters, they are 'waste' from the perspective of the bacteria."[22] Maximizing their transmission across generations, *Wolbachia* adjust and transform the bodies and the reproductive dynamics of their invertebrate hosts. In some crustaceans and in at least one insect species, these bacteria perform a gender-bending trick. They can send a chemical signal that changes genetic males into reproductively viable females.

Working at the intersection of three powerful forces—ethical imperatives to cure diseases of the rural poor in the global South, alluring promises of biocapitalism, and her own curiosity about peculiar microbial agents—Lindsay

set about trying understand and disrupt entanglements connecting *Wolbachia* to filarial hosts. During her everyday labor in the lab—as she pipetted chemicals, spliced genes into insects, operated a confocal microscope—she harbored modest personal hopes.[23] While she had little chance of developing a "blockbuster" drug, a critical discovery about *Wolbachia* could enable her to transition out of the academy into a well-paid position at a biotechnology company. While speculating about her own possible futures, Lindsay manufactured images illustrating the distribution of *Wolbachia* in the tissues of their invertebrate hosts. Although these images appear as only dim dots and lines to the untrained eye, they are spectacular in a technical sense. The production of these images was mediated by surprising relationships among multiple species.

Lindsay displayed images she co-produced—with help from bacteria, fruit flies, jellyfish, rabbits, and goats, among other lively agents—at the 2008 Multispecies Salon in San Francisco. This multispecies spectacle was showcased alongside fruit flies infected with *Wolbachia* bacteria—living art objects kindred to Marcel Duchamp's "Readymades." The installation became an opportunity to give a classic question that Donna Haraway first asked in "Situated Knowledges" a new twist: "With whose blood were my eyes crafted?"[24] The images of *Wolbachia* bacteria on display in the Salon were produced with the blood of rabbits, as well as by "anti-rabbits," a glowing molecule generated by the immune systems of multiple other species. Anti-rabbits are antibodies that have been transformed into a standard molecular imaging technology. They are widely used to illuminate microscopic structures and forms of life. Following anti-rabbits down a proverbial rabbit hole into the Wonderland of immunochemistry reveals a spectacular matrix of multispecies relations.

If Lindsay's work was driven by hopes oriented toward the future—a spirit of biocapitalistic speculation shot through with clear ethical commitments—it was also entangled in a commodity market of biomaterials. Santa Cruz Biotechnology is just one firm, among many, that commercially manufactures anti-rabbits, enabling the production of common images by bringing multiple species together in laboratories. Value-added molecules are produced with the blood of free-range animals, according to "John Tinkel," a pseudonym for an employee of the company's Technical Service Department, whom we interviewed by telephone. "We have a big ranch," said Tinkel, "with goats, cows, and chickens all roaming about. The animals only come in once or twice a year when they give blood." The methods of multisited ethnography ("following the thing") dictate that we should have met the actual animals giving blood at the Santa Cruz Biotechnology ranch, but Tinkel would not

FIGURE 5.3 Living fruit flies and images of *Wolbachia* bacteria inside fruit fly cells. Photograph by Eben Kirksey. See multispecies-salon.org/wolbachia.

let us visit. Fire bombings of researchers' homes in nearby neighborhoods, allegedly by animal rights groups, had put the local biology community on edge.

If we take Tinkel at his word, then elements of lively capital are at play in the enterprises of Santa Cruz Biotechnology. A vision of ethical biocapitalism, a consciousness of animal welfare concerns, is embedded in his description of molecular intra-actions that make the animals on his ranch useful to human enterprises. "Goats are among the most popular species for producing anti-rabbits," he said. "After the technicians inject elements of rabbit blood into the goat, all they have to do is wait—the immune systems of the goats do all the work." Weeks later, technicians collect bags of blood—biomaterial that is treated as a surplus product. This blood contains antibodies to rabbit molecules, the anti-rabbits. Even if Tinkel's "workers" do not have contracts, everyone, he says, is invested in ensuring that the animals have long, productive lives. As the goats age and acquire more immunological "experience," they become better at producing specific antibodies. After isolating anti-rabbits from surplus blood, the technicians attach fluorochrome, a molecule that glows under a specific wavelength of laser light. The resulting product, which appears as a clear liquid to the naked eye, is

then bottled in vials and sold to laboratories, like the one in which Lindsay works, for basic research.

Uncritically applying the language of labor to animals, their immune systems, and biomaterials risks a certain misplaced concreteness. Stefan Helmreich cautions against regarding animals, microbes, or even semi-living matter as productive forces "in themselves." Entrepreneurs mistakenly identify productivity as the essence of animals when they regard other creatures as accumulated labor power, ready to be harnessed.[25] Instead of misplacing animals in concrete shackles forged by capitalism, Helmreich suggests that we focus our attention on the processes that enlist them as agents into systems of production. Still, Haraway insists on "taking animals seriously as workers" even though they are not working "under conditions of their own design."[26] She contends that *human* labor power is only part of the story of lively capital. Riffing on Haraway's insights, and playing with Tinkel's language, we understand anti-rabbits as multispecies commodities in the same way as we understand Lindsay's images as multispecies spectacles: as objects that congeal exploitative "social relations between persons in their work" where not all the "workers" are human persons with contractual rights.[27]

Santa Cruz Biotechnology sells vials of anti-rabbits via its website for prices that start at $70 for half a milliliter. By themselves, these bottles of reified liquid are useless. Actual rabbits, working in the same role as the animals on the Santa Cruz Biotechnology ranch, are necessary to get anti-rabbits to illuminate molecules of interest. In making her images of *Wolbachia*, Lindsay first isolated surface proteins from the bacteria, then injected them into a rabbit. The immune system of the rabbit then tailor-made a new antibody that sought out the *Wolbachia* bacteria living inside cell cultures. When anti-rabbits were added to the cells and illuminated with the right wavelength of laser light, the images finally emerged. The colors in the images purloined from Lindsay's research were arbitrary artifacts of the process rather than the colors of the DNA or bacteria themselves.[28] Two species of anti-rabbits, each attached to a distinctive fluorescing dye (fluorochrome), were used to offer multiple perspectives on the bacteria contained in a single fruit fly cell. The surface proteins of *Wolbachia* appear as red dots (see the left side of figure 5.3) while the genetic material of the fly and the parasitic bacteria glow blue (in the center). The glowing background of these images, the cytoskeleton of the fruit fly cell, was created by a different process—through transgenic manipulations. Genes for the green fluorescing protein (GFP) from a jellyfish were inserted into the DNA of the fruit fly to illuminate its cellular structure. In the composite image (on the right of figure 5.3), the *Wolbachia* hover out-

FIGURE 5.4 A vial of anti-rabbits. Illustration by Madeleine Boyd. See multispecies-salon.org/wolbachia.

side the light-blue nucleus of the fruit fly cell. The bacteria glow a purplish pink, interspersed among the chaotic green lines of the fly's cytoskeleton.

Actual rabbits are usually bled to death, or "sacrificed," when anti-rabbits are used to visualize microscopic forms of life.[29] More than a mere euphemism for unnecessary slaughter, sacrificing animals in the biosciences is what Michael Lynch calls a "rendering practice" that transforms animals and their tissues into signifiers with meaning for members of specialized research communities.[30] The free-range goats at the Santa Cruz Biotechnology ranch reportedly enjoy long lives while producing standardized molecular commodities, but the specialized molecules produced by rabbits in individual labs are useful only for the particular experiments at hand. Every last drop of this rabbit blood is thus valuable. The individual animals have become expendable.[31]

Anti-Rabbit Art, a mixed media installation created for the 2010 Multispecies Salon exhibit in New Orleans, invites the mind's eye to fixate on the micro-processes and oblique powers involved in creating images that drive the speculative ventures of biocapitalism. Cameron Michel and Vashti Windish, a pair of artists who founded the Live with Animals gallery in Brooklyn, brought together the grotesque and the beautiful, the twinned elements of Victor Hugo's sublime, in co-producing this piece with Eben Kirksey. Two long filarial worms run down the center of the collage in a curlicue squiggle

FIGURES 5.5.–5.7 (*above and opposite*) *Anti-Rabbit Art* by Cameron Michel with Vashti Windish and Eben Kirksey. Photograph by Cameron Michel. See multispecies-salon.org/wolbachia.

framing clouds in the center. Faint traces of *Wolbachia* populate a dark background of cells, like a night sky filled with colorful stars, while the raw flesh of a skinned rabbit looms large in the foreground. An actual rabbit, borrowed from a New Orleans breeder who raises animals for sale as pets and food, took up temporary residence in front of the piece drawing attention to pictures of glowing rabbits, transgenic animals with the jellyfish gene for Green Fluorescing Protein (GFP) gazing toward the horizon line.[32]

Pulling messianic visions of biocapitalism out of the clouds, *Anti-Rabbit Art* invites us to consider the multispecies spectacles animating life and death in the age of biotechnology. Spectacles, in the realm of social life, are what people look at rather than looking at each other. "The spectacle reunites the separate," writes Debord, "but reunites it as *separate*."[33] Reuniting images of organisms that are laboring separately in the shadows of biocapital, *Anti-Rabbit Art* exposes and inhabits the realm of the spectacle. While visionaries of the biotech industry remain focused on speculative futures, pinning fabulous dreams to possible drugs, this piece refocuses the gaze of viewers on actual beings living among us in the present. Rather than serve as a vehicle of moral messaging ("Thou shall not kill!"; "Save the rabbits!"), this work of art sets the stage for a series of critical questions: As social justice principles are starting to guide biotech ventures, what ethical dilemmas remain in the realm of the biological?[34] What are the implications of breaking down architectures that separate laboratory laborers and allowing for the proliferation of multispecies interactions? Are emergent life forms beginning to run wild?[35]

WILD HOPES

Responding to a call for "wild artists" by the curators of the Multispecies Salon—an invitation to push Joseph Beuys's famous decree, "You are all artists," beyond strictly human realms—Adam Zaretsky gave the questions orbiting around the exhibit a whimsical and provocative twist. Zaretsky, who describes himself as a "demented naturalist," was already renowned for framing microbes, insects, and plants as creative agents. Years before the Salon, at the Salina Art Center in Kansas, he installed the *Workhorse Zoo*—juxtaposing "great hopes invested in the products of genetic engineering" with "biophobic visions of environmental apocalypse."[36] Zaretsky lived inside a biosecure container for a week—putting himself on display as a representative of *Homo sapiens*, a creature that he regards as a "spectacular life form."[37]

Breaking open the cages and vials that usually contain common laboratory laborers, he documented interactions among multiple species—fruit flies, yeast, *Escherichia coli* bacteria, *Xenopus* frogs, mustard plants, zebrafish, and mice.[38] "Things are really fun," Zaretsky wrote in an e-mail from inside the zoo. "I'm smelly and spastic. The first day was cleanroom suit day, today was techno-spazzy cleanroom day, tomorrow is bioterror day, followed by medical day, caveman day, wild animal day and summed up with infantilism day (with a fig leaf on my diaper)."[39]

The *Workhorse Zoo* was planned while Zaretsky was teaching at San Francisco State University as a visiting professor. While working with students, he unintentionally released a multitude of mutant fruit flies. Some of these escaped flies were a common strain used in developmental biology laboratories called "antennapedia," monstrous forms with legs instead of antennae growing out of their heads.[40] Certainly these tiny monsters contained "hopes for accountability for techno-biopolitics," to purloin a phrase from Haraway.[41] Local administrators began to demand a different sort of accountability. The released mutants, and the scope of Zaretsky's artistic vision more generally, set off a firestorm of e-mails from the university's Committee for the Protection of Human and Animal Subjects. One committee member wrote that Zaretsky's work "shows a totally cavalier and disrespectful attitude for animals" and worried that it would draw unwanted attention from animal activists, as well as US government regulators. Maneuvering as a trickster and a provocateur, Zaretsky deftly dodged mandates from the university administration to cease and desist all of his bioart experiments.

Moving from San Francisco to a small city in central Kansas with a $20,000 grant, Zaretsky used his accidental release of fruit flies as an opportunity to probe broader questions about laboratory life. When he posted a message about the escaped antennapedia on an e-mail listserv for fruit fly experts, he learned that mutant and transgenic insects are constantly running wild. "In fly labs, flies get loose all the time," wrote Brad Jones of the New York University Medical School. Chiming in on the same e-mail thread, John Locke of the University of Alberta wrote, "You can eat them, and there is no danger. We often find them in our coffee cups and sometimes not (it was too late—down they go)." During Zaretsky's weeklong stint inside the Workhorse Zoo, he lived cheek to jowl with mutant fruit flies inside a biosecure tank. As church groups, lawyers' luncheons, art appreciation groups, gothpunk contingents, and local farmers filtered through the Salina Art Center, he offered these spectators fresh beer and tastes of fried albino frogs, zebra

fish, mustard greens, and mice—all organisms "whose genomes have been sequenced, partially annotated and altered" (see plate 7).[42]

By displaying and eating this motley array of critters, Zaretsky hoped to provoke a rethinking of fixed moral positions about biotech research and catalyze open-ended discussions. When Amy Rhodes, a cruelty caseworker with People for the Ethical Treatment of Animals (PETA), lodged a complaint with the Salina Art Center, Zaretsky took it as an opportunity to initiate an e-mail debate, writing, "What is PETA's view on the housing of these organisms, in particular the ethics of multispecies housing? Should multiple organisms be allowed to live together under the jurisdiction of human compatriots? How is this different than a nature-ish setting at a zoo or the minimum requirements for keeping laboratory animals? Are any of these settings acceptable or is there a way they can become acceptable?" Rhodes did not directly address these questions, but she did charge that "the animals were subjected to a seemingly arbitrary and gratuitous display of human manipulation. . . . To make matters worse, it appears from summaries of the exhibit that the mouse population may have been allowed to grow uncontrolled. Nowhere is it mentioned what would happen to the animals once the exhibit was over." In response, Zaretsky (and his collaborator Julia Reodica) wrote:

> Of the 50–60 mice (from a start of two moms and two litters of pups minus the four or five that were eaten), about ten were given away as pets. I believe there were a few escapes as well. The rest were let go under an abandoned bridge in a streambed, which runs through a wheat field down the road from the Land Institute in Salina. We are aware that many or all of them may have died and/or been eaten upon release. We are also of the opinion that the non-native CD-1 Wild-Type Swiss mice who have not left the lab for hundreds of generations deserved a chance on their own. It is our sincere hope that some of them make a niche for themselves in the heartland of the USA.

By opening the cages in his Workhorse Zoo, by dismantling his own multispecies spectacle and letting creatures run wild, Zaretsky actualized part of PETA's vision. The animal experimentation section of PETA's website says, "Right now, millions of mice, rats, rabbits, primates, cats, dogs, and other animals are locked inside cold, barren cages in laboratories across the country. They languish in pain, ache with loneliness, and long to roam free."[43] But in releasing these laboratory animals, Zaretsky was also celebrating aspects of wild nature—potentially dangerous, risky, and out-of-control life—that might make PETA activists uncomfortable.[44] Zaretsky was blurring the dis-

tinction between the "new wild," a realm populated by creatures that have emerged amid regimes of biological control, and the "old wild," where wild geese, wild boars, and other feral animals have long roamed free.[45]

Wildness once only existed beyond the reach of domestication in the popular imagination of Europe.[46] New forms of wildness are now emerging in the age of biotechnology as a result of over-domestication and hypercultivation, according to Sarah Franklin. Biological engineering has generated new uncontrollable life forms. Genetically modified organisms (GMOs) are starting to breed with nongenetically modified wild types. Emergent forms of creaturely life are escaping human attempts to fence them in.[47] Bringing attention to where new wild things are, or where they might come to be, Zaretsky staged another spectacle at the Multispecies Salon in New Orleans.[48] Alongside a tank of GloFish, purchased from a local Petco Superstore, Zaretsky posted a critique of laissez-faire approaches to biocapitalism and a libertarian manifesto for modified organisms. He highlighted tensions between environmental risks and "mutant animal rights." "Humans have forced added value upon the GloFish by jamming the flow of hereditary mutation upon them in accordance with anthropocentric desires and other equally sick pleasures. Without the benefits of 3.5 billion years of beta testing, releasing them into the ecosphere is pollution. But, from a GloFish-centric perspective, they deserve to live outside of command and control: the farm, the store, the suburban house, and the sacrificial toilet bowl. They are fish."

Nearby, in the brackish waters of the Gulf Coast, Zaretsky released a group of reproductively viable GloFish.[49] Crafting an "Intentional Release Document," which he displayed at the Multispecies Salon, he wrote: "Speed-mixing of traits does breed inherently irresponsible, interspecies hazards. . . . [But] transgenic life should have a chance to run wild for its own sake, not just for the sake of profit." Perhaps deflecting the alarm of some environmental purists, Zaretsky framed pictures of himself as he "liberated" these workhorses of biotechnology with a big banner alleging, "BP killed my GloFish!" Thanking corporate deregulation for the oil spill, Zaretsky suggested that wild agents of capitalism have generated anarchistic destruction and "a prodigious flight of forms."[50]

Zaretsky characterized BP's Deepwater Horizon blowout as a "free-to-the-public version of Artaud's theatre of cruelty." Antonin Artaud's "theater of cruelty is not a representation," in the words of Jacques Derrida. "It is life itself, in the extent to which life is unrepresentable."[51] Rather than meaning sadism, or the act of causing pain, Artaud regards "cruelty" as a violent determination to denature and destroy the false reality that "lies like a shroud over

FIGURE 5.8 GloFish are transgenic pets available in "six stunning colors": Starfire Red®, Electric Green®, Sunburst Orange®, Cosmic Blue®, Galactic Purple®, and Moonrise Pink.™ Each colored variety has genetic material from a different species—some fish have coral genes, while others have DNA from jellyfish. According to Yorktown Technologies, the company that owns the intellectual property rights to the fish, GloFish "are safe for the environment and make wonderful pets for new hobbyists and experienced enthusiasts alike." Photograph by Yorktown Technologies. See multispecies-salon.org/biotechnology.

our perceptions."[52] This shroud is analogous to Debord's spectacular image.[53] Engaging in spectacular warfare, pitting the spectacle of theater against the society of the spectacle, Artaud hoped to generate order-destroying crises for the spectator "in which his taste for crime, his erotic obsessions, his savagery, his chimeras, his utopian sense of life and matter . . . pour out, on a level not counterfeit and illusory, but interior."[54] Cruelty is at the root of the theatrical spectacle, according to Artaud.[55] Shocking the audience, inflecting performance with this spirit of cruelty, has the potential to break down distinctions that separate the actor, the spectator, and the spectacle.[56]

Sticking with Artaud's idiom, the spirit of Zaretsky's "GloFish Freedom and Reconciliation Project" might be understood as an attempt to expose cruel truths about life in the age of biotechnology. At a moment when capitalism has gone wild, as beloved creatures are being killed by corporate carelessness in massive ecological disasters, novel forms of life are flying from

laboratories amid anarchistic destruction. Tragedy intertwines with comedy in Zaretsky's theatrical performances.[57] Disruption and destruction, struggle and strife might ultimately become the means for establishing an emergent natural-cultural order populated by the riotous diversity of post-human life. Inhabiting and refracting warring spectacles as a trickster figure, he offered monstrous and twisted visions of biocultural hope.[58]

Life in the age of biotechnology has the potential to become "wayward and erratic, deviant from its intended course in wild flight," in the words of Sarah Franklin.[59] By celebrating forms of deviance and the uncalculated promises contained in wild products of biocapitalism, Zaretsky pointed to the potential of wayward life to blossom in wild profusion. Rejoicing in the liberation of critters from the cages of biotech laboratories, Zaretsky disrupted multispecies relations that were producing spectacular forms of life. Rights of individual animals, to life and liberty, were forced into confrontation with ecological concerns. Playing with the anxieties of activists and administrators, taking on the guise of a mad citizen-scientist, Zaretsky also provoked conversations about accountability and responsibility. He intentionally provoked fears of biological contamination. As anxieties and paranoia about bioterrorism began to spread, as speculation about rogue bioartists and biohackers spun out of control, government agents stepped in.

