Winter 12-15-2022

Cultivating Life: Skill, Sovereignty, and the Nature of Knowledge

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by

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A dissertation presented to
Washington University in St. Louis
in partial fulfillment of the
requirements for the degree
of Doctor of Philosophy

August 2022
St. Louis, Missouri

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Acknowledgements

Geertz famously noted that one of the most significant things about humanity is that we "begin with the natural equipment to live a thousand kinds of life but end in the end having lived only one" (1973, 45). So too it is with a dissertation, and this one in particular. Its final form owes a great deal to many people, and it is to them that I owe a great deal of thanks. First, to the hard-working farmers of the Hudson Valley and central Appalachia, thank you for sharing your labor and your lives with me, and thank you for your ongoing efforts to transform the food and farming system in sustainable and socially-just ways. It is difficult and often thankless work, but as I've learned from each of you, so very important. Seeds of embryonic hope for a more livable future.

Graduate school, like agriculture, is an apprenticeship in ways of knowing and ways of being. I am grateful for the lessons learned from many peers and mentors, and for their enormous, extra-ordinary support, in myriad ways. Thank you to Matt Abel, James Babbitt III, Andrea Rissing, Andrew Flachs, Adrienne Strong, Carolyn Barnes, Mana Tang, and many others for your friendship, for the thoughtful exchange of ideas, and for helping hands. Thanks to Zachary Nowak for the encouragement to pursue a PhD and for the wise mentorship that ensured I'd successfully see its end. Thanks also, of course, to my committee members. John Bowen and Talia Dan-Cohen provided generative and generous insights that significantly improved this project and paper. Bret Gustafson inspired me to support human and more-than-human struggles, while also holding hope for the possibilities of things to come. Glenn Stone taught me to think critically about agriculture, and to better understand the role that knowledge plays in farming systems. His own knowledge has beget mine, and I thank him for it. Finally, Heather Paxson has guided my personal and professional growth for now more than a decade. I can imagine no more

supportive mentor and I consider it the greatest stroke of good fortune to first meet her from the opposite side of a cheese counter.

I wrote this dissertation through undoubtedly the most trying times of my life, and I am blessed to have the support of many. My dogs Zooey and Annabelle, the patient golden retriever and the energetic basset hound, I thank you for keeping me such good company and for letting me know when the mail's arrived. Pandemic isolation was lonely for many, at times me included, but multispecies companionship is real and really vital. It sustains life. So too does the constant support of my human family. My father has always been the most extraordinary example of care, perseverance, and responsibility, and his guidance has gotten me this far. He taught me that a boy becomes a man when a man is needed, and modelled through example. I lost my mother, suddenly and far too soon, at the early stages of this writing project. Debbie was my pole star and a source of unwavering support. I hope that I have made her proud, and also know it couldn't be otherwise. But my greatest thanks goes to Megan, my bride and beacon of light. I'm so lucky to have found you. I look forward to cultivating a life with you, forever and ever and everywhere.

I also gratefully acknowledge the research support of the Wenner-Gren Foundation and the National Science Foundation Doctoral Dissertation Research Improvement Grant (1756513).

Bradley M. Jones

Washington University in St. Louis

August 2022

Chapter 1:

Introduction: **Seeding Alternative Landscapes: Agricultural Dependency and the Struggle for Sovereignty**

Fieldnote
When: August 2019
Where: An agricultural conference near the Hudson Valley of New York.
Why: I am in the area to conduct research in and on the spaces through which beginning farmers learn to farm alternatively—fieldwork that is often quite literally field-work, work in the field, but that also brings me to other fertile sites of agricultural knowledge production, acquisition, and exchange. The agricultural conference is one of them.