WILD FEARS

Apocalyptic fantasies about contagious microbial agents and paranoid images of imminent biological attacks proliferated in the United States in the aftermath of 9/11. One influential group of bioartists, the Critical Art Ensemble, suggests that this period of American history was shot through with "public bioparanoia derived from a spectacle of fear."[60] Reports of anthrax attacks and avian influenza outbreaks, a phantasmagoria of terrifying shadows, hyperstimulated the collective imagination and displaced hopeful visions grounded in emergent forms of life.[61] As the Critical Art Ensemble made modest interventions in biopolitical realms—bringing attention to emergent forms of life and reckoning with environmental problems that were not being addressed by government regulation—they suddenly found themselves caught up in a terrifying spectacle. In 2004, agents with the Federal Bureau of Investigation (FBI) raided the home of Steve Kurtz, one of the founders of the Critical Art Ensemble, and seized his live *E. coli* bacterial cultures and scientific equipment.[62] Initially, Kurtz was detained on suspicion of "bioter-

rorism," but after a prolonged courtroom battle and serious legal expenses, he was cleared of all charges.[63]

Both the FBI and the Central Intelligence Agency (CIA) began tracking the activities of Marnia Johnston, a key member of the Multispecies Salon curatorial collective shortly after the exhibit's debut in San Francisco in 2008. Johnston attracted this unwanted attention when she set out to learn the techniques of genetic engineering. The genetically modified creatures exhibited by Zaretsky came ready-made; they were all ordinary industrial organisms elevated to the status of "art" by the choice of the artists. Johnston aspired to use genetic tools to craft her own living creatures.[64] At the Multispecies Salon, she featured an example of the work she hoped to create herself: Brodyk's *Alzheimer's Portraits*—faces staring forth from Petri dishes that contain an unsettling combination of hope and frustration. The medium of these portraits was part of the message. Brodyk created his own transgenic organisms by inserting a short fragment of human DNA associated with Alzheimer's disease into *E. coli* bacteria to serve as "paint" on blood-red agar of Petri dishes. Johnston had ambitions to learn new laboratory techniques so she could create similar artworks.

Johnston became involved with Do-It-Yourself Biology (DIYbio), a group of citizen-scientists, so she could share lab equipment and skills with other amateurs. Shortly after joining the collective, she was contacted by "Mills Gurman," a pseudonym for a consultant who was working on a report about "biohackers" for the CIA. "When [Gurman] contacted our local DIYbio group, we hadn't really done anything together yet—there wasn't really a there, there," she told us. Still, Johnston agreed to meet with Gurman, hoping to convince him that her artistic practice, and bioart in general, was benign, posing no public health risks. "The meeting left me wanting to know more about what he would report back to the CIA," Johnston told us, "especially now that the government had my name and associated me with a possible threat."

Government agents began to incorporate Johnston into elaborate fantasy worlds. When a senior special agent from the FBI's Weapons of Mass Destruction Directorate reached out to her in August 2009, she remembers feeling "fresh feelings of anxiety." The FBI agent invited her to the conference "Building Bridges around Building Genomes," which he was hosting at a hotel in Nob Hill, a wealthy neighborhood of San Francisco. The event sounded innocuous, and at the last minute Johnston decided to attend. "By being open and honest about my plans as an amateur biologist, I hoped to educate law enforcement, industry, institutions, and the general public," she

said. "Plus, I must admit to having some morbid curiosity." As memories of the 2004 bioterrorism charges brought against Steve Kurtz competed with Hollywood images of government agents in the forefront of her mind, Johnston expected a day of intense discussions with hard-nosed investigators. Instead, the FBI agents drew her into a realm populated by terrifying fictions and wild fabulations.

Watermarked silk and huge mirrors covered the walls of the conference venue, the Mark Hopkins International Hotel. No expense was spared. Plenty of danishes, caffeinated drinks, and juices were on offer. Lacquered wooden boxes held every flavor of Stash, Johnston's favorite tea. About fifty FBI agents were in attendance alongside about fifty other invited guests from a diverse array of governments and organizations: officials from the Centers for Disease Control and Prevention (CDC), the Canadian Center of Intelligence and Security Studies, the Australian Federal Police, the United Nations Office for Disarmament Affairs, as well as university researchers and executives from several synthetic genomics corporations. "Our main activity for the day consisted of role playing, enacting fantasy scenarios," Johnston told us. Traveling through elaborate dream worlds together with government agents and officials became an opportunity for Johnston to study the play of political and economic forces in their imagination. Amid speculative flights of fancy, her hosts slowly revealed that she, and other "biohackers," were figures in their nightmares—possible disruptive threats to existing arrangements among species, peoples, institutions, and nations.[65]

"Special Agent Smith" (name changed by request), a handsome and charismatic FBI agent with dark hair and light eyes, led a role-playing game that involved Johnston and twenty other conference attendees. "Special Agent Smith intimated that his superiors had encouraged him to tell jokes to liven up our serious discussions about bioterrorism," Johnston later told us. Blending specters of terror from the recent past, memories of the outbreak of H1N1 avian influenza in 2005, with speculation about future possibilities, Smith unveiled carefully scripted fictions about bioterror. A fatal flu was breaking out, he told the assembled group, deaths were suddenly and dramatically on the rise in San Francisco. "How will you each respond?" he asked.[66] A state government official said that he would request help from the CDC and that there should be meetings among the FBI and local, state and national health department officials. A health care professional suggested that labs should determine the genotype of the virus.

Guiding the playful exercise with charm and style, Special Agent Smith revealed evidence of criminal mischief when he gave the next clue. He brought

out a fabricated lab report, a response to the suggestion from the health care professional, indicating that the flu virus contained genetic sequences not known in the wild. A molecular tag, a genetic fingerprint, was found in the virus that linked it to a particular biology research laboratory. With this turn in events, "Victor Yu," an FBI special agent wearing a blue Hawaiian-style bowling shirt, became an assertive participant in the game. Special Agent Yu was built like a football player, more than six feet tall and weighing around two hundred pounds. Talking about how he would ramp up his investigation, working over the laboratory with a fine-tooth comb, Special Agent Yu said he would question researchers directly to determine whether there had been a breach in lab safety protocol or there was criminal intent. The researchers in the room became visibly uncomfortable, and the room went quiet.

Special Agent Smith was using this fantasy scenario to teach Special Agent Yu, and the other agents, how to play by a new set of rules—the Domestic Investigations and Operations Guidelines—a recently revised FBI playbook.[67] As the discussion unfolded, the agents outlined different stages of an investigation: how they would start with publicly available records and then gradually intrude on subjects' lives, initiating wiretaps and interviewing neighbors, co-workers, and family friends. While Special Agent Smith trained these junior agents, others in the room began to imagine themselves in the crosshairs of an FBI investigation. Dr. "Juan Gonzales" of the CDC began to urge the investigators not to jump to hasty conclusions. Viral tags, according to Gonzales, are difficult to trace because labs constantly share samples for research. Other researchers chimed in, adding that tags are often published and that any competent molecular biologist could insert one into a viral sample.

Continuing with the game, Special Agent Smith revealed a new twist in the prefabricated plot that suddenly put Johnston in the hot seat: He linked the outbreak to a researcher who had brought a sample of a flu virus home for his daughter, a straight-A high school student who was very interested in virology and had frequented the online DIYbio forums. Johnston spoke up. "I tried to give the group a sense of the things that citizen-scientists with DIYbio are actually working on: biofuels, projects to create cheaper, more portable lab equipment, as well as manipulating the genes of plants and non-pathogenic bacteria," she said. "To my knowledge, no one on the DIYbio forums has ever talked about working on human pathogens." Piggybacking on Johnston's comment, Gonzales questioned the plausibility of the plot line. "This is completely unrealistic," he said. "A researcher would never intentionally bring a deadly virus home to his daughter."

Offering an example of a much more pressing problem, Gonzales talked

about academic labs in Texas that had covered up breaches in safety protocol instead of reporting them. Administrators hid accidents because they did not want to lose their funding. "People are actually becoming sick from these incidents," he said. "The accidental release of human pathogens by academic research labs and biotech companies is a much more palpable threat to public health than the possibility of something going awry with an art project."

By venturing into the realm of transgenic biology, Johnston, and many other bioartists, were trying to bring attention to the very problems identified by Gonzales. Even though she had not yet spliced any genes herself, in a sense Johnston's artistic vision was actualized. By laying plans for a scandalous art project, she had helped initiate an internal institutional critique within the US government. Johnston came away from the role-playing games at the Mark Hopkins International Hotel thinking that the FBI bioterrorism initiatives were misguided. Government agents were focusing attention on a handful of artists and hobbyists who have few resources, in contrast to legions of scientists in academic research labs and biotech companies who were working within lax federal regulations. The FBI was defending entrenched political and economic relationships. Special Agent Smith's verve and charm notwithstanding, they were doing a clumsy job of anticipating strategic surprises. Still, Johnston's brief adventure in the dream world of government agents had a lasting impact on her artwork. Even if she did not buy Special Agent Smith's spectral fictions, his nightmares nonetheless had a chilling effect on her bioart.

Johnston stopped tinkering with the tools of transgenic biology and turned back to her earlier works with conventional ceramic media. Kneading clay, carefully attending the kiln, layering on colorful glaze, she created a multitude of figurines to embody her concerns. She began making a swarm of Paranoia Bugs, ceramic sculptures that she first created in 2005 during the US invasion of Afghanistan. "Then the paranoia of the US was a kind of swarm," Johnston related, "where fears fed and bred upon each other, crawling and overtaking everything in their path." In 2005, she gave paranoia a dark body and spindly legs. With the paranoia of US government agents directly targeting her own artistic practice in 2008, the Paranoia Bugs took on a new life. The bugs of the second generation were fleshier and less steady on their legs.

"They are stem cells gone wild," she told us. "Some have mouths and cannibalize their brethren; others have wings but still can't fly. Fearing their own kin, and suspicious of the motives of others, Paranoia Bugs are always on the lookout—to make sure they don't get eaten." Johnston's sculpture gave

a material form to anxieties and fears that were breeding and feeding on themselves in the Global War on Terror. Paranoia Bugs were creatures of science fiction. They were born at the crossroads of promising speculative fabulations and terrifying spectral fictions (see chapter 7).[68] Amid wild hopes and wild fears—at the intersection of fabulous dreams by biotechnology enthusiasts and paranoid nightmares of government agents—the Paranoia Bugs are figures of the political dimensions of anxiety.

Wild fears about life itself are proliferating in the age of biotechnology. If anxiety (*Angst*) and care (*Sorge*) are tied together in Martin Heidegger's notion of *Mitsein*, an existential condition that involves being with others in the world, then perhaps prevailing fears might generate the cause to care.[69] Architectures built to protect humans from pathogens have become the source of constant anxiety as they are beginning to leak. These same architectures, which separate humans from laboratory laborers, are also reinforcing widespread fears of animals and other abject forms of life. In other words, laboratories have generated the sense of separation that underpins spectacular life in the age of biotechnology. Bioartists have begun to disrupt multispecies spectacles, opening windows to truths that are less cruel, by reconfiguring architectures of separation. Cultivating multispecies relationships in which the personal is biopolitical, artists have begun to wrangle with contagious anxieties orbiting around laboratory life. They are learning novel ways to be with and care for others in the world.[70]

BECOMING ANIMAL

Like many people who have lived in New York City, Kathy High had long been anxious around rats—thinking of them as grotesque, monstrous, and unsettling. Compelled to work with and against her embodied feelings of disgust by the writing of Donna Haraway, High decided one day that she would begin creating art with transgenic rodents. Haraway has described the ethical and epistemological dilemmas that emerged when human genes were spliced into OncoMouse, the first patented animal, so that it would reliably produce breast cancer. The genes that made OncoMouse suffer also made this chimerical creature more human. "Our bodies share substance; we are kin," says Haraway. After reading these words, High decided to place an order with Taconic Farms, a breeder of transgenic rats for biomedical researchers. The rats cost $328 apiece. When the shipment of live animals arrived at her office, she "worked to get them into the cage with the least amount of trouble—and the least amount of contact. . . . They made me nau-

FIGURE 5.9 Photographs of transgenic rat models code named "HLA-B27," developed for pharmaceutical research on autoimmune diseases, were displayed at the Multispecies Salon in New Orleans and New York City. The photographs were taken by High, who used a toy microscope to capture moments of play, and moments of death and dying, from close proximity. Images courtesy of Kathy High. See multispecies-salon.org/high.

seous and queasy. They made my skin crawl. I had never touched a rat before except accidentally, when they crawled over me in bed at night or when they ran by my foot in the alley or the subway. They terrified me. Plague-laden animals, low to the earth, crawlers, sneaky, creepy vermin."[71] High surmised that the rats shared her initial fear and desire for distance—what might be called biophobia, in contradistinction to the biologist E. O. Wilson's notion of biophilia—immediately hiding under huts she provided in the cage.

These rats had been hyper-domesticated through generations of breeding, followed by more recent genetic modifications. High traces their history back to Jack Black, a famous "rat whisperer" who worked for Queen Victoria in the mid-nineteenth century. Like a house cat, Black's job was to catch rats. But rather than kill them all, he would sell some of the friendlier, gentler, "fancier" rats back to the ladies of society. Jack Black also sold select rats to scientists in Paris. Some of these Parisian rats found their way to Philadelphia. There, at the Wistar Institute, the rats' food, caging, and handling was standardized. The Wistar Institute also attempted to standardize the rat.[72]

The rats High ordered travel under the technical name HLA-B27/Đ2m (HLA stands for human leukocyte antigen, subtypes B*2701–2759). In 1990, Robert Hammer and his colleagues created this rat with hopes of developing drugs for an array of inflammatory illnesses, such as rheumatoid arthritis and a joint condition of the vertebral column called "spondyloarthropathy." The transgenic rats were born to suffer. The HLA-B27 strain spontaneously

develops inflammatory diseases involving multiple organ systems, including the gastrointestinal tract, peripheral and vertebral joints, male genital tract, skin, nails, and heart.

High also suffers from an inflammatory condition, Crohn's disease, and came to see the transgenic rats in her care as kin, her sisters in suffering. Biological ties can be decentered in gay and lesbian kinship, suggests Kath Weston in *Families We Choose*. Choice, or love, can be the defining feature of kin relationships. High combined queer kinship based on care and love with elements of biological and transgenic relatedness to understand the nature of her relationship with the rats.[73] This kinship drove High's desire to care for the well-being of these creatures. She worked to bring them from the realm of "bare life" (*zoe*), which is killable, into the realm of *bios*, with legible biographical and political lives alongside humans.[74] High never saw the animals as pets, exactly. Instead, she saw them as "beings that resonate with me in ways that other animals cannot—because of that small addition of human DNA."[75]

Embracing Animal, the installation High created in collaboration with her sisters in suffering, was part of "Becoming Animal: Art in the Animal Kingdom," a show at the Massachusetts Museum of Contemporary Art (MassMoCA) curated by Nato Thompson.[76] Becomings (as understood by Gilles Deleuze and Félix Guattari) are new kinds of relations that emerge from alliances and symbiotic attachments, in contrast to relationships structured by patrilineal descent or filiation. Atavistic longings underpin Deleuze and Guattari's writings about creatures such as wolves, rats, and ants.[77] Animals that travel in packs or rhizomorphic swarms, they say, grip humans in hideous pacts, criminal machines, and nonhuman sexual desires.[78]

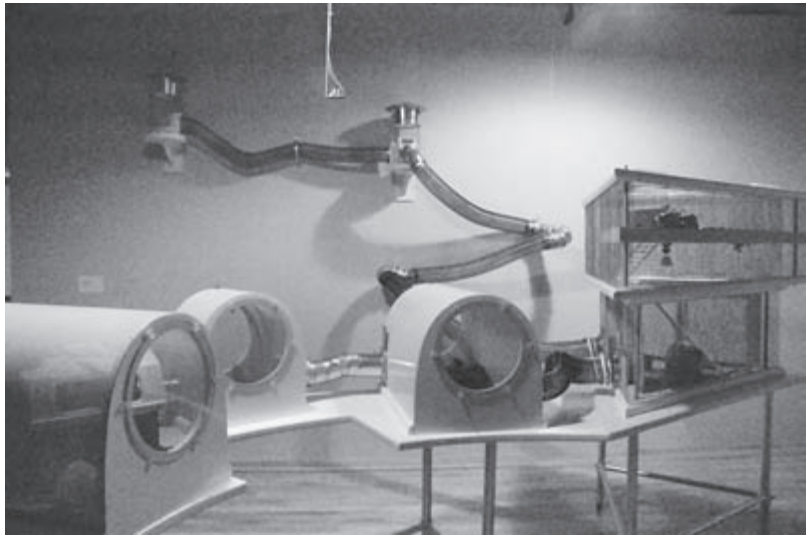
Certainly, High used her own body as a site of transgressive play with rats. A video accompanying her installation in the Multispecies Salon depicts cartoons of rats running up her skirt and scampering around inside her shirt. Rather than invoking the criminal and hideous animal becomings of Deleuze and Guattari, High's piece explores the tact of interspecies touching. As David Abram reminds us, "Whenever we touch any entity, we are also ourselves being touched *by* that entity."[79] Rather than becoming an atavistic pack-animal, High found herself enfolded in relationships with rats premised on reciprocity of curious touching, infectious affects, and symbiotic attachments. These generative becomings produced cause for care.

Even if the biotic features of HLA-B27 rats make them standardized commodities in the biomaterials marketplace, High learned that the rats in her care possessed highly distinct personalities. She gave each rat a name.

Matilda was incredibly playful. Tara would eat from her hand. Star was shy, acted like the elder, and seemed to be full of quiet wisdom. Contacts and encounters with these distinctive individuals prompted High to get beyond the anxiety, revulsion, and fear she had previously experienced from afar. Through research and interaction, she developed a better understanding of the rats' behavior and desires, creating relations with the animals based on attentiveness, play, and empathy. Some of the rats began to teach High how to play games, like moving a paper towel back and forth between parts of the living environment. Matilda "could have played the paper towel game all day, if you did it with her," says High. "She didn't want to stop."

A diverse constellation of experts and "amateurs" were swept up in infectious animal becomings as they partnered with High in her *Embracing Animal* project. Museum staff and interns at the MassMoCA gallery, custodial staff who came to double as animal caregivers, and a veterinarian were all quick to acquire new skills. Rather than illustrate ideas of relational aesthetics, which are predicated on social and natural harmony, this artwork offers an opportunity to push Clare Bishop's notion of "relational antagonism" beyond the realm of spectacular artworks and into the domain of multispecies worlds. Relational antagonism involves exposing labor relations and provides "concrete and polemical grounds for rethinking our relationship to the world and one other."[80] Bishop offers an idiom for considering the labor relations at play within the team that worked with High to create an "architecture of care" for the rats in the gallery. Pushing past the domain of human labor relations, High's work generates a sense of critical antagonism with respect to the multispecies relations on display.

Antagonism, in the words of Ernesto Laclau and Chantal Mouffe, confronts us with a situation in which "the presence of the 'Other' prevents me from being totally myself."[81] In *Embracing Animal*, rats were transformed through encounters with a multitude of human Others—caretakers, spectators, and curators. They went from being the workhorses of biotechnology to the workhorses of the art world. High writes, "PROBLEM NOTED: The rats were no longer lab products, but became art products, again on display, again used as research. Does this shift or change their status in the world? They were still workers and products for sale. But, while the rats were considered 'art objects' instead of 'lab products,' their very presence in the exhibition made us come face-to-face with the reality and fragility of these small man-made creatures."[82] Negotiating power in multispecies assemblages requires great empathy, reflexivity, and tact. Following Haraway, these publicly displayed workhorses might be seen as "significantly unfree partners, whose



FIGURES 5.10–5.11 An architecture of care gave Kathy High's transgenic rats a kind of life usually denied to the invisible workers of biotechnology labs. Mike D. Wilber, a custodian at the museum, became the primary caretaker for the rats in the installation. This installation, *Embracing Animal*, was displayed at the Massachusetts Museum of Contemporary Art in 2004–2005. Photographs by Adam Zaretsky (top) and Kathy High (bottom). See multispecies-salon.org/high.

differences and similarities to human beings, to one another, and to other organisms are crucial to the work" of the artist.[83]

After the rats exhibited at MassMoCA passed away, High had them cremated and enclosed in glass spheres with spiky surfaces, like white blood cells. This memorial was exhibited in the Multispecies Salon at the CUNY Graduate Center in Manhattan. Blue- and pink-tinged photographs—portraits of her sisters in suffering during their last moments of life—framed the display of the remains in a small wooden box. Banners listing the technical names of other transgenic rats—such as the MT1-Alzheimer's precursor rats that were patented by James Vitale and his colleagues in 1993—gave a presence to a multitude of other animals that have been created for biomedical research. Millions of lab rodents are used every year in US scientific laboratories. High's memorial was for them, too. In "Rat Love Manifesto," High writes, "The politics of caring for such a forgotten creature, a pest, a disposable one, has to have a transformative effect. . . . I am not against the kinds of scientific research that works with animals. But I do think there are other kinds of research to be conducted." Thus, High eschews a "thou shalt not" style of ethics in favor of a more experimental approach to ethical engagement.[84]

LIVING IN EMERGING WORLDS

Multispecies spectacles are animating a diversity of life forms in the age of biotechnology. Humans and other beloved beings occupy the dazzling realm of spectacular life, while laboratory laborers inhabit the realm of the killable—an obscured domain populated by an anonymous multitude. Abject critters and hopeful monsters are proliferating in the shadowlands of human nightmares even as they figure into hopeful dreams and schemes.[85] Wild hopes and fears, spectacular promises contained in new technologies of salvation and warnings of a coming apocalypse, can blind us to potentials contained in concrete possibilities. Exposing, disrupting, and reconfiguring the systems that produce spectacles, artists are offering examples of how we might begin to reconfigure the entangled webs we weave with other beings. Amid spectacular warfare in competing dream worlds, bioartists are cultivating relationships with these creatures based on responsibility, attention, and care.[86] They are experimenting with new ethical engagements to illustrate how we might better live together with others in common worlds.

Howard Becker's classic ethnography, *Art Worlds*, insists that works of art "are not the products of individual makers, 'artists' who possess a rare and

special gift. They are, rather, joint products of all the people who cooperate via an art world's characteristic conventions to bring works into existence."[87] Insights from art worlds come together with gleanings from SF worlds—the realm of science fiction and speculative fabulations of Donna Haraway (chapter 7). Bringing fictions and fabulations together with observations of actual interspecies interactions, Haraway diffracts our understanding of relations that already exist through uncanny visions of what might yet come into being.

Recognizing that unloved others already live with us in common worlds offers an opportunity to reimagine the divisions of power and labor that underpin multispecies spectacles.[88] Bioartists are offering us conceptual, technical, and ethical resources for thinking through our obligations to the emergent forms of life in the age of biotechnology. Our own lives and well-being have become dependent on mutant fruit flies, transgenic rats with inflammatory diseases, and rabbits with immunological entanglements connecting them to multiple species. Humans have created creatures that are needy of care, that have been made to share our suffering and our vulnerabilities.[89]

Rather than simply celebrate new possibilities of multispecies mingling with vulnerable critters, artists are also insisting that we think with care about actual pathogens, as well as possible emergent biotic enemies.[90] As billions of abject animals, plants, microbes, and disembodied cells labor in the shadows, a few potentially dangerous life forms have evolved. By releasing laboratory laborers, Zaretsky illuminated threats to humans and established ecological assemblages have been created by deeply entrenched biopolitical relationships. Creatures and infectious agents are constantly escaping from corporate facilities, university laboratories, and agro-industrial enterprises. As FBI and CIA investigators are lost in orbit, circling in their own nightmarish fantasy worlds, there is an opportunity for those of us outside government agencies to generate more responsible and responsive fictions and fabulations.

Promiscuous agents are moving among worlds—transforming and being transformed, violently disturbing the established order, and being incorporated into new assemblages and world-making networks all along the way.[91] Nomads can be dangerous, irredeemably destructive, or tolerant, in the words of Isabelle Stengers. The challenge, for Stengers, is to trap nomads, to enfold them in production of common worlds.[92] Rather than just celebrate the uncalculated promises contained in wild products of biocapitalism, in-

stead of rejoicing at the potential of wayward life to blossom in wild profusion, we might consider the challenges of building entangled worlds together, tooth and nail, in concert with others.[93] Tactful collaborations, where each agent has an interest in seeing the other maintain its existence, are engendering livable futures.[94] Organic intellectuals are generating modest biocultural hopes by luring new life forms into emerging worlds.[95]

NOTES

Eben Kirksey took the lead in initiating this essay, gleaning ethnographic artifacts from laboratories, co-producing artworks with artists, collecting digital ephemera online, interpreting the findings, and writing the manuscript. Brandon Costelloe-Kuehn took the lead in the "Becoming Animal" section, conducting deep participant observation with Kathy High, layering in nuanced interpretations of affective ties that form across species lines, and drafting and revising the prose. By editing film footage of the Reverend of Nano Bio Info Cogno, Costelloe-Kuehn also helped give this project a virtual presence (see multispecies-salon.org/paraethnography). Dorion Sagan was a modest witness to performative interventions in the art gallery and lent his skills as a master poacher, writer, and philosopher to the project as we revised and refined the manuscript.

1. Biological specimens were regarded as spectacles in a dialogue between Sarah Franklin and the pioneering bioartist Suzanne Anker. Discussing Anker's work on fetal specimens, they explore the edges of the scopic economy in which seeing is knowing: Anker and Franklin, "Specimens as Spectacles," 106. See also Vivanco, "Spectacular Quetzals, Ecotourism, and Environmental Futures in Monte Verde, Costa Rica," 83; West, *Conservation Is Our Government Now*, 2.

2. Here we are torquing the words of Donna Haraway, who presses for "taking animals seriously as workers without the comforts of humanist frameworks for people or animals": Haraway, *When Species Meet*, 73.

3. Debord, *The Society of the Spectacle*, 5, 8.

4. Spectacular forms of life are also being produced and sustained by labor of "the living dead," parts of disembodied systems that Eugene Thacker regards as "strangely nonhuman, at work in the molecular spaces of cells, enzymes, and DNA." Riffing on Marx, as well as on the subgenre of zombie epidemic films that critique the biotech industry, Thacker brings us out of the domain of animals to describe what he calls "biomaterial labor" or "living dead labor": Thacker, *The Global Genome*, 40.

5. Giorgio Agamben writes that "bare life" (*zoe*), that which is killable, has become central to the contemporary political stage. Bare life lacks the protections and considerations granted to subjects deemed to have biographical life (*bios*): Agamben, *Homo Sacer*, 2, 120. Animals, plants, fungi, and microbes once confined in anthropological accounts to the realm of *zoe* have started to appear alongside

humans in the realm of *bios*. See also Kirksey and Helmreich, "The Emergence of Multispecies Ethnography," 545.

6. Da Costa and Philip, *Tactical Biopolitics*, xviii.

7. Joanna Zylinska has explored a series of interrelated questions, which overlap with the key subject of this chapter, about performativity at the ontological level of life: What is life? What counts as human life? How are the boundaries of the human established and maintained? Is the distinction among humans, animals, and machines solid or arbitrary? Are differences between species a matter of grade or kind? Zylinska, *Bioethics in the Age of New Media*, 159.

8. Biological art is founded on an "aesthetics of caring, an aesthetics of attention and responsibility," in the words of Oron Catts and Ionat Zurr of SymbioticA, as quoted in Bureaud, "The Ethics and Aesthetics of Biological Art," 39. See also Catts and Zurr, "The Ethics of Experiential Engagement with the Manipulation of Life," 131.

9. Crapanzano, *Imaginative Horizons*.

10. Harding, "Get Religion." A video of the Reverend of Nano Bio Info Cogno's ministry is available at http://multispecies-salon.org/paraethnography.

11. "Diffraction patterns record the history of interaction, interference, reinforcement, different," writes Donna Haraway. "Diffraction is about heterogeneous history, not about originals": Haraway, *Modest_Witness@Second_Millennium.Female Man_Meets_OncoMouse*, 273.

12. Debord, *The Society of the Spectacle*, 5.

13. Similar insights about inequalities in health care that cut along lines of race, class, and geography have been explored by medical anthropologists: see, e.g., King, "Immigration, Race, and Geographies of Difference in the Tuberculosis Pandemic"; Sunder Rajan, *Biocapital*.

14. A study of this drug for treatment of patients with inflammatory arthritis, which was published in *Rheumatology*, found "a total of 25 patients (3.7%) died while taking methotrexate and four died (0.6%) within 3 months of stopping methotrexate." This same study concluded that "methotrexate is well tolerated in clinical practice in the medium to long term." Methotrexate was initially used as chemotherapy for cancer. In 1988, it was approved by the US Food and Drug Administration to treat severe rheumatoid arthritis: Kinder et al., "The Treatment of Inflammatory Arthritis with Methotrexate in Clinical Practice," 61.

15. Sunder Rajan, *Biocapital*, 123, 149.

16. Fortun, "Mediated Speculations in the Genomics Futures Markets," 141. See also chapter 7 in this volume.

17. Franklin, "Ethical Biocapital," 121.

18. Kate Lindsay is a pseudonym.

19. Haraway, *When Species Meet*, 46.

20. Sheila Jasanoff has described how biotechnology has increased the power of metropolitan centers of science and technology as what she terms a "new form of imperial rule" over people at the periphery. She calls for institutional innovations to bring global biosciences and biotechnologies under effective democratic control. Absent the sweeping transformations envisioned by Jasanoff, semi-empowered

intellectuals like Lindsay are working within existing institutions—trying to transform the system from within: Jasanoff, "Biotechnology and Empire," 273.

21. Jeyaprakash and Hoy, "Long PCR Improves Wolbachia DNA Amplification," 393.

22. Martin, "The Egg and the Sperm," 485; Stouthamer et al., "*Wolbachia Pipientis*," 82.

23. Franklin and Lock, *Animation and Cessation*, 13.

24. Haraway, "Situated Knowledges," 192.

25. Helmreich, "Species of Biocapital," 464. See also Catts and Zurr, "Semi-Living Art," 245; Zurr, "Complicating Notions of Life," 402.

26. Haraway, *When Species Meet*, 73.

27. Labor was regarded as a dialectical process by Marx, involving the progressive humanization of nature, as well as the naturalization of man. A multispecies perspective, where there is little room for human exceptionalism, offers a different idiom for understanding labor relations. Sidestepping the binary of nature-culture in our analysis of anti-rabbits, we see an opportunity to push past the human exceptionalism inherent in classic Marxism. Anti-rabbits illustrate the immunological rabbitization of goats rather than the progressive humanization of nature. For more on Marx and the humanization of nature, see Stokes, *Man and the Biosphere*, 52.

28. Sommerlund, "Beauty and Bacteria," 385.

29. The killing of animals, in early modern Europe and today, has long been contested by people who have observed the subjective feelings of suffering, fear, and terror experience by animals, according to Erica Fudge. Contemporaries of Descartes believed that animals could suffer, and this may have led him to propose the "beast-machine" hypothesis. In this lab, rabbits are machines that manufacture specialized antibodies that are used to produce scientifically useful imagery: Fudge, "Two Ethics," 114.

30. Lynch, "Sacrifice and the Transformation of the Animal Body into a Scientific Object," 267.

31. Molly Mullin's excellent review article "Mirrors and Windows" chronicles the history of ideas about animals being inferior to humankind, as creatures to be conquered and exploited.

32. The glowing rabbit is a visual citation of the iconic GFP Bunny, a transgenic animal created by French scientists in collaboration with Eduardo Kac, a bio-artist. In part, Kac's project failed—initially he proposed to live with the transgenic rabbit in an art gallery. But the French laboratory refused to part with the rabbit after they had created it. This failure "transformed the project into an open communication art piece," in the words of Jens Hauser, "that could not have been planned." As the project slipped from the artist's control, it became a wild card in public discourse: Hauser, "Observations on an Art of Growing Interest," 94. See also, Wolfe, *What Is Posthumanism?*, 164.

33. Debord, *The Society of the Spectacle*, 29.

34. "Bioartists have not only challenged the separation between ethics and aesthetics," writes Anna Munster, "but have also foregrounded the extent to which bio-

ethics must, in the contemporary climate, be considered more than a mere branch of applied ethics": Munster, "Bioaesthetics as Bioethics," 14.

35. Franklin, "Ethical Biocapital," 113.

36. Jacques Loeb, an experimental biologist who worked in the late nineteenth century, proclaimed the advent of a new scientific era when "a constructive or engineering biology" would take the place "of a biology that is merely analytical." His work on artificial parthenogenesis, which involved producing living sea urchins from unfertilized eggs, was heralded as a "change in the mode of production (or reproduction), an improvement upon nature in that it eliminated an unnecessary element (the sperm), and offered the possibility of replacing" males with an admixture of chemicals: Pauly, *Controlling Life*, 94.

37. "The urge to protect and comfort what we consider vital," in the words of Phil Ross, "has motivated the forming of numerous enclosed spaces, including our garden walls, the ceramic pots for our plants, and the transparent bioreactors that grow our cultured tissues." The protective environment that Zaretsky created around himself, and the rest of his Workhorse Zoo, drew attention to the framing and isolation of contemporary forms of life: Ross, "Bioteknécronomicon," 59–60.

38. Eduardo Kac used many of these same species (mice, zebra fish, tobacco plants, as well as a colony of amoebae) in his October 2001 installation, *The Eighth Day*, in a gallery at Arizona State University. Each organism in Kac's piece was modified by introducing a GFP gene: see Wolfe, *What Is Posthumanism?*, 158.

39. Zaretsky, "Workhorse Zoo."

40. Robert Kohler has chronicled the contingencies and accidents that led experimental biologists to adopt *Drosophila* as a workhorse. Starting from the emergence of a mutant strain called "*with*" in January 1910, which had a distribution of pigmentation that was distinctly higher than the wild type, "a proliferation of mutations in *Drosophila* altered the domestic ecology of experimental organisms and disciplines." Intense inbreeding in the coming years produced a diversity of mutants: with *olive* body color, and *speck* wing axil, *beaded* wing, and the famous *white* eye-color mutant: Kohler, *Lords of the Fly*, 45.

41. Haraway, "The Promises of Monsters," 68.

42. *A Guinea Pig's History of Biology*, a book by Jim Endersby about the plants and animals who taught us the facts of life, contains accounts of the natural and cultural histories of some the same creatures on display in Zaretsky's Workhorse Zoo: the fruit fly (*Drosophila melanogaster*), the zebrafish (*Danio rerio*), and the human (*Homo sapiens*). Digging deep in the annals of science, Endersby also writes about *Passiflora gracilis*, a plant in Darwin's greenhouse that proved key in his thinking about plant reproduction and movement. Recounting Gregor Mendel's experiments with hawkweed (*Hieracium auricular*), Endersby suggests that it was this intractable plant, and not peas, that generated key discoveries about the "extraordinary profusion of distinct forms": Endersby, *A Guinea Pig's History of Biology*, 127.

43. PETA, "Animals Used for Experimentation," accessed January 13, 2013, http://www.peta.org.

44. "It is precisely the recognition of the inevitability of violence that makes

Zaretsky's open-ended bioethical project so different from the humanist bioethics of 'informed consent,'" in the words of Joanna Zylinska. "Indeed, his question also inheres a suspicion toward an illusion about the human as a self-contained moral agent, fully accountable for his moral actions and political agency": Zylinska, *Bioethics in the Age of New Media*, 167.

45. Franklin, "Ethical Biocapital," 102.

46. Cassidy and Mullin, *Where the Wild Things Are*, explores age-old questions in the new era of biological control. This book reexamines the concept of domestication against the background of shifting relationships among humans, animals, and plants.

47. Franklin, "Ethical Biocapital," 102.

48. Joe Masco has theorized "mutation" while attending to multigenerational reproduction and the quality of biosocial transformations over time. Injury, improvement, and noise are the three key elements at play in Masco's notion of "mutant ecologies." Masco focuses on monstrous radioactive mutants that populated mediascapes of the 1950s. In contrast to this figural specificity, Zaretsky plays fast and loose—celebrating the promiscuity of mutants gone wild: Masco, "Mutant Ecologies," 517.

49. A diversity of life forms have been marketed and distributed under the GloFish trademark. In June 2012, the website at GloFish.com heralded the availability of "five striking colors—Starfire Red, Electric Green, Sunburst Orange, and the new Cosmic Blue and Galactic Purple." Rather than "cheesy Green Fluorescent Protein (GFP) or the yellow ribbon Yellow Fluorescent Protein (YFP)," Zaretsky released fish with "big, old, commie Red Fluorescent Protein (RFP) expressing, vertebrate internationalists." The fish, which travel under the trademark of Starfire Red, get their color from a gene appropriated from a *Discosoma* species of coral.

50. Artaud, "The Theater of Cruelty (First Manifesto)," 92; Zaretsky, "GFRP," 3.

51. In Artaud's own words, "Art is not the imitation of life, but life is the imitation of a transcendental principle which art puts us into communication with once again": quoted in Derrida, "The Theater of Cruelty and the Closure of Representation," 8.

52. Müller, "Artaud The Language of Cruelty," 175.

53. Guy Debord's *The Society of the Spectacle* was published nearly twenty years after Artaud's manifesto, *The Theater and Its Double* (1938). Here we are engaging in Whiggish intellectual history by using Debord as an aid to reading Artaud.

54. Artaud, "The Theater of Cruelty (First Manifesto)," 92.

55. "Without an element of cruelty at the root of every spectacle, the theatre is not possible": Artaud, *Le Théâtre et son double*, 99.

56. Artaud, "The Theater of Cruelty (First Manifesto)," 92–94.

57. Tragedy and comedy are among the four modes of narrative emplotment identified by Hayden White: see White, *Metahistory*, 190.

58. Haraway, "The Promises of Monsters," 300.

59. Franklin, "Ethical Biocapital," 102.

60. Critical Art Ensemble, "Bioparanoia and the Culture of Control," 414.

61. Purloining the phrase "phantasmagoria of shadows" from Jacques Lacan, and

entering into dialogue with the writing of Veena Das about rumor, Eben Kirksey has described how hopes can be displaced by shifting illusions, figures that pass into each other and dissolve, and terrifying dreams that capture the collective imagination: Kirksey, *Freedom in Entangled Worlds*, 166.

62. The fear of FBI agents of a potential epidemic speaks to questions raised by Ed Cohen. "How do we contain viral disease?" he asks. A paradox subtends attempts to bio-scientifically control outbreaks of disease by microbes. "The reason we (i.e., humans) want to contain such diseases is precisely because we (i.e., living organisms) already contain them": Cohen, "The Paradoxical Politics of Viral Containment," 15.

63. "Resistant culture always needs to find a means to fight fire with fire," wrote the Critical Art Ensemble in an electronic salvo they published in 2002, just before Kurtz was detained. "In other words, how do we develop tactics using biological materials and processes? In response to this question, Critical Arts Ensemble and some rogue scientists set about trying to form a model of direct biological action": Critical Art Ensemble, *Molecular Invasion*, accessed February 25, 2014, http://www.critical-art.net/MolecularInvasion.html. See also Hirsch, "The Strange Case of Steve Kurtz," 23; Associated Press, "Charge Dropped against Artist in Terror Case," April 22, 2008.

64. Tomkins, *Duchamp*, 158.

65. See also Lowe, "Viral Clouds," 645.

66. All quotes in this section are as reported by Marnia Johnston. We were in close consultation with her in the lead-up to the conference, immediately after the event, and during the preparation of this essay.

67. The Electronic Frontier Foundation has posted the "FBI's Domestic Investigative Operational Guidelines" online at http://www.eff.org, accessed January 13, 2013.

68. Haraway, "The Promises of Monsters," 300.

69. Heidegger, *Being and Time*, 155; Nancy, "The Being-with of Being-there," 10.

70. A fresh approach to "thinking with care," which displaces Heidegger's focus on angst with a feminist account of interdependence, has just been published by María Puig de la Bellacasa. She writes, "Care obliges us to constant fostering, not only because it is in its very nature to be about mundane maintenance and repair, but because a world's degree of liveability might well depend on the caring accomplished within it": Puig de la Bellacasa, "Nothing Comes without Its World," 198.