It's been a whirlwind two days of workshops, sessions, and social events. The bright and early Guerilla Gardening session underlined how you don't have to go by the book when it comes to planting and propagation protocols. The instructor argues that by breaking the rules and distancing yourself from so-called conventional wisdom—from the information contained on seed packets to the advice in the well-known farming handbooks being sold in the lobby—you can often do things cheaper, with less effort, and better suited to your own farm and family's needs. He goes through what he calls the bunching method at some length, which apparently saves a bunch of time and seed trays with less seedling loss. Then there's mulch, which should be applied to your beds by the truck load. It's out there, he tells us, just keep your eyes out and "take the crappiest mulch you can get." Quality doesn't matter and farmers will usually just give it away. One man's trash is another's treasure. To farm successfully, he suggests, all you need is DIY ingenuity and a willingness to experiment. There is no one right way to farm. It strikes me that his outside, off-farm income, must be awfully nice too. Creative trial and error (often significant error) may lead to workable innovations, but don't bet the farm on it. For indeed, as

one of pamphlets on the USDA rural development sponsorship table in the hallway puts it, "Farming is risky business."

I head from there across the campus to a workshop on the past and future of Community Supported Agriculture (CSA). The older fellow who has been farming for some three decades spoke to how important CSA's have been for building community, for managing market risks, for securing upfront capital, and in important ways for decommodifying food. But he highlights how they reached their peak a decade ago and younger farmers are having a difficult time making the most of these alternative market forms. Indeed, more beginning farmers are saturating the scene each season and (surprise) only so many consumers are willing to eat a crate full of kale. That and the door-delivery box schemes like Blue Apron that cash in on the cache of local agriculture and carve out market share. He's glad he got into it when he did, able to establish a committed customer base while the getting was good. The younger farmer presents next, underlining how she uses social media and other new marketing techniques to bring in customers, and how she offers customizable produce shares to try to keep them. Her photos are absolutely stunning, she barters produce with a professional photographer. But she lost her farm last year because the landowner wanted to go in a different direction, turns out they didn't like the aesthetics and fast pace of actual agriculture. She's starting from scratch down the street and struggles as she passes her old farm daily, only some of her customers came with her. She has a small child and a small income, and doesn't know if she'll be farming this time next year.

Feeling dispirited from these conversations about making markets work for small farmers and rather-intentionally looking for uplift, I skipped several concurrent workshops on the "Hidden Dangers of Glyphosate" and "What Bayer/Monsanto Doesn't Want you to Know" and sought out a session promising insights on how to actually "make a living growing vegetables."

Someone is farming successfully, apparently. A bearded, rather-spritely fellow outlines the basics of his farm operation, how he intercrops plantings in tight rotations, extends the season with hoophouses, and focuses on high value crops. He knows how much each crop is worth per acre, and tells as much when asked. But he doesn't *really* want to talk about crop planning, price per bed foot, training efficient employees, or how he grosses $100k per acre. He wants to talk about cultivating relationships. You're not growing commodities he emphasizes, you're growing community. Profit simply cannot be the bottom line. Sure your sales will likely increase because people buy into your mission, but more importantly you will be more fulfilled because you're pursuing a passion. People, he says, will want to work with you and buy from you and support you through difficult times, of which there will be many. There is no mention of spreadsheets or social media or all the new alternative farm management software coming online and being peddled in the sponsors booths outside—Tend, Farmigo, Harvie, and farmOS a few of the more prominent. There's no talk of labor-saving technologies, even those that are free and open source, being built communally, designed to be largely DIY and appropriate to scale. No, for him success has to do with perspective and an intentional approach: it has to do with state of mind he reiterates, whether or not you love the work. I lose track whether the session is on sustainable agriculture or self-help psychology. Making a living, it seems, is also about making a life. Success in farming about a good deal more than making money.