71. High, "Playing with Rats," 465–66.

72. By 1915, the Wistar Institute was shipping rats for research around the world. Wistar rats are just one among the several dozen "animal models" for sale in the Taconic catalog. Robert Kohler wrote about how the common fruit fly, *Drosphilia*, was standardized through inbreeding. Through a network for exchanging stocks of flies, *Drosphilia* became a model organism commonly used in genetics laboratories around the world. The standardization and proliferation of both rats and flies in laboratory research resemble similar processes of chemical standardization for lab use. Developments in the field of chemistry inspired the director of the Wistar Institute, Milton Greenman, to recognize "in the rat the potential to be a living analog to the pure chemicals that legitimated pure science. From

management literature he extracted the ideals of uniform production, standards of quality, efficiency of production, applying them to scientific practice to generate an animal model that thrives as standard equipment in laboratories throughout the world today." Karen Rader interrogated a related question. "How did the genetically standardized mouse initially succeed as a standard organism when mammalian genetics, the very science for which it was supposedly best designed, initially did not?": Kohler, *Lords of the Fly*, and Rader, *Making Mice*, 17, as quoted in Clause, "The Wistar Rat as a Right Choice," 335.

73. Pointing to the possibility of new forms of relatedness, Janet Siskind suggests that "sociability is a panhuman, panprimate, and panmammalian tendency, but the molding of this sociability into forms of kinship and marriage is nonintrinsic and external, potentially as discardable as the chrysalis of tomorrow's butterfly." Yet she excludes relations that are not solely human from the concept of kinship. "The recent use of terms such as 'lineage' or 'kinship' for nonhuman primates," Siskind contends, "adds confusion rather than clarity to these concepts. Certainly analogues can be found for all human behavior, but what is undertaken here is to analyze kinship as a human, symbolic category." Rather than see High's claims to interspecies kinship as adding "confusion," we follow Stefan Helmreich, who has used organic practices (especially lateral gene transfer) as an opportunity to rethink cultural categories, including kinship, sketching "the rise of new kinships and biopolitics organized less around practices of 'sex' than politics of 'transfer'": Siskind, "Kinship and Mode of Production," 860, 870; Helmreich, "Trees and Seas of Information," 340; Weston, *Families We Choose*.

74. Agamben, *Homo Sacer*, 2–3. See the discussion of a related point in Kirksey and Helmreich, "The Emergence of Multispecies Ethnography," 545.

75. In grappling with "emergent forms of life," Michael Fischer unpacks "the pervasive claim (or native model) by practitioners in many contemporary arenas of life (law, the sciences, political economy, computer technologies, etc.) that . . . life is outrunning the pedagogies in which we have been trained." He explores how forms of life always contain ethical dilemmas or, in the idiom of Emmanuel Levinas, "the face of the other": Fischer, *Emergent Forms of Life and the Anthropological Voice*, 456.

76. This exhibit, in the curator's words, was "the first large-scale art exhibition to explore the closing gap between human and animal existence": Nato Thompson, "Becoming Animal," accessed January 13, 2013, http://www.massmoca.org.

77. Deleuze and Guattari, *A Thousand Plateaus*, 263, 265.

78. Deleuze and Guattari distinguish individuated "Oedipal animals" from creatures that travel in packs or swarms, such as wolves or rats, that "grip every animal in a becoming." They suggest "anyone who likes a dog or a cat is a fool." We join Donna Haraway in rejecting the wolf-dog opposition in Deleuze and Guattari's work. "The wolf/dog opposition is not funny," Haraway writes. "This is a philosophy of the sublime, not the earthly, not the mud; becoming-animal is not an *autremondialisation*": Haraway, *When Species Meet*, 28–29. See also Deleuze and Guattari, *A Thousand Plateaus*, 257; Kirksey and Helmreich, "The Emergence of Multispecies Ethnography," 566n2; Vitamvor, "Unbecoming Animal Studies," 184–85.

79. Abram, *Becoming Animal*, 58.

80. Bishop, "Antagonism and Relational Aesthetics," 79.

81. Laclau and Mouffe, *Hegemony and Socialist Strategy*, 125.

82. Kathy High, "Embracing Animal," accessed January 13, 2013, http://becoming-animal-becoming-human.animal-studies.org.

83. Haraway, *When Species Meet*, 72.

84. Kathy High, "Rat Love," accessed January 13, 2013, http://www.embracinganimal.com.

85. Monstrous forms and abject creatures have long populated the European imagination. In *The Platypus and the Mermaid and Other Figments of the Classifying Imagination*, Harriet Ritvo explores ideas about hybridity, cross-breeding, and monstrosities in eighteenth-century and nineteenth-century Britain.

86. Bureaud, "The Ethics and Aesthetics of Biological Art," 39.

87. Becker, *Art Worlds*, 35. Adele Clarke uses a social worlds approach to understand the development of reproductive science. She explores the interactions and intersections of various social worlds (communities of practice and of discourse) engaged in collective action. Science makes strange bedfellows, and some of the most interesting aspects of Clarke's analysis are in her discussions of who worked with whom, who funded whom, and why. Her insights are certainly also relevant to studying the unexpected collaborations that generate bioart worlds: Clarke, *Disciplining Reproduction*. See also Clarke and Star, "The Social Worlds/Arenas/Discourse Framework as a Theory-Methods Package."

88. Rose and van Dooren, "Unloved Others," 2.

89. See chapter 7 in this volume. We are indebted to Astrid Schrader, whose notion of shared vulnerabilities influenced our thoughts as we composed the conclusion to this essay.

90. Puig de la Bellacasa, "Nothing Comes without Its World," 197.

91. Here we are drawing on Nicolas Thomas's ideas about entangled objects. He insists "upon the promiscuity of objects and imagined playful, powerful, politicized affairs constituted through moments of desire, incorporation, intransigence, and risk; giddy moments in which shared histories or their absence become crucial; and moments in which prior meanings and affiliations can be violently disturbed": Thomas, *Entangled Objects*, 208.

92. Stengers, "The Cosmopolitical Proposal," 995.

93. Haraway, *When Species Meet*; 35, 42; Kirksey, *Freedom in Entangled Worlds*, 14–15; Latour, *Politics of Nature*, 455; Stengers, *Cosmopolitics I*, 35–36.

94. Here we are indebted to Matei Candea, a multispecies ethnographer at Cambridge University who has been studying tactful cosmopolitical proposals involving humans and meerkats.

95. The "emerging worlds" initiative, launched by the Department of Anthropology at UC Santa Cruz in 2008, involves studying "world-making networks, geographies, innovations, meanings, and assemblages that are carrying us into the future": Department of Anthropology, "Emerging Worlds," accessed January 13, 2013, http://anthro.ucsc.edu.

CHAPTER 6

INVERTEBRATE VISIONS: DIFFRACTIONS OF THE BRITTLESTAR

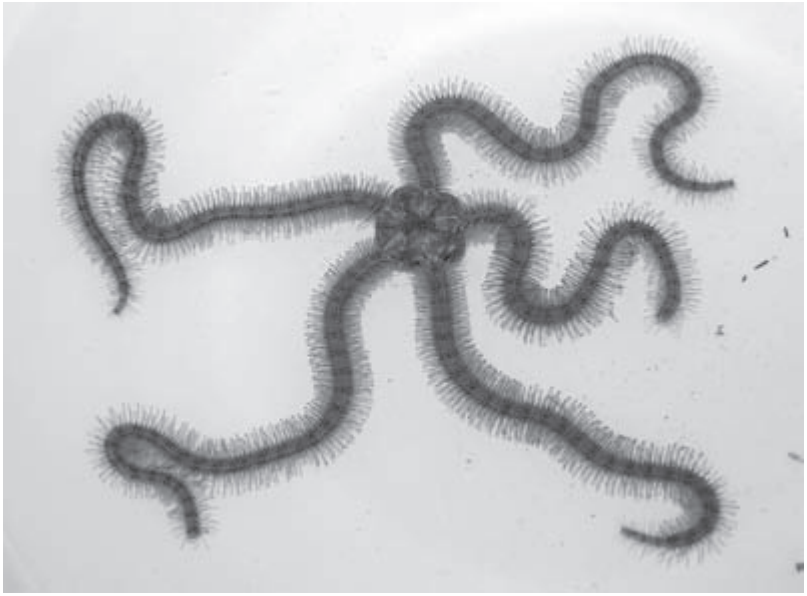
Karen Barad

The "eyes" made available in modern technological sciences shatter any idea of passive vision; these prosthetic devices show us that all eyes, including our own organic ones, are active perceptual systems, building in translations and specific ways of seeing, that is, ways of life. There is no unmediated photograph or passive camera obscura in scientific accounts of bodies and machines. There are only highly specific visual possibilities, each with a wonderfully detailed, active, partial way of organizing worlds. . . . Understanding how these visual systems work, technically, socially, and psychically ought to be a way of embodying feminist objectivity.
—Donna Haraway, "Situated Knowledges"

Diffraction patterns record the history of interaction, interference, reinforcement, difference. Diffraction is about heterogeneous history, not about originals. . . . Diffraction is a narrative, graphic, psychological, spiritual, and political technology for making consequential meanings.
—Donna Haraway, *Modest_Witness@Second_Millennium .FemaleMan_Meets_OncoMouse*

"Eyeless Creature Turns Out to Be All Eyes" announces the *New York Times*.[1] An international team of material scientists, theoretical physicists, chemists, and biologists were featured in the *Times* for their amazing finding that a brainless and eyeless creature called the brittlestar, an invertebrate cousin of the starfish, sea urchin, and sea cucumber, has a skeletal system that also functions as a visual system. The ability of this critter to reconfigure the boundaries and properties of its body is prompting technology enthusiasts to reimagine what it means to be human. This multi-limbed sea creature is being enterprised up for new computer designs and telecommunications optical networks (giving new meaning to the AT&T slogan "Reach Out and Touch Someone"). Summarizing the results of a study published in the August 23, 2001, issue of the scientific journal *Nature*, Jonathan Abraham, the author of the *Times* article, continues: "The brittlestar, a relative of the starfish, seems to be able to flee from predators in the murky ocean depths without the aid of eyes. Now scientists have discovered its secret: its entire skeleton forms a big eye. A new study shows that a brittlestar species called *Ophiocoma wendtii* has a skeleton with crystals that function as a visual system, apparently furnishing the information that lets the animal see its surroundings and escape harm. The brittlestar architecture is giving ideas to scientists who want to build tiny lenses for things like optical computing."[2] The researchers found that the approximately ten thousand spherically domed calcite crystals covering the five limbs and central body of the brittlestar function as micro-lenses. These micro-lenses collect and focus light directly onto nerve bundles that are part of the brittlestar's diffuse nervous system. Remarkably, the brittlestars secrete this crystalline form of calcium carbonate (calcite) and organize it to make the optical arrays. According to Alexei Tkachenko of Bell Laboratories, one of the authors of the study, "The brittlestar lenses optimize light coming from one direction, and the many arrays of them seem to form a compound eye." "It's bizarre—there's nothing else that I know of that has lenses built into its general body surface," says Michael Land, who studies animal vision at the University of Sussex, Brighton.[3]

The fact that certain species of brittlestars respond to light was already well established, but the mechanism of their superior visual capacity was not known.[4] Photosensitive brittlestars are able to navigate around obstacles, flee from predators, and detect shadows. They also turn lighter in color at night and darker during the day. At first glance, this evolutionary strategy seems ill conceived, since it increases their visibility to predators. But if the brittlestar's goal is increase its vision (the better to avoid predators), to collect



FIGURES 6.1–6.2 Brittlestars, like other echinoderms (sea urchins, starfish, and sand dollars) are organized according to principles of radial symmetry. These organisms have five identical segments. Blue-lined brittle star (*Ophiothrix lineocaerulea*). Photograph by Ria Tan, http://www.wildsingapore.com. The illustration is from Ernst Haeckel, *Kunstformen der Natur* (1904). See multispecies-salon.org/barad.

as much light as possible during the night, and likewise to protect its visual system from oversensitivity, overexposure to light, during the day (think sunglasses), then the process of evolutionary selection seems justified.

To test their hypothesis that "these calcitic microstructures might have a function in directing and focusing the light on photosensitive tissues," the researchers at Bell Labs used a technique called optical lithography, a process that is also used for inscribing circuits on microchips: "To detect and visualize the lensing effect, we designed a lithographic experiment. A DAP [dorsal arm plate] of *O. wendtii* was cleansed of organic tissue, and a low-magnification scanning electron micrograph (SEM) of its dorsal surface was recorded as a reference image."[5]

The lensing system was analyzed by placing the prepared sample on a silicon wafer. Mimicking the process used to engrave circuits optically on a silicon wafer in the making of microchips, the researchers shined light through the lenses, which etched the wafer. By analyzing the etchings, the researchers were able to deduce the focal length of the lenses. This was compared with a transmission electron microscopy study of thin sections of decalcified dorsal arm plates, which revealed bundles of nerve fiber located at the focal plane of the lens system. On the basis of this finding, the researchers suggested that "the array of calcitic microlenses with their unique focusing effect and underlying neural receptors may form a specialized photoreceptor system with a conceivable compound-eye capability."[6]

In talking with the press, Joanna Aizenberg, a Bell Labs scientist and the lead author of the study, likens the brittlestar to a digital camera that builds up a picture pixel by pixel.[7] In this exchange, one quickly loses track of whether the digital camera is a metaphor for brittlestar vision or the reverse, especially as the metaphor begins to take on a strikingly material form: "Instead of trying to come up with new ideas and technology, we can learn from this marine creature. . . . The [calcitic] lenses surround the whole body, looking in all different directions and providing peripheral vision to the organism. . . . This is the quality we all want to incorporate in optical devices, in cameras in particular. Instead of having one lens pointing in one direction, you could have thousands of lenses pointing in different directions. This will give you perhaps a 360-degree view of the whole space."[8] In summary, the remarkable finding of this international multidisciplinary team of scientists is that the brittlestar's skeletal system is composed of an array of micro-lenses, little spherical calcite crystal domes (on the order of tens of microns in diameter) arranged on its surface, which collect and focus light precisely on points that corresponds to the brittlestar's nerve bundles, part of its diffuse

nervous system, suggesting that the combined system seemingly functions as a compound eye (an optical system found in insects).

Physicist Roy Sambles, who works on optics and photonics at the University of Exeter in Britain, expressed his enthusiasm for this brainless creature's ingenuity this way: "It's astonishing that this organic creature can manipulate inorganic matter with such precision—and yet it's got no brain." Crystals emerge from the right chemical environment, they are self-organized, rather than engineered by careful top-down control. "It's starting with a soup of chemicals and pulling out this wonderful microstructure," says Sambles, who fantasizes about emulating the process "in a bucket in a corner of the lab."[9] Further, Sambles writes:

> Human ingenuity came up with microlens arrays only a few years ago, and they are used in directional displays and in micro-optics, for example as signal-routing connectors for signal processing. Once again we find that nature foreshadowed our technical developments. The same applies to photonic solids, structures that can selectively reflect light in all directions. Photonic materials have stimulated much research over the past ten years because of their potential in light manipulation, yet they are to be found in opals and in the wings of butterflies. But then, nature has been in the business of developing functioning optical structures for a very long time.[10]

The brittlestar may not get full credit for its superior ingenuity, which exceeds the current technological ingenuity of humans, but a larger, older, and wiser configuration called "nature" does. As one National Public Radio reporter put it, "Even the most primitive creatures might have the edge over modern science."[11] (So what makes it "primitive" again?)

While this discovery is a fantastically interesting scientific result, it is probably fair to say that the excitement surrounding this finding and the wide reporting of this story has more to do with its potential applications than pure amazement at the ingenuity of this creature's bodily know-how. Consider the appropriately measured tone of the acknowledgment in the technical article's closing sentence: "The demonstrated use of calcite by brittlestars, both as an optical element and as a mechanical support, illustrates the remarkable ability of organisms, through the process of evolution, to optimize one material for several functions, and provides new ideas for the fabrication of 'smart' materials."[12]

Understatement (or, at least, reserve) is considered good professional etiquette in scientific publications. Summaries such as the ones in the "News

and Views" section of *Nature* allow quite a bit more leeway, but statements to the popular press follow a different set of rules altogether. So it perhaps is not surprising that a *Discover* magazine reporter juxtaposed a statement by Aizenberg expressing her amazement at the brittlestar with a pull-no-punches opening line that makes the stakes crystal clear: "Until now, engineers have only dreamed of such perfect microlenses, which could be invaluable in optical networking and microchip production. Aizenberg is inspired. 'This is very clever engineering,' she says. 'We may be able to mimic it, borrowing from nature a design that has already been working for thousands of years.'"[13]

As might be expected, the press releases from Bell Labs (owned by Lucent Technologies) are very upbeat about the discovery. In a press release titled "Bell Labs Scientists Find Remarkable Optics in Marine Creatures That May Lead to Better Microlenses for Optical Networks," dated August 22, 2001, Bell Labs explains that this multifunction biomaterial may lead to better-designed optical elements for telecommunications networks and faster computers through improved optical lithography techniques: "Scientists hope to mimic nature's success and design microlenses based on the brittlestar model. Such biomimetic lenses may prove useful as components of optical networks, and in chip design, where they could potentially improve optical lithography techniques. 'Biomimetics builds on nature's expertise,' said John Rogers, director of nanotechnology research at Bell Labs. 'In this case, a relatively simple organism has a solution to a very complex problem in optics and materials design.'"

A year and a half later, on February 21, 2003, Bell Labs issued an enthusiastic report on Aizenberg's more recent achievement, published in the journal *Science*: "the creation of the world's first micro-patterned crystals inspired by bioengineering found in nature."[14] The summary phrase, set as a boldface subtitle designed to catch the reader's eye, is telling: "Study of how nature designs crystals in sea organisms may be important to nanotechnology." With a wink to the brittlestar, Aizenberg explained the project this way: "I have always been fascinated with nature's ability to perfect materials. . . . The more we study biological organisms, the more we realize how much we can learn from them. We recently discovered that nature makes excellent micro-patterned crystals, and we decided to see if we could copy the natural approach in the lab, since this technique may be useful in nanotechnology." In contrast to the "top-down" approach currently used to make lenses, whereby glass is ground down to match the specifications of the lens, Aizenberg and her colleagues used a "bottom-up" technique, popular in nanotechnology development, in which successive layers of calcite are built up

to make the lenses. The report makes effective use of the lead scientist's enthusiasm and engages it to ratchet up the excitement a notch, predicting nothing less than a revolution in manufacturing optical devices: "The new Bell Labs approach may revolutionize how crystals are made in the future for a wide variety of applications."

The brittlestar's optical system is different in kind from the visualizing systems that many science studies and cultural studies scholars are fond of reflecting on.[15] The history of Western epistemology displays great diversity and ingenuity in the generation of different kinds of epistemological and visualizing systems. (Plato's is not Descartes's is not Kant's is not Merleau-Ponty's is not Foucault's.) But as long as representation is the name of the game, the notion of mediation—whether through the lens of consciousness, language, culture, technology, or labor—holds nature at bay, beyond our grasp.[16]

The brittlestar is not a creature that thinks much of epistemological lenses or the geometrical optics of reflection. The brittlestar does not have a lens serving as the line of separation, the mediator between the mind of the knowing subject and the materiality of the outside world. Brittlestars do not *have* eyes. They *are* eyes. That is, it is not merely the case that its visual system is embodied. Its very being *is* a visualizing apparatus. The brittlestar is a living, breathing, metamorphosing optical system. For a brittlestar, being and knowing, materiality and intelligibility, substance and form entail one another. Its morphology—its intertwined skeletal and diffuse nervous systems, its very structure and form—entails the visualizing system that it is. This is an animal without a brain. It does not suffer the Cartesian doubts of an alleged mind-body split. Knowing is entangled with its mode of being.[17]

Brittlestars are not fixated on the illusion of the fixity of "their" bodily boundaries, and they would not entertain the hypothesis of the immutability of matter for even a moment. Dynamics is not merely matter in motion to a brittlestar when matter's dynamism is intrinsic to its biodynamic way of being. A brittlestar can change its coloration in response to the available light in its surroundings. When in danger of being captured by a predator, a brittlestar will break off the endangered body part (hence its name) and regrow it. The brittlestar is a visualizing system that is constantly changing its geometry and its topology—autonomizing and regenerating its optics in an ongoing reworking of bodily boundaries. *Its discursive practices*—the boundary-drawing practices by which it differentiates between "itself" and the "environment," by which it makes sense of its world—*are materiality enacted*.[18] Its bodily structure is a material agent in what it sees/knows. Its

bodily materiality is not a passive blank surface awaiting the imprint of culture or history to give it meaning or open it to change.

The very substance of the brittlestar is morphologically active and generative—playing an agentive role in its differential production, its ongoing materialization. That is, *its differential materialization is discursive*. This dynamics entails causal practices that reconfigure boundaries and properties that matter to its very existence.[19] The ongoing reconfiguring of its bodily boundaries and connectivity are intra-active material-discursive practices through which the agential cut between "self" and "other" (e.g., "surrounding environment") is differentially enacted. The neologism "intra-action" (in contrast to the usual "interaction") signifies the mutual constitution of entangled agencies.[20] Agential cuts are the result of specific intra-actions.

On one agential cut, a given arm is part of the former; on another, it is part of the latter. The ability to distinguish "self" from "other"—to track and dodge predators, for example—is a requisite for the brittlestar's survival. But this does not imply that categories need to be fixed. On the contrary, the survival of these critters depends on their capacity to discern the reality of their changing and relational nature. Intelligibility and materiality are not fixed aspects of the world but, rather, are intertwined agential performances. This eye, this being, is a living optics. Topologically enfolding bits of the environment within itself, and expelling parts of itself to the environment, is part of the brittlestar's biodynamics. This apparatus serves as both the condition for the possibility of the intertwined practices of knowing and being *and* as a causally productive force in its further materializations. Talk about a multifunctional biomaterial!

Brittlestars challenge not only disembodied epistemologies but also traditional—and, indeed, many nontraditional—notions of embodiment. Bodies are not situated in the world. They are *of* the world. Location for a brittlestar is not about occupying a determinate position in a given environment, although it may be usefully (con)figured as *specific connectivity*.[21] Objectivity cannot be a matter of seeing from somewhere, as opposed to the view from nowhere (objectivism) or everywhere (relativism), if being situated in the world means occupying particular coordinates in space and time, in culture, and in history. The importance of the body as a performance, rather than a thing, can hardly be overemphasized.

Brittlestars offer us resources for rethinking conventional conceptions of space and time. The brittlestar's bodily dynamism resists the familiar notion that space is a preexisting container, a stage on which actors take their places, and that time is the mere uniform ticking of a clock. Spacetime does

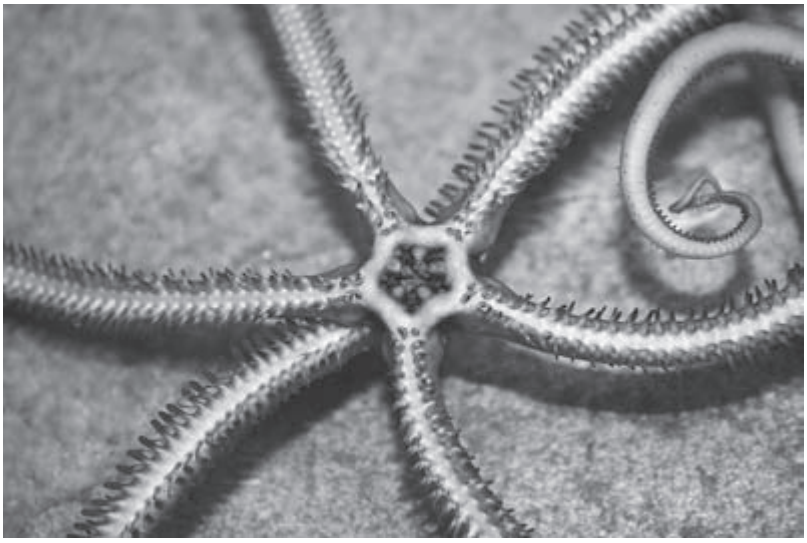


FIGURE 6.3 Close-up of an ophiuroid brittle star showing its fragile arm. Photograph courtesy of the National Oceanic and Atmospheric Administration Photo Library. See multispecies-salon.org/barad.

not sit still while bodies are made and remade. The relationship of space, time, and matter is much more intimate.[22] Matter does not move in space and time. Matter materializes and dynamically enfolds different spatialities and temporalities. Bodies are among the differential performances of the world's dynamic reconfiguring. No-thing stands separately constituted and positioned inside a spacetime frame of reference, and no divine position for our viewing pleasure exists in a location outside the world.[23] There is no absolute inside or absolute outside. There is only exteriority within—that is, *agential separability*.[24] Embodiment is a matter not of being specifically situated in the world but, rather, of being of the world in its dynamic specificity.

Some brittlestars have bioluminescent arms that continue to wiggle and emit light after breaking off. Marine biologists understand this as an effective survival tactic that a brittlestar performs to distract predators while it escapes. Is this jettisoned limb simply a piece of an organic-inorganic structure shuttering with remnant reflex energy or a companion-species being helping out? If the detached limb's continuing movements are judged to be mere reflex, on the basis of the fact that the fragment has no brain, what of the original organism? Shall we deny the liveliness and ingenuity of this smart material without a brain, a living contestation of the organic-inorganic

binary? (Watch the antics of an autonomous brittlestar arm online at http://multispecies-salon.org/barad.)

Brittlestar species exhibit great diversity in sexual behavior and reproduction. Some species use broadcast spawning, and others exhibit sexual dimorphism. Some are hermaphroditic and self-fertilize while some reproduce asexually by regenerating or cloning themselves out of the fragmented body parts. When is a broken-off limb only a piece of the environment and when it is an offspring? At what point does the "disconnected" limb belong to the "environment" rather than the "brittlestar"? Is contiguity of body parts required in the specification of a single organism? Can we trust visual delineations to define bodily boundaries? Can we trust our eyes? Connectivity does not require physical contiguity. Is the connection between an "offspring" regenerated from a fragmented body part and the parent brittlestar the same as its connection to a dead limb or the rest of the environment? Imagine the possibilities for lost limb memory trauma when it comes to brittlestars. Rethinking embodiment in this way surely will require rethinking psychoanalysis, as well.

Negotiating complex sets of changing relations concerning bodily boundaries, brittlestars are evolutionarily attuned to processes of differentiation and visual recognition. In fact, brittlestar optics help sharpen some of Donna Haraway's insights about diffraction. Haraway suggests that diffraction can serve as a useful counterpoint to reflection: Both are optical phenomena, but whereas the metaphor of reflection reflects the themes of mirroring and sameness, diffraction is marked by patterns of difference.[25] Troubling the notion of reflection as a pervasive trope for knowing, brittlestar optics challenge some key assumptions about visuality (and epistemology) that are based on the optical model of reflection. Indeed, brittlestars impress on us the need to pay greater attention to our assumptions about epistemology, particularly in its relationship to ontology. Brittlestars are attentive to different optical effects all at once. The tiny lenses that make up the brittlestar's skeletal system are susceptible to significant diffraction effects. As the size of a lens decreases, the diffraction effects increase. Lens makers are attentive to the optical trade-off between resolution and diffraction effects. Insects with compound eyes are also on to this optical trade-off. Diffraction effects limit the ability of a lens (or a system of lenses) to resolve an image. The greater the diffraction effects, the less determinate are the boundaries of an image. This is a fundamental physical limit (not merely a practical one) to light microscopes and other visualizing systems.[26] Brittlestars thus live at the edge of being diffraction gratings. These living, breathing, and mutating animals also offer an opportunity to rethink the nature of relationships.

Diffraction is not about any difference but about which differences matter. The brittlestar illustrates the possibilities for differentiation without individuation. Brittlestars have evolved in intra-action with their environment. Intra-action marks the relational nature of the world in its intra-active becoming. There are no independently existing things that precede their intra-action. Rather, differences are materialized through a dynamics of iterative intra-activity. It is through specific intra-actions that the boundaries and properties of agents become determinate. Brittlestars' micro-lenses are optimized to maximize visual acuity (for the discernment of predators, hiding places, and other important phenomena). They seem to have evolved in a creative tension, a trade-off, between the resolution of detail and diffraction effects, between geometrical and physical optics.

The focus of the analysis in the *Nature* article about brittlestars is exclusively on geometrical optics. There is no discussion of possible physical optics effects, such as diffraction. But diffraction effects, which limit the resolving power of a lens, are significant for lenses as small as the brittlestar's. (The smaller the lens, the greater the blurring of the image by diffraction.) This is also an important factor for small animals such as insects. In fact, it is the reason they do not have the kind of eyes that the human or octopus has. If the human eye were scaled down to fit an insect, the insect would be unable to resolve things on the scale that matters to it because the diffraction effects would be so significant. Insects thus use a different optical system—namely, compound eyes.[27] Compound eyes use bundles of very small optical detectors to form an image. The ability of the compound eye to resolve details increases as the individual detectors become smaller and more numerous, much like a computer monitor with large numbers of pixels per unit area. The price is that the smaller the lens, the greater the diffraction effects. How that tension is negotiated clearly matters: The possibilities for survival are at stake in an organism's ability to differentiate boundaries in its surroundings.[28]

Brittlestars know better than to get caught up in a geometrical optics of knowing. Clearly, they are in a different genus from the mediating machines, inscription devices, lenses, Panopticons, and various other epistemological tools that many science studies and cultural studies scholars fancy. These epistemologies too often figure visualization as a matter of geometrical optics, leaving important factors of physical optics aside. But this approach will produce a fuzzy image, at best. Limiting an analysis to the domain of geometrical optics, in the neglect of diffraction and other important physical optics effects, corresponds to limiting the analysis to the domain of classical physics in the neglect of quantum effects.[29] In the

absence of a vigorous examination of the ontological issues, the locus of knowledge is presumed never to be too far removed from the human, and so the democratizing move is to invite nonhuman entities into our sociality. But the nature-culture dualism is not undermined by inviting everything into one category (man's yet again). The point of challenging traditional epistemologies is not merely to welcome women, slaves, children, animals, and other dispossessed Others (exiled from the land of knowers by Aristotle thousands of years ago) into the fold of knowers. The point is to better account for the ontology of knowing.

Brittlestars literally enact my onto-epistemological point about the entangled practices of knowing and being, a central element of agential realism.[30] They challenge our Cartesian habits of mind, breaking down the usual visual metaphors for knowing along with its optics of mediated sight. Knowledge making is *not* a mediated activity, despite the common refrain to the contrary. Knowing is a direct material engagement, a practice of intra-acting with the world as part of the world in its dynamic material configuring, its ongoing articulation. The entangled practices of knowing and being are material practices. The world is not merely an idea that exists in the human mind. To the contrary, "mind" is a specific material configuration of the world, not necessarily coincident with a brain. Brain cells are not the only ones that hold memories, respond to stimuli, or think thoughts.[31] Brittlestars intra-act with their ocean environment. They respond to differential stimuli made intelligible through intra-actions, adjusting their positions and reworking their bodies to avoid predators or find food or shelter, all without brains or eyes. (Was the cell biologist Daniel Mazia being merely metaphorical when he remarked that "the gift of the great microscopist is the ability to think with the eyes and see with the brain"?[32] Surely, a plethora of statements about tacit knowing, including a wealth of testimonials offered by scientists, suggests some more literal, material meaning.)

"I think therefore I am" is not the brittlestar's credo. Knowing is not a capacity that is the exclusive birthright of the human. The "knower" cannot be assumed to be a self-contained rational human subject, or even its prosthetically enhanced variant. There is no res cogitans that inhabits a given body with inherent boundaries differentiating self and other. Rather, subjects are differentially constituted through specific intra-actions. The subjects so constituted may range across some of the traditional boundaries (such as those between human and nonhuman and self and other) that get taken for granted. Knowing is a distributed practice that includes the larger material arrangement. To the extent that "humans" participate in scientific or other

practices of knowing, they do so as part of the larger material configuration of the world and its ongoing, open-ended articulation.

In traditional humanist accounts, intelligibility requires an intellective agent (a that to which something is intelligible). Intellection is thus conventionally framed as a specifically human capacity. But in my agential realist account, intelligibility is an ontological performance of the world in its ongoing articulation. Intelligibility is not a human-dependent characteristic but a feature of the world in its differential becoming. The world articulates itself differently. And knowing does not require intellection in the humanist sense, either. Knowing is a matter of differential responsiveness to what matters.

Knowing, however, is not a matter of mere differential responsiveness in the sense of simply having different responses to different stimuli. Knowing requires differential accountability to what matters and is excluded from mattering. As Joseph Rouse remarks, "There is nothing about the letters p-o-s-i-t-i-o-n or the *po-'zi-shun* that magically connects them to what is disclosed in measurements using apparatus with internally fixed parts; only their actual ongoing use in such circumstances, in reliably recognizable and normatively accountable ways, can account for their discursive significance."[33] But recognition need not entail cognition in humanist terms. A brittlestar can recognize a predator and successfully negotiate its environment to elude capture despite the fact that it has no brain. A brittlestar is not some ideal Cartesian subject. But through specific practices of intra-active engagement, it differentially responds (not simply in the sense of responding differently to different things that are out there but) in ways that matter. Life and death are at stake.[34]

Brittlestars are not merely tools that we can use to teach us about how to build enhanced communication networks and principles useful to biomimesis—an approach used by scientists, engineers, and designers that explores possibilities of making novel designs by copying existing forms of life. Brittlestars are living testimony to the inseparability of knowing, being, and doing. On the one hand, we trust our eyes when it comes to believing that boundaries we see are sharp, inherent edges marking the limit of separate entities. Yet on closer examination, the diffraction effects—the indefinite nature of those boundaries—become clear. I am not suggesting that there really are no boundaries or that what is at stake is a postmodern celebration of the blurring of boundaries. We have learned too much about diffraction to think in these simplistic terms. On the other hand, we do not trust our eyes to give us reliable access to the material world.

As inheritors of the Cartesian legacy, we would rather put our faith in repre-

sentations than in matter, believing that we have a kind of direct access to the content of our representations that we lack toward that which is represented. Representationalism involves the wrong optics, the wrong ground state, the wrong set of epistemological and ontological assumptions. Haraway's move away from optics as "a politics of positioning" (in "Situated Knowledges") to diffraction as "an optical metaphor for the effort to make a difference in the world" (in *Modest_Witness*) signals the kind of shift that is required.[35]

There is more to diffraction than meets the eye. As we have learned from quantum mechanics, diffraction is a much subtler and more profound phenomenon than the classical understanding suggests. The phenomenon of diffraction does not merely signify the disruption of representationalism and its metaphors of reflection in the endless play of images and its anxieties about copy and original. Diffraction is an *ethico-onto-epistemological* matter. We are not merely differently situated in the world. "Each of us" is part of the intra-active ongoing articulation of the world in its differential mattering. Diffraction is a material-discursive phenomenon that challenges the presumed inherent separability of subject and object, nature and culture, fact and value, human and nonhuman, organic and inorganic, and epistemology and ontology, as well as material and discourse. Diffraction marks the limits of the determinacy and permanence of boundaries. One of the crucial lessons we have learned is that agential cuts cut things together-apart (one move). *Diffraction is a matter of differential entanglements, where entanglement is not the intertwining of separate entities, but their very inseparability*.[36] This is the deep significance of a diffraction pattern. Differentiating is not about othering/separating. It is about making connections and commitments. What is on the "other side" of the cut is not separate from us. Agential separability is not individuation; the dynamics is one of differentiating-entangling. Ethics is not about the right response to the other but about responsibility and accountability in lively relationships. "We" are a part of these relationships; we do not stand apart.

Brittlestars are not pure bits of nature or blank slates for the imprinting of culture. They are not mere resources or tools for human interventions. They are not simply superior optical engineers or natural inspirations for the enterprising ingenuity of humans. Brittlestars are phenomena intra-actively produced and entangled with other phenomena. They are agentive beings, lively configurations of the world, with more entanglements than arms. They are not merely objects of our knowledge/product-making projects. "Humans" and "brittlestars" learn about and co-constitute one another through a variety of "brittlestar"-"human" intra-actions.

Biomimesis may be the goal of certain research projects that seek to appropriate the ingenuity of the brittlestar's lens system, but this practice cannot be understood as a process of copying the other. Nature is not a pure essence that exists "out there" or on a slide positioned under the objective of our microscopes. Is the brittlestar the lens that we look at, or look through, or look with? Brittlestars are not gripped by the idea of mirroring, imitation, reflection, or other tropes of "sameness." These echinoderms do not reflect on the world; they are engaged in making a difference in the world. The specific nature of our intra-actions with brittlestars matters. For all we have learned from our intra-actions with brittlestars, the issue is not whether we are willing to follow Nature's example. The attending ethico-onto-epistemological questions have to do with responsibility and accountability for the entanglements "we" help enact and what kinds of commitments "we" are willing to take on (including commitments to "ourselves" and who "we" may become).

Brittlestars are *trans/materialities*. They transgress the sacrosanct divides between organic and inorganic, machine and animal, episteme and techne, matter and intelligibility, macro and micro. Brittlestars not only already know how to do nanotechnology (so beautifully that they have done away evolutionarily with optical aberrations in perfecting of their nanoscale designs), they live it. Indeed, brittlestars are an ancient nanotechnology that lives and breathes and repairs itself, marking a rather queer temporality that comes from the past and the future.

It would be a serious error to mistake biomimesis for mere imitation. The emerging field of biomimetics is not about copies of originals or even copies of copies without beginning or end. On the contrary, biomimesis is a particularly poignant call for the incorporation of difference at every level in breaking the deadening and sinister symmetry of Sameness. The biomimetic-inspired study of the brittlestar reveals the limitations of the geometrical optics of mirroring and shows us that the crucial point is not mirroring but its creative undoing, not sameness for its own sake but attentiveness to differences that matter. Contemporary practitioners of biomimesis do not claim to be making replicas of nature. Rather, they are engaged in practices that use nature as inspiration for new engineering designs.

Biomimetics honors Mother Nature as the primo engineer, but it does not promise to abide by her methods. It embraces new innovations, new materials, new techniques, new applications. Bringing the new to light is its highest principle. Of course, the new bio-info-nano-technologies embrace the new for very practical reasons: Aside from the excitement and romantic overtones that inevitably accompany the story of the scientist as explorer

breaking into new frontiers, and its obvious publicity benefits, without the new there is simply no copyright to be gained. But we should slow down in our unquenchable quest for the new. It is not so much newness as emergence that is at issue: With the intra-active generation of new temporalities, new possibilities, new subjectivities, the "new" has become the trace of what is yet to come. The copyright symbol © should be a sign not of the right to copy but, if anything, of the responsibilities entailed in producing differential materializations (for whom and at what costs?).[37]

Biomimetics is a nodal point around which nanotechnology, biotechnology, and information technology become more and more complexly entangled. As we entertain the possibilities for forming partnerships with brittlestars and other organisms for biomimetic projects, we are co-constituting ourselves into phenomena that mimic (but do not replicate) the entanglements of the objects we study and the tools that we make. The entanglements we are a part of reconfigure our beings, our psyches, our imaginations, our institutions, our societies.[38] "We" are an inextricable part of what gets reworked in our research and development projects. The ethical questions that we will want to consider are not only about how nonhuman animals are being appropriated for human desires but also how our desires and our beings are co-constitutively reconfigured.

Optical lithography is a prime example of how biomimetics has transformed not only the notion of mirroring but also our understanding of optics. Biomimetics is not interested in mirror images of the Same. It has a different optics in mind. Biomimetics involves bringing different difference patterns into existence. It is interested in running the rays of understanding back through the apparatuses of production to remake these very apparatuses. Optical lithography is used to study brittlestars' lenses, and then brittlestars' lenses are used as inspiration for improving optical lithography. Tools are used to rework tools.[39] Enfolded into the apparatuses of bodily production, these phenomena contribute to their constitution as nanotechnology phenomena. This is not simply the iteration of simulacra (copies from copies without originals); these dynamics have a much more complex topology. Differences are incorporated at each level. Reflexive analyses do not cut it. We need to understand diffraction effects. How are differences constituted and enfolded? Which differences matter, how do they matter, and to whom?

NOTES

This essay was originally written in 2004 in honor of Donna Haraway, an invited contribution for an "un-Festschrift" that, unfortunately, has yet to materialize. In the meantime, much of this material was published as part of chapter 8 of my *Meeting the Universe Halfway* (Duke University Press, 2007). It is presented here with revisions in response to two peer reviewers. Thanks are due to Eben Kirksey for suggestions to make it more accessible. I dedicate the chapter to my dear friend and colleague Donna Haraway, with deepest gratitude.

Epigraphs: Haraway, "Situated Knowledges," 583; Haraway, *Modest_Witness@Second_Millennium.FemaleMan_Meets_OncoMouse*, 273.