Several of the framed debate panels are interesting. One asks whether organic agriculture is a social movement, a farming practice, or a set of national policies. There is much ado over the recent extension of organic certification to hydroponic growing. What exactly is "soluble nutrition" delivered through aquatic substrate? Where does it come from? Doesn't organic agriculture need soil and people? Isn't it supposed to enhance biodiversity, biological cycles, and

soil biological life? The policy expert thinks not, she argues the goal is to expand the market and get organics in as many big box stores and on as many people's plates as possible. For that, high tech growing is the only truly sustainable solution. This is met with moans and mumbles from the old-school organic crowd. Another session gets even more heated, on what makes for an invasive species and what we're—as farmers and conservationists— to make of them. The social scientist argues that thinking through invasion requires establishing an arbitrary baseline, ecologies are always in a state of flux. And besides, says the ecologist, so-called invasives are just taking advantage of disturbed landscapes and suffering soils, they've found a competitive niche in the ruins of modern farming and forestry. A rather irate audience member disagrees, the Japanese knotweed is killing everything he exclaims, preventing the native species from reproducing, destroying their natural habitat. The allusion to both colonization and immigration is a subtext everpresent. One person complains that what we consider native is whatever ecology Columbus so-called "discovered" when he stepped off the boat. Another suggests that the only invasive species is the human. Nature would be better off without us.

1.1 A Lay of the Landscape

These opening fieldnotes offer a small sampling of insights gleaned from a single agricultural conference hosted near the Hudson Valley of New York in 2019. As becomes clear in even brief reflection, there is a great diversity of conversations—from practical to philosophical—that occur at a conference purportedly to be about training neophyte farmers into the practices and principles of sustainable agriculture. At the same time that new market approaches and production practices are developed and discussed, in these spaces of deliberation and knowledge exchange how we conceptualize nature and how we ought to interact with it is

being fundamentally reimagined. What does it mean to even call Nature it, when we are everywhere entangled? In these exchanges discussion of soil microbiology and the importance of mycorrhizal interactions for plant health shift seamlessly into conversations about collaborative synergies for healthy economies, defined by mutualism. Lessons in landscape ecology bleed into wisdom on what it means to live well. Living well is always already in direct tension with actually making a living, viable livelihoods an elusive white whale for most who are or aspire to be organic farmers. Indeed the issues at stake are economic, ecological, ethical, and ideological, at once. As one of the presenters emphasizes with heightened reflexivity: "How we garden reflects our worldview…the ultimate goal of gardening is not only the growing of crops, but the cultivation and perfection of new ways of seeing, of thinking, and of acting in the world."

It does not take a cultural anthropologist interested in transformations in human/environmental relations as mediated through agriculture—as I am—to see that an agricultural conference offers a revealing window into the complexities, challenges, and prospects that are presented in sustainable small-scale farming. These opportunities and obstacles are at once agricultural and cultural, having to do with how one learns to farm and to farm well, but also what it means to live well in the context of global climate change, economies of extraction and abandonment, and the proliferation of precarious livelihoods. The agricultural conference is a revealing entrée for highlighting a set of complicated issues at the heart of organic agriculture and how economies and ecologies are being transformed, or might be, as demanded by the dictates of the 21st century. This dissertation offers important insights derived from across these fertile fields for thought.

My research ethnographically examines the cultivation of knowledge, nature, and farmers in U.S. alternative agriculture. Several interrelated interests inform this project. First, I am

interested in how alternative farmers learn to farm sustainably when they are poorly served by the dominant institutions of knowledge production and transfer and yet their practice is extremely knowledge intensive. Second, I seek to better understand the experiences and challenges of alternative farmers, asking what political, economic, and—in particular—environmental landscapes are being cultivated (or inhibited) as they strive to secure wellbeing for human and non-human others. Finally, I explore how farmers struggle to establish "room to maneuver," in other words, to institutionalize autonomy from the constraints of agriculture's diverse dependencies and from the ideological enclosures that suggest it is no longer possible to think, to act, indeed to farm alternatively. Ultimately, I emphasize that research findings offer important theoretical contributions on the dynamics of agricultural knowledge, the social relations of expertise, and the transformation of human/environmental relationships across agrarian landscapes. They also offer significant practical contributions to the alternative agricultural sector and movements for food sovereignty.