1. Jonathan Abraham, "Eyeless Creature Turns Out to Be All Eyes." *New York Times*, September 4, 2001.

2. Abraham, "Eyeless Creature Turns Out to Be All Eyes."

3. Land quoted in Whitfield, "Eyes in Their Stars." *Nature*. Available at http://www.nature.com/news/2001/010823/full/news010823–11.html.

4. Photosensitive species of brittlestars exhibit responses to their environment that are superior to those of other marine organisms and seem to entail visual functioning. For example, they move out of the way of predators and run into crevices they spy from a distance. The existence of photosensitivity was linked to diffuse dermal receptors in previous studies.

5. Aizenberg et al., "Calcitic Microlenses as Part of the Photoreceptor System in Brittlestars," 820.

6. Aizenberg et al., "Calcitic Microlenses as Part of the Photoreceptor System in Brittlestars," 822.

7. Whitfield, "Eyes in Their Stars."

8. BBC News Service, "Can We Learn to See Better from a Brittlestar?" December 16, 2002.

9. Sambles quoted in Whitfield, "Eyes in Their Stars." *Nature*. Available at http://www.nature.com/news/2001/010823/full/news010823–11.html.

10. Sambles, "Optics," 783.

11. National Public Radio, "Sea Creature Sight," August 22, 2001, available at http://www.npr.org, accessed on February 26, 2014.

12. Aizenberg et al., "Calcitic Microlenses as Part of the Photoreceptor System in Brittlestars," 821.

13. Weinstock, "A Thousand Eyes without a Face."

14. Aizenberg et al., "Direct Fabrication of Large Micropatterned Single Crystals," 1205.

15. What is at issue is not the geometrical optics model that positions representation as the lens that mediates between the object world and the mind of the knowing subject. That kind of optics reflects a geometry of absolute exteriority between ontologically and epistemologically distinct kinds.

16. This is not to say that language, culture, technology, and labor do not matter. Surely they do. The point is to question the assumption that they serve a mediating

function. My notion of agential realism rejects the geometrical optics metaphor of lenses and mediation and offers an alternative (nonrepresentational) understanding of *how* these factors come to matter: see Barad, *Meeting the Universe Halfway*, chap. 4.

17. There is no res cogitans agonizing about the postulated gap (of its own making) between itself and res extensa. There is no optics of mediation, no noumena-phenomena distinction, no question of representationalism.

18. I draw on and further elaborate Michel Foucault's notion of discursive practices. According to Foucault, discursive practices are not the same thing as speech acts or linguistic statements. Rather, discursive practices are the material conditions that define what count as meaningful statements: Foucault, *Power/Knowledge*, 194. For my elaboration, see Barad, *Meeting the Universe Halfway*, chap. 4.

19. This is to suggest not that matter and discourse are equivalent but, rather, that the relationship is one of mutual entailment. Similarly, one cannot draw a distinction between the brittlestar's skeletal system and its visualizing system. There is no skeleton without the calcite crystals that also make up the visualizing system, and vice versa.

20. The notion of "interaction" assumes that there are separate individual agencies that precede their interaction. In contrast, "intra-action" recognizes that distinct agencies do not precede but, rather, emerge through their intra-action. It is important to note that agencies are only distinct in a relational sense, not an absolute one. It is through specific intra-actions that the boundaries and properties of "agents" become determinate. That is, agencies are only distinct in relation to their mutual entanglement; they do not exist as individual agents. For a more detailed discussion of the key agential realist notion of intra-action, see Barad, *Meeting the Universe Halfway*.

21. Haraway does not take location to be about fixed position (although, unfortunately, many readers who cite Haraway conflate her notion of "situated knowledge" with the specification of one's social location along a set of axes referencing one's identity). She reiterates this point in different ways throughout her work. For example, she writes, "Feminist embodiment, then, is not about fixed location in a reified body, female or otherwise, but about nodes in fields, inflections in orientations, and responsibility for difference in material-semiotic fields of meaning. Embodiment is significant prosthesis; objectivity cannot be about fixed visions when what counts as an object is precisely what world history turns out to be about": Haraway, "Situated Knowledges," 181. Situated knowledges are not merely about knowing/seeing from somewhere (as in having a perspective) but about taking account of how the specific prosthetic embodiment of the technologically enhanced visualizing apparatus matters to practices of knowing. See also Barad, *Meeting the Universe Halfway*, 470n45.

22. For more details, see Barad, *Meeting the Universe Halfway*, esp. chaps. 4, 6–7. See also Barad, "Nature's Queer Performativity (the Authorized Version)"; Barad, "Quantum Entanglements and Hauntological Relations of Inheritance."

23. Erwin Schrödinger nicely sums up the difficulty of the spectator theory of knowledge. "Without being aware of it, and without being rigorously systematic

about it, we exclude the subject of cognizance from the domain of nature that we endeavor to understand. We step with our own person back into the part of an onlooker who does not belong to the world which by this very procedure becomes an objective world": Schrödinger, *What Is Life?*, 127.

24. "Agential separability" is a key concept in agential realism: Barad, *Meeting the Universe Halfway*, 140.

25. Diffraction is a phenomenon exhibited by waves. Waves bend around edges and overlap with one another, making diffraction patterns. This essay only offers a glimpse into my much more extensive elaboration of diffraction. For a detailed discussion of diffraction as it is understood from the point of view of classical mechanics, see Barad, *Meeting the Universe Halfway*, chap. 2. For a further elaboration of this physical phenomenon (including its far-reaching implications for understanding quantum physics) and the profound epistemological and ontological shift produced by a quantum understanding of diffraction, see Barad, *Meeting the Universe Halfway*, index, s.v. "diffraction (interference)."

26. This optical limit is called Abbe's law. In theory, the diffraction limit can be mitigated (i.e., the diffraction effects can be reduced) by taking advantage of certain features of the phenomenon of quantum entanglement, but a limit exists nonetheless for any finite number of entangled photons: see, e.g., Boto et al., "Quantum Interferometric Optical Lithography," and the cautionary comments in Ole Steuernagel, "Comment on 'Quantum Interferometric Optical Lithography.'"

27. The compound eye of insects is made up of many individual units called ommatidia. Each ommatidium is a simple light detector (a light pipe) that points in a different direction. The insect's ability to resolve images depends on a large number of small ommatidia in its eye. Resolution increases with smaller and more numerous ommatidia. But if the ommatidia are too small, then blurring caused by diffraction becomes significant. The optimal size of insect ommatidia is a compromise between these competing effects. For example, for a wavelength of .5 micron (yellow-green), the optimal diameter of an ommatidium is 27 microns. Interestingly, the individual lenses of the brittlestar have a diameter of approximately 20 microns, so it seems that the brittlestar has also engineered a good trade-off between resolvability and diffraction. For a discussion of the optics of the compound eye, see Feynman et al., *The Feynman Lectures on Physics*, 1:36–38. See also Alexander, *Optima for Animals*.

28. Brittlestars are living breathing (liminal) diffraction gratings. Their very being is a flexible distributed growing and regenerating multi-oriented shape-shifting topologically variant dynamical system of diffraction gratings.

29. There is a profound distinction between classical and quantum physics—the epistemology and ontology that each entails is strikingly different. In a sense, this neglect of physical optics (quantum physics) can be understood as marking the epistemological limit of science studies. There is more to nature than "nature-as-the-object-of-human-knowledge" (to borrow a phrase from Sandra Harding), but she is not alone in this insistence). The latter constitutes a re-veiling (which provokes the seeming need for a revealing) of nature, yet again. Boundary-making practices do not merely pick out the epistemic object, consigning the rest to the

background. Scientific practices are not merely practices of knowing, and the knowledge produced is not ours alone. Even in direct challenges to Western philosophy's traditional conceptions of epistemology there is a tendency to continue to think of knowers as human subjects, albeit appropriately hooked into our favorite technological prostheses: see Harding, *Whose Science? Whose Knowledge?*, 147.

30. Elsewhere I have presented a relational ontology that rejects the metaphysics of *relata*, of "words" and "things." In an agential realist account, it is possible to acknowledge nature, the body, and materiality in the fullness of their becoming, without resorting to the optics of transparency or opacity, the geometries of absolute exteriority or interiority, and the theorization of the human as either pure cause or pure effect while at the same time remaining resolutely accountable for the role "we" play in the intertwined practices of knowing and becoming: see Barad, *Meeting the Universe Halfway*.

31. "Holding," "responding," and "thinking" are all intra-active engagements with and as parts of specific configurations of the world.

32. Mazia quoted in Wayne, *Light and Video Microscopy*, 219.

33. Rouse, "Barad's Feminist Naturalism," 153.

34. "Recognizability" is not a fixed and universal notion. Rather, it also obtains its meaning through its ongoing use in specific practices. What is at issue, then, is not mere differential responsiveness but normative differential responsiveness. Different material intra-actions produce different materializations of the world and hence there are specific stakes in how responsiveness is enacted. In an important sense, it matters to the world how the world comes to matter.

35. Haraway, *Modest_Witness@Second_Millennium.FemaleMan_Meets_OncoMouse*, 16; Haraway, "Situated Knowledges," 193.

36. See Barad, *Meeting the Universe Halfway*, esp. chap. 7.

37. "This is an excellent reminder as to why the recent uncritical embrace of the 'new' [a trend to which the academy has not been immune] might well give us pause. Although in [some important (philosophical)] sense there may be nothing but the new, this point should not deflect our attention from the fact that the uncritical embrace of the new (the brighter, shinier, lighter model) fits all too comfortably with capitalism's reliance on the continual production of new desires including a desire for the new": Barad, *Meeting the Universe Halfway*, 473n57. Significantly, the methodology of diffraction does not do away with the old in favor of the new—indeed, they are always already threaded through one another. I wrote this well before I had any inkling that my work was to be dubbed "new materialist." While it is exciting to be a part of a current *re*-turn to materialism, I also have some reservations about the framing and a sense of discomfort that derives from precisely this kind of concern: that the old not be discarded for the new, and that attention be given to the ways in which all the "news" (new turns, new programs, new fee structures, new forms of digital education, and the like) feed neoliberalism's grip on the academy. To my mind, the "old" materialism is not only an honored part of "new" materialism's inheritance. It is also a rich resource for feeding and informing the "new" materialism, especially now, when economic analyses are so urgently needed—hence, my desire to place poststructuralist and Marxist insights in conver-

sation with one another by reading them through one another rather than placing them at odds with each other. For other authors who are similarly committed, see, e.g., Rosemary Hennessey, Leela Fernandes, Miranda Joseph, Linda Alcoff. Of course, feminist science studies has always had a disloyal but honored relationship to historical materialism. Where would feminist theory in the twenty-first century be without Haraway's "A Cyborg Manifesto"?

38. *Entanglement*, in the quantum theory sense, refers not to the intertwining of separate states but, rather, to their inseparability. To put it another way, spatially separated particles in an *entangled state* do not have separate identities; they are instead part of the same phenomena. Empirical support for a relational ontology interpretation (such as the one offered by agential realism) has been amassing since the 1990s, when rapid technological advances made possible an increasing number of experiments that test fundamental questions about the nature of reality. For details, see Barad, *Meeting the Universe Halfway*, esp. chap. 7. There has been some confusion as to whether the existence of quantum phenomena has any relevance for thinking about the nature of human experiences, which occur at the macroscopic scales. But this insistence on quarantining quantum queerness is suspect for several reasons. For one thing, the notion of a "micro-world" does not hold up either theoretically or experimentally. That is, while there is much talk about a so-called micro-world, as compared with a "macro-world," Newtonian physics is thought to have been superseded by quantum physics. In particular, Newtonian physics happens to be a good approximation for relatively massive objects, but quantum physics is thought to be the fundamental theory. Furthermore, there is no empirical evidence of such a disjunction of ontologies at a particular scale. On the contrary, with each passing year new experimental evidence is gathering that flies in the face of the supposition that the world is divided into two—a "micro-world" that follows the laws of quantum theory and a "macro-world" that follows the laws of Newtonian physics. For example, in 2011, it was demonstrated that it is possible to entangle macroscopic bits in the form of diamond chips. "Our results show that entanglement can persist in the classical context of moving macroscopic solids in ambient conditions": Lee et al., "Entangling Macroscopic Diamonds at Room Temperature," 1253. As the quantum entanglement expert physicist Anton Zeilinger proffers, "Someday, we will actually be able to demonstrate that quantum uncertainty has its relevance also for macroscopic objects. This is a question of technology as it develops. There is no clue in sight telling us that quantum uncertainty must stop somewhere. . . . There is no reason *in principle* why it should not be possible to observe quantum superpositions of living systems someday. For example, there is no fundamental reason why one should not be able to observe a quantum double-slit experiment for an amoeba or a very small bacterium": Zeilinger, *Dance of the Photons*, 44, 249; emphasis added. In addition, according to agential realism, scale is intra-actively (re)configured in the ongoing intra-active becoming of space-time-mattering.

39. These creatures are reminiscent of the "living mutating differential gear assemblage": see Barad, *Meeting the Universe Halfway*, chap. 6.

CHAPTER 7

SPECULATIVE FABULATIONS FOR TECHNOCULTURE'S GENERATIONS: TAKING CARE OF UNEXPECTED COUNTRY

Donna J. Haraway

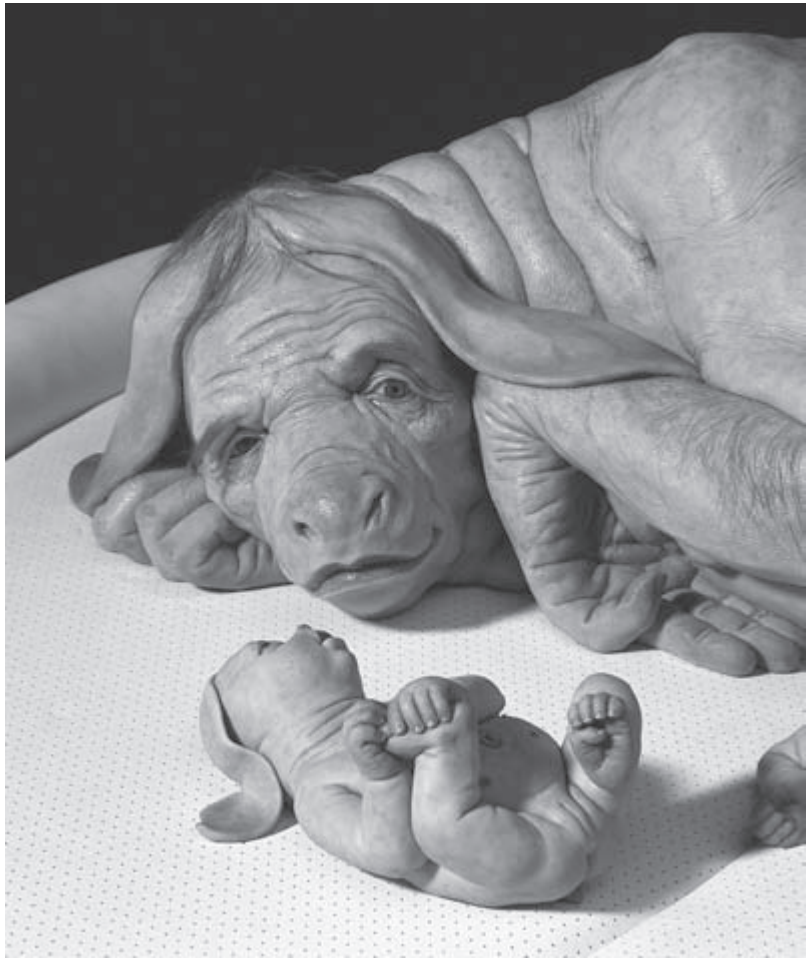
When I first saw Patricia Piccinini's work a few years ago, I recognized a sister in technoculture, a co-worker committed to taking "naturecultures" seriously without the soporific seductions of a return to Eden or the palpitating frisson of a jeremiad warning of the coming technological Apocalypse.[1] I experienced her as a compelling storyteller in the radical experimental lineage of feminist science fiction. In an SF sense, Piccinini's objects are replete with narrative speculative fabulation (see plate 8). Her visual and sculptural art is about worlding—that is, "naturaltechnical" worlds at stake, worlds needy for care and response, worlds full of unsettling but oddly familiar critters who turn out to be simultaneously near-kin and alien colonists. Piccinini's worlds require curiosity, emotional engagement, and investigation, and they do not yield to clean judgments or bottom lines—especially not about what is living or nonliving, organic or technological, promising or threatening. As a graduate student in bioart and critical theory playing brilliantly in my 2004 seminar with *The Young Family* and *Still Life with Stem Cells*, Lindsay Kelley awakened my passion for Piccinini's corporeal practice of ethically inquisitive fabulating in the heterogeneous media of her collaborative work habits. So I set about learning what these worlds might be like and how they invite the risk of response, of becoming someone one was not before encountering her human and nonhuman critters.

Piccinini's worlds are full of youngsters—including pink and blue truck babies promising to tell where grown-up trucks come from, ambiguously fetal-like transgenics in *Science Story*, eager if blob-ish stem cell playgroups with

a girl in a polka-dot smock, Euro-Australian children paired with fabulated introduced species of indeterminate age, animorphic motorcycle neonates in *Nest* (2006), vividly colored cyclepups, naked pink synthetic paedomorphic "siren moles" in the *So2* series, and gestating wombats in the dorsal pouches of protector surrogates. She invites those willing to inhabit her worlds to dedifferentiate in order to risk bioengineered redifferentiating as part of a queer family whose members require us to rethink what taking care of this country, taking care of these generations, might mean (see multispecies-salon.org/piccinini).

From the start, I knew that Piccinini lived and worked in Australia. Like me, she is the offspring of white settler colonies, their frontier practices, their ongoing immigrations, and their bad memories and troubled discourses of indigeneity, belonging, appropriation, wastelands, progress, and exclusion. Twenty-first-century technoscience and technoculture are nothing if not frontier practices, always announcing new worlds, proposing the novel as the solution to the old, figuring creation as radical invention and replacement, rushing toward a future that wobbles between ultimate salvation and destruction but has little truck with thick pasts or presents.[2] But in her sensuous sculptural and graphic stories of terran critters who were not on Earth before now and whose evolutionary and ecological habitats are the installation, the mall, the website, and the lab, Piccinini seems to me to be proposing not another frontier but, rather, something more akin to a decolonizing ethic indebted to Australian Aboriginal practices of taking care of country and accounting for generations of entangled human and nonhuman entities.

In this little essay, I want to think about Piccinini's art in conversation with the anthropologist Deborah Bird Rose's *Reports from a Wild Country*.[3] Rose is a Euro-American who went to Australia as an ethnographer in the early 1980s to study with Aboriginal people in the Northern Territory around the Victoria River District. Since that time she has worked on land claims, collaborative documentation of sacred sites, and refiguring and enacting social and ecological justice on wounded but still vital places across Australia that must somehow collect up all of their past and contemporary inhabitants—those human and not, as well as those technological and organic. She, her Aboriginal teachers and friends, and many other Australians work to reground responsibility and accountability to time, generations, and place in a way that might lead to ecological and social restoration and reconciliation. Rose was taught to see the difference between violently blasted places called "the wild" and "quiet country—the country in which all the care of generations of people is evident to those who know how to see it." Across settler societies such as the United States and Australia, "violence



FIGURES 7.1–7.2 (*above and opposite*) Patricia Piccinini, *The Young Family*, silicone, fiberglass, leather, human hair, and plywood, 85 × 150 × 120 cm, 2002. Photograph by Graham Baring. Image courtesy of the artist. See multispecies-salon.org/piccinini.

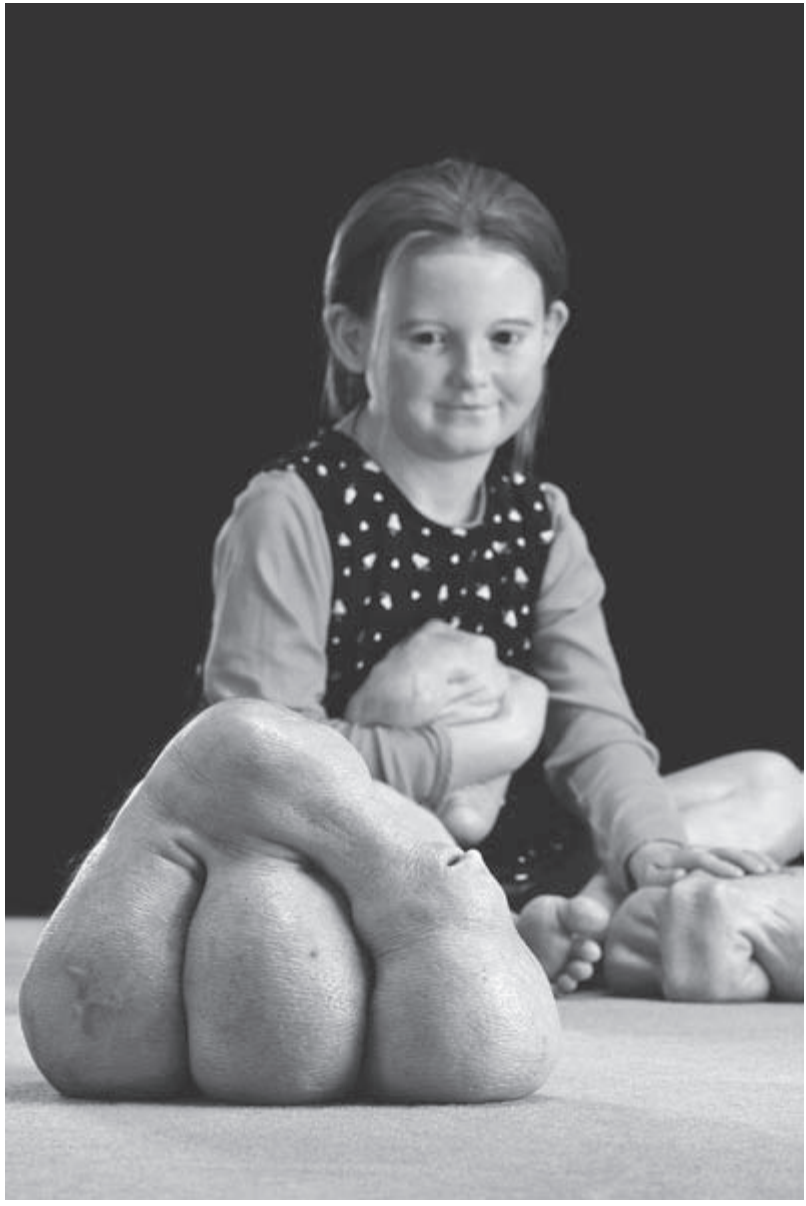


FIGURE 7.3 Patricia Piccinini, *Still Life with Stem Cells*, silicone, polyurethane, human hair, clothing, and carpet, life-size with variable dimensions, 2002. Photograph by Graham Baring. Image courtesy of the artist. See multispecies-salon.org/piccinini.

is central both to conquest and to progress. . . . We cannot help knowing that we are here through dispossession and death. . . . What alternatives exist for us, and what is asked of us? . . . Alternatives arise unexpectedly in relationships among people and between people and place. Alternatives are entangled in the midst of the wild, and may depend on the wild even as they resist it." The crucial question is how to face settler heritage differently, to participate in decolonizing generational practices, in a state of what Rose calls "responsive attentiveness."[4]

To me—and, I think, to Piccinini—that question is especially pressing in the land I call technoculture, where the artist's critters all gestate and proliferate. Piccinini cultivates a practice of decolonizing responsive attentiveness. Could the worlds of technoculture ever come to be quiet country? It depends, Piccinini's critters suggest, on taking care of generations and doing so in all-too-wild country like the mall, the highway, the lab, and the installation. How might a speculatively fabulated SF art object help morph eroded and disowned no-places into flourishing and cared-for places?

Orientation to time must be the first consideration. Rose emphasizes that, shaped by Christian temporality, European societies "face" the future, while the past is behind and is to be overcome, succeeded, surpassed. In that teleological, goal-directed orientation, the present is nothing but a vanishing point of transition toward what is to come, whether that is destruction or redemption. In contrast, the fundamentally non-teleological time of Aboriginal country is 180 degrees the other way around; people "face" the past for which they bear the responsibility of ongoing care in a thick and consequential present that is also responsible to those who come behind—that is, the next generations. Indwelling that sort of time, country is a multidimensional matrix of relationships: "It consists of people, animals, plants, Dreamings, underground, earth, soils, minerals, waters, surface water, and air. . . . All living things are held to have an interest in the life of the country. . . . [T]hose who destroy their country destroy themselves."[5] Furthermore, countries are not equivalent, interchangeable, abstract. Country is materially and semiotically distinctive, each with its own human beings created for that country and responsible for it through the generations.

Nothing could seem less like modern "Western" science and its future-besotted biotechnological and cyborgian global offspring, who are seemingly innocent of—and so radically destructive of—place. But Piccinini suggests something else is possible in technoculture—not to mention necessary—and I am on her side. Growing up in the presence of Piccinini's plethora of SF elder youngsters is to face the past and care for the generations with verve and

ethical imagination. To show why I think that, I need to start again with *Still Life with Stem Cells* and *The Young Family*. Take a moment with the anatomical niceties of *Leather Landscape*, and then embrace my unsafe progenitors and offspring among the critters of the series Piccinini calls *Nature's Little Helpers* (see multispecies-salon.org/piccinini). As the artist's exhibition at the Venice Biennale in 2003 proclaimed, "We are family." Happily this is not the world-famous heterosexual nuclear family of Christian settler imaginations and of all-too-current national policy.

Most of Piccinini's works are premised on bioscientific practices of manipulation and alteration of living beings, of creating "new worlds," if "only" in art. Stem cell research, genetic engineering, cloning, bioelectronics, and technologically mediated ecological restoration and kin formation loom large. Reorienting the arrow of time, both *Still Life with Stem Cells* and *The Young Family* provoke the onto-ethical question of care for the intra-acting and interacting generations that is not asked often enough in technoculture, especially not about its own progenitors and offspring. The important question is not found in the false opposition of nature and technology. Rather, what matters is who and what lives and dies, where, when, and how. What is wild, and what is quiet? What is the heritage for which technocultural beings are both accountable and indebted? What must the practices of love look like in this tangled wild/quiet country? Piccinini's artist statement for her Wellington exhibition "In Another Life" poses the question of care in words: "I am particularly fascinated by the unexpected consequences, the stuff we don't want but must somehow accommodate. There is no question as to whether there will be undesired outcomes; my interest is in whether we will be able to love them."[6] Replying to a questioner at her lecture at the Tokyo University of Fine Art in 2003, Piccinini laid out her large, queer, non-heteronormative view of our technocultural family: "In my work, perhaps I am saying that whether you like them or you don't like them, we actually have a duty to care. We created them, so we've got to look after them." Looking after imperfect, messy, really existing mortal beings is much more demanding—not to mention playful, intellectually interesting, and emotionally satisfying—than living the futuristic nightmare of techno-immortality.

Piccinini insists in word and object that the people of technoculture have a familial, generational duty to their failures, as well as to their accomplishments. Natural or not, good or not, safe or not, the critters of technoculture make a body-and-soul changing claim on their "creators" that is rooted in the generational *obligation of* and *capacity for* responsive attentiveness. To care is to know how to nurture quiet country through the often unexpected

generations, not to point toward future utopia or dystopia. To care is wet, emotional, messy, and demanding of the best thinking one has ever done.[7] That is one reason we need speculative fabulation.

The cell blob–human girl play group in *Still Life with Stem Cells* is neither utopian nor dystopian; it is seriously *playful* and so curious, inquisitive, and risky (see plate 9). Encountering either this romp or the *Young Family* of mop-eared, porcine transgenics (do they exist to provide sick, wealthy humans with organs and tissue?), both the artist and visitors to the exhibit palpably run the risk of coming to care about, even to love, the fabulated blobs and the unlovely chimeric litter with a shrivel-skinned, big-rumped, heavy-lidded, all-too-humanoid mama. Commenting on those big-headed and ungainly synthetic organisms called siren moles, such as the one on the blue car seat in the Artium exhibit's *SO2 (Synthetic Organism 2 Series) Waiting for Jennifer* (2000), Jacquelyn Millner, the writer on Australian contemporary art, concluded, "Unlike Dr. Frankenstein who grew to hate his creation and suffered the consequences, Piccinini would urge us to bring an attitude of love to the products of technology, to accept our ethical mantle as creators, to take care of all our progeny, even of the artificial variety. The love she appears to propose is not of the romantic, infatuated ilk—classic technophilia—but of the familial variety, with its overtones of responsibility, ethical guidance and life-long commitment."[8] I would only add that Rose's understanding of Aboriginal material and ethical guidance on taking care of country insists that we learn to care for ancestors as well as offspring. We face ancestors, and progeny come after; learning how to tell time that way in technoculture would be truly revolutionary. It would mean taking the present seriously, not just passing through it to elsewhere.

This brings me to my favorite Piccinini critters: Nature's Little Helpers. Alerting viewers to both danger and possibility, these drawings, installations, and sculptures palpably argue that the artist has fallen in love with her speculatively fabulated progeny. She has certainly made me do so. To get to Nature's Little Helpers, where I will encounter the intriguing dorsal pouches on a protector species fabulated for gestating the young of an endangered species of wombat, I mentally pass by the colony of humanoid, transgenic, African meerkat-like beings in *The Leather Landscape* (2003), exhibited in "We Are Family" at the Venice Biennale (see multispecies-salon.org/piccinini). What arrests me in this more than natural colony is not the pink-suited blond human toddler face-to-face with a fabulated potential playmate living on soft white leather in the museum space. Rather, I am struck by the four-breasted female sitting peaceably on the next level up of the pyramidal habitat, with

her milk-lusty babies nestled between her legs ready to attach to her alluring array of ventral teats. If I had not seen the critters from Nature's Little Helpers first, I might not have noticed the "natural" feature of ventral teats on the transgenic mother in *Leather Landscape* or paused at the number four. But I did see the dorsal pouches first, and now I cannot let go of the image of the fronts and backs of progenitors and guardians all covered with organs to feed and shelter off-category offspring. I cannot let go of the capacious, inventive arrangements Piccinini makes to take care of unexpected, vulnerable, hungry progeny of whatever species, natural or not. Look what the stork brought!

With Nature's Little Helpers, Piccinini focuses her questions more on ecology and evolution than on genetic engineering or cloning, but the domains are not cleanly separated, either. For one thing, the Helpers are all SF humanoids with dubious naturalcultural genealogies. In the stark heritage of destroyed human and nonhuman beings and blasted country, acknowledged or not, the past surges into the present and shapes possible futures, just as it does in Rose's reports from a wild country. The pressing question is *how* to inherit, how to face, the living—and killing—past. The urgent need is to learn how to do that to be able to take the present seriously, to be able to move toward multispecies reconciliation. But in settler societies and their "global" heirs, the category of "endangered species" takes hold of organisms, including people, and subjects them to the ambiguous grace of salvation, specifically being saved through a regulatory and technological apparatus of ecological and reproductive management. Salvation is proposed in the time frame of barely secularized "Western" science. Apocalypse looms; in that story, the past—nature—is the time outside time and must be restored in all its innocence. That kind of time is utterly wild—that is, outside the care of responsible generations. Thick, contingent, relational naturalcultural history disappears once again in the dream of natural wilderness, a frontier category of the first rank in the lineage of settler societies. Prodded by Rose, I experience Piccinini's art as proposing another kind of time and place for vulnerable creatures of diverse species and generations. Piccinini's art is tuned to reconciliation and taking care of always situated place and its denizens.

To do so, Piccinini introduces a bestiary of SF protector species paired with Australian officially endangered species. The speculatively fabulated protectors are not altogether reassuring, nor should they be. The settler habit of introducing species that quickly add problems to those they were supposed to solve is in the forefront of Piccinini's thinking. She remembers Australia's and Aotearoa New Zealand's naturalcultural history of introduced

species, human and nonhuman alike, with modern examples such as the cane toad brought from the neotropics to munch repressively on the cane beetle that eats the sugarcane that gobbles up laboring people, who need the money from sugar to feed their children. She remembers the exterminist consequences of well-intentioned introductions of companion species—in this example, for the unintended meal: the endemic amphibians gobbled up by voracious, prolific, mobile cane toads. In addition to the fact that they were not fabulated to watch out for people, the protectors are emphatically introduced species. If they have them at all, their home worlds are elsewhere. How can one not see in Piccinini's narrative art the not always so well intentioned introductions of the settlers themselves and their exterminist consequences? The Helpers might watch out for officially endangered species, but someone will have to watch out for the protectors, too—in every sense of "watch out."

There will be unexpected consequences. Taking care of unexpected country will be required—again and always. Reconciliation is not guaranteed; it is proffered, suggested, haltingly pictured. Any reconciliation will depend on descendants of settler worlds letting go of salvation history and instead learning to live in technoculture in something more like the time of Aboriginal country, facing ancestors of many kinds and responsible for those who come after. Technocultural people must study how to live in actual places, cultivate practices of care, and risk ongoing face-to-face encounters with unexpected partners. Well-tuned people have to be *present* in country for it to flourish; thus, there will be no perfection, but there can be ongoing and effective care that stays alert to many sorts of history. This kind of time and place is utterly contemporary—that is, committed to a flourishing present, not a present that is only a pivot between past and future. Learning how to live in a flourishing present is indebted to Aboriginal practices and ideas, but not in the mode of colonial or postcolonial settlers' finding salvation in the indigenous to heal the scars of the modern and technological. That way of understanding reconciliation completely misses the point about another conception of time and place, another way to *face* histories, or what the feminist theorist Katie King calls "pastpresents."[9] The unbridgeable dichotomy between the traditional and the modern is as much a frontier myth as the cordon sanitaire between nature and culture or between the organic and the technological.

What is certain in Piccinini's world is that nature and culture are tightly knotted in bodies, ecologies, technology, and time. Take tiny, brightly colored birds living in Victoria—golden helmeted honeyeaters, or HeHos—as an example. These birds are multiply dependent on companion species re-

FIGURE 7.4 Patricia Piccinini, *Getaway*, digital type C photograph, 80 × 160 cm, 2005. A young female Bodyguard keeps a wary eye out for intruders. See multispecies-salon.org/piccinini.

lations among gum trees, a kind of possum, and their feathered selves to get their sugary meals of oozing sap. Their survival is threatened by ignorant or greedy humans encroaching on their places and cutting down their gum trees. Their living arrangements need people who know how to recognize and live with HeHo ecologies. In 1998 the population reached a critically low level of fifty birds. Piccinini invented a protector for HeHos called the Bodyguard.[10] Armored adult Bodyguards look fearsome, with their serious canine teeth and imposing threat postures. Several photographs in the Artium exhibit pictured the Bodyguard and HeHos in their complex naturalcultural ecologies and economies with contemporary people (*Arcadia*, *Getaway*, *Roadkill*, *Thunderdome*, see multispecies-salon.org/piccinini). Look closely at the Bodyguard sitting beside young Alice in the graphite drawing in the Artium exhibit. Both the human and off-human critters are using cell phones; their speculatively playful conversation is corporeally a tangle of the organic and technological. Then look at the infant Bodyguard sitting with baby Hector in their graphite drawing; these youngsters do not find each other strange; they are coeval, in shared time. They are full of the promise of reconciliation if their parents can learn to face the past in the present. Unlike the HeHos and the Aboriginal people historically responsible for taking care of country, both sets of parents for the youngsters in the drawing—those for the Bodyguards and those for Hector—are introduced settler species in Australia. That fact implies a long and steep learning curve for knowing how to recognize and care for place and time.

The ecological, evolutionary, and assisted-reproduction narratives of Nature's Little Helpers all pulsate with pastpresent lives and the ongoing care they demand. Endangered species by legal definition signal the threat of the final loss of "heritage." But that global-speak, settler-nation kind of heritage culture or heritage nature is not what Piccinini's Helpers are concerned with, as I experience these storied drawings, photographs, and installations. The Helpers seem to have a much more relational and mundane task on their hands. Without the supposed comfort of attending to their own "natural" offspring ("natural" in their case would mean transgenic if not science fiction progeny), the introduced protectors' job seems to be *to parent* their unsafe, endemic, and too few xeno-specific charges. The Helpers' job is to nurture these charges into full contemporary naturalcultural sociality, to locate them in a flourishing present replete with its expected, unexpected, and ontologically heterogeneous beings. To parent is to instruct, guard, carry, nurture, and finally let go. The principal charges of the Helpers whom Piccinini has introduced so far are HeHos, Leadbeater's possums, and northern hairy-nosed wombats, not human beings, a point people would do well to remember in the presence of these protectors. Just look at *The Embrace* (2005) in the Artium exhibit for clarity on this matter (see plate 10). Reminiscent of images of the parasitizing monster from the film series *Alien*, the Progenitor for the Leadbeater's possum glues its whole self alarmingly onto the face of a human woman. Perhaps she looked too closely. Perhaps she had no respect. She certainly did not face in the right direction and may never be able to correct her error.

But in Piccinini's artworks we also see the other side of the protectors—their unaccountable interest in and seeming openness to those who come behind the settlers who imposed a frontier naturalcultural ecology and frontier knowledges, including so much of technoscience. The progeny of endangered species—those who will exist in generations past, present, and future because of their SF protectors' effective care—will meet human youngsters descended from the wild settler species who are willing to learn what contemporary quiet country might still be, including a technoscience committed to flourishing pastpresents. Nurtured by their teachers, alien and aboriginal, these youngsters might yet track a path to reconciliation in their reports from a wild country.

The blue-sheeted bed with the life-size figures made of silicone, hair, and acrylic resin in *Undivided* (2004) depicts a settler-descended human child sleeping and spooning with an adult *Surrogate for the Northern Hairynosed Wombat* (see multispecies-salon.org/haraway). The scene is peaceful. The

FIGURE 7.5 Patricia Piccinini, *The Embrace*, silicone, fiberglass, leather, plywood, human hair, clothing, variable dimensions, 2005. Photograph courtesy of the artist. See multispecies-salon.org/haraway.

Surrogate seems utterly unthreatening; the human child is being embraced tenderly. Walk around to the back of the sleeping Surrogate to see the two rows of drawstring dorsal pouches running along the Helper's spine, six in all. Each pocket shelters an immature marsupial wombat, with the earliest, still in fetal stages, no bigger than a jelly bean, gestating at the anterior end and the ready-to-face-the-world older joey poking out of the posterior pocket. That furry youngster seems likely to pop out of the pouch by morning to meet the pajama-clad boy before the Surrogate even wakes up. That meeting could surprise all of the parents and guardians in these off-category species assemblages.

The two drawings of human children and Surrogates in the Artium exhibit, *Laura* and *Leo*, also seem to portray benign companions. Indeed, *Leo* is a portrait of the little guy snoozing with the Surrogate in *Undivided*. Still, I know that human babies often hurt the other critters they play with. I trained my dogs with children on loan from my graduate students so the canids might learn to tolerate exploratory excesses by badly coordinated, unaccountable, tiny hominids who were unwisely endowed too early in their development with grasping hands. Are the Surrogates so well instructed? Why should they be? The adult Surrogates and the children are awfully close, maybe too close for a human child and an alien guardian species. The appealing, full-frontal Surrogate in color on the cover of the Wellington exhibition catalog, *In Another Life*, does not calm my anxiety or Piccinini's. The creature's ventral surface *does* sport a proper navel, indicating some kind of mammalian kinship, however reconfigured in SF technochimeras and however foreign to the non-uterine gestational needs of marsupial wombats. The Surrogate was not fabulated to be a protector for *Homo sapiens*, after all, but for *Lasiorhinus kreftii* (the Northern hairy-nosed wombat), whose habitats and associates have been blasted by the very species introduced by Leo and Laura's ancestral kin, if not by the kin directly.

I am not sure what Queensland's indigenous peoples call or called Northern hairy-nosed wombats, although "Yaminon" is an Aboriginal name (whose?) for these animals that appears in global Internet conservation websites today, without discussion of the human-nonhuman historical naturecultures that generated that name. I am even less sure what names different Aboriginal peoples might give the dorsally armored Surrogate. The young certainly come behind. The term "wombat" itself comes from the Eora Aboriginal community that lived around the area of modern Sydney.[11] But whatever the proper names, the Surrogates could reasonably decide that Laura, Leo, and

the girl in *Undivided* do not fall under their writ of protection if the young hominids get unruly with the wombats, intentionally or not.