In a general sense, this dissertation explores the emerging institutions of knowledge production and exchange that support alternative agriculture in the United States [e.g. the agricultural conference]. In particular, I am interested in indigenous technical knowledge and agro-ecology, how these sustainable approaches to food production are developed and disseminated in contexts without significant generational repositories of knowledge or established modes of knowledge transfer. Indeed, most beginning sustainable farmers do not grow up on farms nor do they matriculate through the established infrastructure of agricultural knowledge. They often have little connection to the system of land grant institutes and to their agricultural science curriculums. More still, cooperative extension services, the farmer support network developed in the early 20th century by the USDA and agricultural colleges, are often

irrelevant, uninterested, or unfamiliar with the struggles and strategies of alternative farms. Despite this lack of conventional institutional support, alternative forms of agriculture are extremely knowledge dependent. As Robert Netting (1993) famously summed, in such systems "skill replaces scale," meaning that to grow intensive polycultures on small plots for an extended period of time is a daunting and seriously demanding task. My research informs how smallholder farmers learn to farm sustainably when they are both poorly served by dominant institutions and the practice itself is extremely knowledge-intensive.

Practical questions about knowledge and its application in alternative agriculture are only part of the agenda. I also strive to better understand the emerging phenomenon of neo-agrarianism more generally. For a century or more agricultural experts and social scientists have predicted the "death of peasantry" (Hobsbawm 1994, 289). Such assumptions have been the result of changes in the political economy of global market regimes and the expansion of processes of industrialization and commodification. In the United States, with its "get big or get out" and productivist policies, in the last half century we've lost roughly 4 million farms. The average age of the American farmer nears 60. Nearly 100 million acres of U.S. farmland are expected to change hands in the next 5 years. Farmers over the age of 65 outnumber their 35 and younger counterparts 6:1. It wasn't long ago that Kathryn Dudley (2000) and her agrarian informants in Minnesota could envision the forlorn prospect of "the last farmer." Riddled with debt from the 1980s bank crisis, and dealing with the demands of technological modernization and its treadmill, many farmers got big, and still were forced to get out.

Despite consolidations and expansions of unfathomable scale, there is nevertheless an emerging a bumper crop of young farmers, heading back to the land in search of good agriculture and the good life. In this dissertation, I seek to bring theories of global "repeasantization" (van

der Ploeg 2008, 2019)—defined as, "the agricultural process of production becomes more peasant-like" (2019, 237)—to bear on the U.S. to explore what kinds of lives and livelihoods are emerging across its damaged agrarian landscapes. I'm interested in two things in particular. The first, is to better understand the experiences, challenges, and aspirations of folks in this neo-agrarian movement: what are young farmers up to and why? How are they faring? What sorts of political, social, economic, and environmental work are they engaged in as they struggle to better ensure wellbeing for people, plant, and planet? Building on that, the second focus. I'm interested in how farmers attempt to institutionalize autonomy—that is, to carve out space—from the vagaries of market dependence and from the ideological enclosures that suggest it is no longer possible to think, act, indeed farm alternatively. This, as it turns out, has a good deal to do with the development of alternative knowledge systems. It is clear that alternative farming offers an important challenge to the economically and environmentally maladaptive industrial agricultural system, but everywhere struggles to set viable roots within it orbit.

1.2 Overarching Context: The Political Ecology of Agrarian Change in U.S. Agriculture

Prior to proceeding, it is important to situate this U.S. neoagrarian movement within the broader political ecology of a century of agricultural development. There are different ways to write this history, some triumphalist, others critical and pessimistic. But a dominant approach from critical social scientists has been to emphasize that developments over the last century—quite literally, the result of so-called "modernizing" development projects—have cultivated and sedimented structures of dependency. Farmers have become increasingly reliant on a number of crucial characteristics (for more, see Cochrane 1993; Fitzgerald 2003; Goodman et al. 1987; Kloppenburg 1988; Levins and Cochrane 2010; Lewontin 2000; Stone 2007, 2022a, 2022b):