Let us consider for a moment a contemporary adult northern hairy-nosed wombat, sometimes called the bulldozer of the bush, as she burrows intently in the dry woodland floor of the Ebbing Forest National Park in central Queensland, Australia. Keeping the dirt out, the female's backward-facing pouch shelters a youngster attached to a teat on her belly. Including perhaps only twenty-five breeding females in the early years of the twenty-first century, with adults weighing between fifty-five and ninety pounds, these roguish but vulnerable marsupials are among the world's rarest large mammals.[12] It might seem tragically easy to count these wombats—if only the nocturnal and crepuscular, generally solitary, and secretive critters would show themselves to the census takers. Working with the Queensland wombat for more than ten years, Andrea Taylor of Monash University in Melbourne "has developed a low disturbance genetic technique to census the wombat population. Wombat hair is collected on sticky tape strung across wombat burrows and DNA in the follicle is used to identify the sex and the 'owner' of the hair."[13] In her noninvasive and smart technique, Taylor, in my eyes, is practicing care. Living endangered means living in technoculture; it is a condition of flourishing—or not—on Earth now for most critters. Living well in technoculture is part of the obligation of taking care of unexpected country.

However, all is not well in the tiny patch of these wombats' remaining bit of Earth. Piccinini knows that the African buffelgrass planted for European cattle in the white settler colony outcompetes the native grasses on which the hairy-nosed wombats depend and that the threatened wombats contend for food and habitat with cattle, sheep, and rabbits. These marsupials also endure predation by dingoes—mammals dating from much earlier introductions, who have unstably achieved ecological charismatic macrofauna status today after a lamentably unfinished career as vermin to Euro-Australians and a deep—and, with great difficulty, ongoing—history as companion species to Aboriginals. Yet the modern rehabilitated nationalist dingoes, even after the cattle have been evicted and the buffelgrass has been discouraged in the work of ecological restoration, have to be fenced out of the patch of Queensland semi-arid grassland and woodland that is the only place left where northern hairy-nosed wombats burrow and dine.

But, then, Piccinini knows that living beings in knotted and dynamic ecologies are opportunistic, not idealistic, and it is not surprising to find many native species flourishing in both new and old places because of the resources provided by interlopers from other lands and waters. Think of the

kookaburras, displaced from their former ranges, eating introduced pest snails and slugs alongside European starlings. Piccinini knows, in short, that introducing species (from another watershed, another continent, or another imagination) is often a world-destroying cut, as well as sometimes an opening to healing or even to new kinds of flourishing.[14] Piccinini's fabulated companion species to endangered species may be one more handy newcomer, among many, rather than a destructive invader, among many—or it may be both, the more usual course of things. The crucial question has to be not, "Are they original and pure (natural in that sense)?" but, rather, "What do they contribute to the flourishing and health of the land and its critters (naturalcultural in that sense)?" That question does not invite a disengaged "liberal" ethics or politics but requires examined lives that take risks to nurture some ways of getting on together and *not* others. Generally positive to animals that Europeans disparagingly have called feral, Australian Aboriginal peoples have tended to evaluate what Westerners call "species assemblages," new and old, in terms of what sustains the human-nonhuman, storied, changing, and lived world that in English is called "country." As the feminist science studies scholar Karen Barad put it for ears tuned to Western philosophy and science, "Embodiment is a matter not of being specifically situated in the world, but rather of being in the world in its dynamic specificity. . . . Ethics is therefore not about right response to a radically exterior/ized other, but about responsibility and accountability for the lively relationalities of becoming of which we are a part."[15]

That brings us back to the Surrogates. Look again at the three pairs of gestational pouches that run down the spine of the protector companion species, nurturing three stages of wombat development. Aligned with that of other marsupials, such as the red kangaroo, Surrogate wombat reproduction seems to be run on "just-in-time" principles for stocking embryos on the gestating body. Just out of the birth canal and plucked from the hairs of its wombat mama's belly while struggling up to crawl into a pouch to finish making a wombat, a barely formed embryo surely inhabits the Surrogate's top pouch. Attached to a teat? Does the Surrogate have teats in those odd, sphincter-ringed drawstring pouches? How not? Normal northern hairy-nosed wombats have only two teats in their single, backward-facing pouches, so they cannot handle three young out of the body at once, much less six, and they give birth to only one young at a time, once a year. Joeys stay in the pouch eight to nine months. But if they are like kangaroos, these wombats could have arrested embryos ready to speed up their life course if the senior joey dies—or is disappeared by aliens. Northern hairy-nosed wombats like to

have their babies in the rainy season, and getting a replacement joey into the pouch too late, when the succulent grasses are drying out, would not bode well for that reproductive cycle anyway. Maybe the Surrogates pluck just emerged and still fetal joeys from wombat females and put them in their own pouches, thus forcing the wombats to get another embryo out of their body sooner and multiplying the numbers of young who can be raised in a season. This would not be the first time that forced reproduction was employed as an evolutionary and ecological rescue technology. Ask any tiger in a Species Survival Plan database. I am reminded that only about several dozen breeding female northern hairy-nosed wombats live on planet Earth to gestate the young of their species. Being female in such a world never comes without paying the price of value. No wonder Piccinini is suspicious, as well as open to another world. Unexpected country will be full of surprises, good and bad, even as it is fully webbed in pastpresents.

The middle rung of Surrogate pouches houses more developed but still hairless baby wombats; they are far from ready to explore the outside world. A teat, a pouch, and a vigilant Surrogate's armored spine are all that are required for now. The third rung of pouches holds mature furry baby wombats that are ready to crawl out of the pocket to begin risky encounters in a wider world. For a few months, joeys can leap back into the pouch when things get too scary and supplement grass with milk, but even the best wombs or pouches, alien or native, give time-limited protection.

I would love to call the Surrogate "queer" and let it go with a celebratory frisson that comes so cost-free to those not made to inhabit the category, but I am sure Piccinini would wince if I tried to get away with that. The Surrogate remains a creature that nourishes indigestion—that is, a kind of dyspepsia with regard to proper place and function that queer theory is really all about. The Surrogate is nothing if not the mutter/matter of gestation out of place, a necessary if not sufficient cut into the female-defining function called reproduction. To be out of place is often to be in danger and sometimes also to be free, in the open, not yet nailed by value and purpose but full of pastpresents. The point for me in Piccinini's Nature's Little Helpers is *parenting*, not *reproducing*. Parenting is about caring for generations, one's own or not; reproducing is about making more of oneself to populate the future—quite a different matter.

There is no fourth rung of guarded gestation. The human and wombat youngsters will find each other soon. Then what the world of companion species might become is open. The past has not laid enough ground for optimism for relations between white settler humans and wombats. Yet the

FIGURE 7.6 A rear view of Piccinini's *Surrogate (for the Northern Hairynosed Wombat)*. The frontispiece of this volume provides a view of the sculpture from the front. Silicone, fiberglass, leather, plywood, and human hair. Dimensions: 103 × 180 × 306 cm. See multispecies-salon.org/piccinini.

past is far from absent or without rich offerings for reconciliation. The past, present, and future are all very much knotted into each other, full of what we need for the work and play of naturalcultural restoration, less deadly curiosity, materially entangled ethics and politics, and technical and organic well-being. Experienced together, Rose's writing and Piccinini's art tell about attention to alien and native beings linked in learning how to take care of unexpected country, in alliance with those called traditional owners of the land who see better the difference between wild and quiet because they face those who came before and care also for those who come behind, in all their demanding and unfinished kinds.

NOTES

This chapter was originally published in a limited edition art catalog featuring Patricia Piccinini's work: Donna Haraway, "Speculative Fabulations for Technoculture's Generations: Taking Care of Unexpected Country," in *(Tiernas)Criaturas/(Tender)Creatures*, ed. Patricia Piccinini (Vitoria: Egileak, 2007), 100–107. The essay was reprinted in the "Unloved Others" special issue of the *Australian Humanities Review*, edited by Thom van Dooren and Deborah Bird Rose (http://www.australianhumanitiesreview.org/archive/Issue-May-2011/home.html): Donna Haraway, "Speculative Fabulations for Technoculture's Generations: Taking Care of Unexpected Country," *Australian Humanities Review*, no. 50 (2007): 95–118. This special issue contains other outstanding contributions to the growing literature in the field of multispecies ethnography.

1. For more on naturecultures and Piccinini's *Surrogate (for the Northern Hairy-nosed Wombat*), see Haraway, *When Species Meet*, 288–92.

2. Kenney, "Frontier Epistemologies."

3. Rose, *Reports from a Wild Country*.

4. Rose, *Reports from a Wild Country*, 4–6.

5. Rose, *Reports from a Wild Country*, 153–54.

6. Piccinini, *In Another Life*, 13.

7. For feminist science studies thinking about matters of care, see Puig de la Bellacasa, "Nothing Comes without Its World."

8. Millner, "Patricia Piccinini."

9. King, "Pastpresents: Playing Cat's Cradle with Donna Haraway," accessed February 26, 2014, available at http://playingcatscradle.blogspot.com/.

10. Piccinini says that her Bodyguard was "genetically engineered" with large teeth that have a dual function: "He will protect [the honeyeater] from exotic predators, and he has powerful jaws that allow him to bite into trees, to provide the birds with sap." These teeth are also a reminder that other species are not only good to think with, nor only to play with, but that they just might bite. Guarding against wild hopes and wild fears at the entrance to the Multispecies Salon, Piccinini's

Bodyguard and Surrogate generated a heady mix of affective responses in gallery goers—wonder, trepidation, and above all curiosity about the other artworks inside.

11. "Wombat," Wikipedia, accessed January 14, 2013, available at http://en.wikipedia.org/wiki/Wombat.

12. The northern hairy-nosed wombat can be tracked through the Wombat Information Center, accessed January 14, 2013, http://www.wombania.com; the biodiversity information website BIRD, accessed January 14, 2013, http://bird.net.au; and Flannery and Kendall, *Australia's Vanishing Mammals*.

13. See the website at http://www.yaminon.org, accessed January 14, 2013.

14. For the shaping of "new natures" composed of the mixed native-introduced species assemblages of every place on Earth by the twenty-first century, see Low, *The New Nature*. For integration of Low's controversial approaches with science studies, sociology, colonial studies, and postcolonial cultural studies, and considerations of animal well-being from both ecological and rights perspectives, see Franklin, *Animal Nation*. The kookaburra example is on p. 230.

15. Barad, *Meeting the Universe Halfway*, 377, 393.

ACKNOWLEDGMENTS

The phrase "Multispecies Salon" emerged over dinner conversation among Rosa Ficek, Heather Swanson, and Eben Kirksey in 2006, when they were all graduate students at the University of California (UC), Santa Cruz. Later that year, they all participated in the first Multispecies Salon, an interactive discussion at UC Santa Cruz. Departing from these discussions, Marnia Johnston, a ceramic artist, collaborated with Kirksey to curate the first Multispecies Salon exhibit alongside the 2008 Annual Meetings of the American Anthropological Association (AAA) in San Francisco. They brought seventeen artworks, everyday objects, and living creatures into a gallery called PLAySPACE, at the California College of Arts, to provoke conversations about contact, contagion, and care. Here James Clifford poached the fish that was offered to him.

Swarms of para-ethnographers at the Multispecies Salon in New Orleans were coordinated by Craig Schuetze, of UC Santa Cruz, and Nick Shapiro of the University of Oxford. "The exhibit involved the unfolding of encounters," wrote Schuetze in a para-ethnographic report. "There was an interweaving of subject and object, ethnographers and informants, culture and nature."[1] More context for these collaborations appears in a coauthored essay published by the Kroeber Anthropological Society:

> Swarming, a form of collective action modeled after honeybees, has been celebrated (by the likes of Hardt and Negri) as a form of radical politics: "In the swarm model suggested by animal societies . . . we see emerging new networks of political organizations . . . composed of a multitude

FIGURE A.1 Marnia Johnston sitting with a swarm of her ceramic *Paranoia Bugs*. Photograph by Eben Kirksey. See multispecies-salon.org/johnston.

of different creative agents." As Eugene Thacker notes, the figure of the swarm has generated mutations in the body politic that are "structurally innovative but politically ambivalent." Lately, Pentagon strategists have appropriated the tactics of swarming. A new generation of swarming drones has been developed to respond to all sorts of sensory input from ground sensors, cameras, intelligence, satellite information, and data from other drones. Drones now can communicate information to each other directly and react to received information in real time without mediation by humans. One controller can manage a central drone and the other drones follow—adapting, reacting, and coordinating. The first coordinated swarm drone attacks took place in December 2009, in which five drones attacked alleged Taliban fighters with ten closely coordinated hellfire missiles, killing fifteen people. Perhaps these flying machines embody the nightmares of Hugh Raffles: "There is the nightmare of fecundity and the nightmare of the multitude. . . . There is the nightmare of knowing and the nightmare of non-recognition. . . . Nightmare begets nightmare. Swarm begets swarm. Dreams beget dreams. Terror begets terror." Artists and other interlopers poached ideas about swarming from

Hugh Raffles and Jake Kosek at the Multispecies Salon. Even as the figure of the swarm was flourishing within the modern militarized state, [they] playfully reappropriated the tactics and technologies of war.[2] (Also see multispecies-salon.org/swarm.)

Swarming became a tactic, rather than the theme, of the Multispecies Salon when it migrated to New Orleans in 2010. Myrtle von Damitz III, a painter, was the core member of the "curatorial swarm" who oversaw the participation of more than eighty artists in the New Orleans show. In New Orleans, Marnia Johnston curated an installation of bioart in the Kawliga Studios orbiting around the theme "Life in the Age of Biotechnology." Nina Nichols and Amy Jenkins, the founders of the Pretty Goat Dairy, herded flocks of Edible Companions at the Front, a prominent establishment in New Orleans's Saint Claude Arts District. Myrtle von Damitz III and Eben Kirksey populated a freshly renovated warehouse called the Ironworks with organisms and artworks that spoke to the theme "Hope in Blasted Landscapes," with support from the City University of New York (CUNY) Graduate Center. The creative impulses of Karen Kern, from the Arts Council of New Orleans, helped enliven the exhibit. Thanks are also due to Andy P. Antippas, Gilbert Buras, Amie Davis, and the Front collective. Maria Brodine, Brandon Costelloe-Kuehn, Lina Dib, and Maria Vidart were key members of the para-ethnographic swarm who offered us key insights, digital artifacts, and material-semiotic traces of themselves.

The New Orleans Fringe Fest Parade, featuring the Good Children Carnival Club and Marching Band, connected the multiple sites of the Multispecies Salon with a roving crowd of spirited revelers. Holly's Tamales kept us well supplied with vegan tamales, while Elizabeth Shannon cooked up frog legs, nutria stew, and gator tail. Chef Zack Lemann, from the Audubon Insectarium, offered us a salad with grasshoppers and crickets, cicada shish kebabs, and ant pupae for dessert. Walt McClements, the J. O. Evans Ensemble, and the Tom Paines played live music. A Bayou Butoh dance performance, inspired by the BP oil disaster, explored emergent forms of life in a toxic aqueous landscape. Free pregnancy tests were conducted with *Xenopus* frogs by the performer MLE Danger, who then adopted the animals, caring for them long after other art objects were packed up and shipped home.

Initially, the swarms of creative agents associated with the Multispecies Salon staged tactical interventions, or "calculated actions determined by the absence of a proper locus." The leadership of the AAA was quick to accommodate these intrusions. Maria Vesperi, the executive program chair of the

FIGURE A.2 Nina Nichols and Amy Jenkins with a goat from their Pretty Doe Dairy. Photograph by Black Forest Fancies. See multispecies-salon.org/prettydoedairy.

AAA's Annual Meeting in San Jose in 2006, granted us a Presidential Session in the official program and supported our off-site event at UC Santa Cruz. We also thank Don Brenneis, president of the AAA; Monica Heller, executive program chair in 2010; and Damon Dozier, Joslyn Osten, and everyone who helped create the Inno-vent forums starting in 2010. Art Spill, an Inno-vent organized by Maria Bordine and Craig Campbell of the Ethnographic Terminalia collective, drew visiting anthropologists to multiple nodes of networked activities in the Saint Claude Arts District.

The Society for Cultural Anthropology became a proper locus for the multispecies Zeitgeist when it hosted the multispecies meal at its Natureculture meetings in Santa Fe, New Mexico. Particular thanks are due to Danilyn Rutherford and Brad Weiss. The editorial leadership of *Cultural Anthropology*—Mike and Kim Fortun—provided us with an early forum for these ideas with a special issue titled "The Emergence of Multispecies Ethnography." The journal's managing editor, Ali Kenner, and a committed team of interns worked virtual wonders with Drupal in the old *Cultural Anthropology* website.

Patricia Alvarez, a visual anthropologist, and Christopher Newman, a filmmaker, pushed way beyond the bounds of Drupal to give the Multispe-

cies Salon a virtual second life with the latest digital tools. Together, they produced a theatrical trailer that generated buzz ahead of the swarm that descended on New Orleans. Newman and Alvarez contributed their own filmic installation in the "Life in the Age of Biotechnology" exhibit. Following the exhibit from San Francisco to New Orleans, Alvarez generated audiovisual interventions on our website that have already begun to spread like a good virus.

The Committee for Interdisciplinary Science Studies at the CUNY Graduate Center brought the Multispecies Salon to New York City in early 2011. Louise Lennihan provided moral support behind the scenes in concert with Katherine Carl, Anna Conlan, Erin Glass, Chris Lowery, Reggie Lucas, Victoria Pitts-Taylor, Jesse Prinz, Joan Richardson, and Ray Ring. Nonsense, the underground events listing hosted by Jeff Stark, spread the word. The Treehaus—a Brooklyn collective of artists, musicians, activists, and scholars—infused the Salon with renewed creative energy. Krista Dragomer opened the door to a residency at Proteus Gowanus and co-created works of art. Tamara Pittman catalyzed smart conversations on the banks of a super-fun Superfund site. Agnieszka Gratza linked this project to the revitalized salon culture of New York City and opened portals to international art worlds. Mike Khadavi and Grayson Earle co-produced amphibious installations in the gallery. Grayson built the architecture of our online archive and helped stage underground frog pregnancy tests at multiple undisclosed locations in Brooklyn.

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FIGURE A.3 Grayson Earle posing next to *Utopia for the Golden Frog of Panama*, a retrofit refrigerator, in Brooklyn. Photograph by Eben Kirksey. See multispecies-salon.org/frog-utopia.

Mogu Mogu (Timothy Choy and Shiho Satsuka), Lisa Jean Moore, Benjamin Morris, Baptiste Moutaud, Jake Metcalf, Charlie Nichols, Robert Nideffer, Jonathan Padwe, Heather Paxson, Sally Pearson, Rob Peterson, Luke Quinn, Astrid Schrader, Susan Leigh Star, Taline Tabakyan-Golino, Tory Tepp, Katy Jane Tull, Ruth Wallen, Traci Warkentin, Paige West, Vashti Windish, and Adam Zaretsky. Permanent members and visitors to the Environmental Humanities Saloon at UNSW—especially Thom van Dooren, Deborah Bird Rose, Stephen Muecke, and Deanna Pindell—provided feedback in the final moments of this project. Madeleine Jean Boyd—a true lover of equines—labored endlessly in bibliographic and artistic realms for this book. Then she

took the ideas in her own direction with her co-curated exhibit "Intra-action: Multispecies Becomings in the Anthropocene."

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Sage advice from Jade Brooks, Sara Leone, Ken Wissoker, Sarah Franklin, and George Marcus ensured that every element of this book was polished to perfection. Nancy Hoagland helped us think strategically about moving beyond the book into digital realms. Thanks are also certainly due to Laura Sell for helping us imagine a networked future for this project.

This book is dedicated to the spirit of Beatrice Marie-Noëlle Pegard.

NOTES

1. Craig Schuetze, Christopher Newman, and Patricia Alvarez, "Multispecies Salon II," available online at http://www.culanth.org/?q=node/366.

2. Kirksey et al., "Poaching at the Multispecies Salon," 131. Cites for the direct quotes within the extract are Hardt and Negri, *Multitude*, 92; Kosek, "Ecologies of Empire," 668; Raffles, *The Illustrated Insectopedia*, 201–3; Thacker, "Networks, Swarms, Multitudes." See also multispecies-salon.org/swarm.

3. *WSQ: Women's Studies Quarterly*, published by the Feminist Press at the City University of New York, is an interdisciplinary forum for the exchange of emerging perspectives on women, gender, and sexuality since 1972. For more information, visit http://www.feministpress.org/wsq.

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