- knowledge experts or knowledge contained in technology [e.g. deskilling]
- off farm inputs [fertilizer, pesticides, seeds, fuel, feed, (immigrant) labor, irrigation, etc]
- banks/debt
- global commodity markets and commodity subsidies
- high-priced proprietary technology [genetically modified organisms, high-tech tractors, robots, big data]
- privatized property, competitive markets for land
- logics of productivism, efficiency, and utilitarian rationality

The result of this combination is the ever-increasing "capture" of the dominant institutions of agriculture. The effect of the transformations outlined above is to create conditions of dependence, conditions that when taken to their extreme effectively amount to contract relations. The industrial chicken farming model is arguably the ultimate expression of this system of dependency with extraction of value from metabolic processes the primary goal of vertical integration at every level (see Beldo 2017; on pigs and the factory farm, see Blanchette 2020). Farmers are left with what Jan Douwe van der Ploeg (2008) calls limited "room to maneuver" and agriculture is increasingly aligned with outside interests. Capital continues to penetrate, the market continues to control, and the state continues to simplify. For smallholders the outcome is catastrophic across a number of factors critical to subsistence livelihoods. No flexible market relations, limited peer-to-peer cooperation, narrow understanding of ecology, and a growing monoculture of crops and what Vandana Shiva (1993) calls "monocultures of the mind."

For instance, focusing on knowledge and agricultural know-how, scholars have emphasized that in the U.S., industrial agriculture has "captured" the predominant institutions of knowledge production, orienting research problems and technological solutions towards agribusiness and large farm interests (Buttel 2005, Fitzgerald 2003, Kloppenburg 1988, Lewontin and Berlan 1986). Buttel (2005) suggests that "the impact of that [land-grant] research on farm structure, rural areas, and the food system is largely determined by what the land-grants'

‘agroindustrial partners’’ do when they appropriate the basic research findings of land-grant scientists” (Buttel 2005, 281). This capture of knowledge has promoted greater commodity market dependency resulting in an ongoing agrarian crisis of family farming (Adams 2002, Barlett 1993, Dudley 2000). It has also buttressed the "academicization of agriculture" in which abstract scientific knowledge flows top-down from specialists to farmers; the latter treated as recipients rather than generators of knowledge and rendered increasingly reliant on expert authority (Cleveland and Soleri 2002, 2007). Agricultural science has sought to transcend local specificities to produce “universal” knowledge that is independent of spatial and social location; simplifications with devastating social and ecological effects (Scott 1998). Such transformations, in part, have invited the “plantationocene” (Haraway 2015) a global condition of human and more-than-human violence in which the reductionist mindset renders monocultures and landscapes of economic and ecological suffering.

Recent technological transformations in industrial agriculture only continue to deepen this trend towards agrarian enclosure across multiple scales. The next frontier is the advancement of big data, robotic automation, precision farming, and other forms of digital agriculture (See Stone 2022a). Like other iterations of “appropriation and substitution” (Goodman et al., 1987) across agrarian landscapes (e.g. commodified seed), digital agriculture deepens dependencies on external inputs. This may take the form of on-farm production technologies such autonomous tractors or automatic dairy milking machines. But also, and important for our purposes here, it takes the form of knowledge, replacing farmer decision-making and experiential know-how with off-farm expertise. In a recent article on what he terms “surveillance agriculture”—referring to “a subset of technologies that appropriate agricultural decision-making”—Glenn Stone (2022a, 2) underlines that agriculture reliant on big data offers “a new frontier of commodification and

'pulling-away of the natural ground' in agriculture to substitute capital for experiential knowledge," and emphasizes that "new decision-appropriating technological regimes could pose novel threats" to farmers globally. This is potentially problematic for farmer-decision making as well as skill. As Carolan (2020) suggests in terms of the ability to repair robotic technologies, "To think some farmers facing a broken-down piece of (digital) equipment have no choice but to incur these sizable expenses (time as well as money, as service trips are billed with mileage included when distances are great) when a perfectly 'skilled' repair person might be next door ought to raise grave ethical concerns" (201). Time will tell if, for practicing farmers, they raise grave functional concerns as well. In the meantime, the apparent capture of agriculture by agri-business only becomes more prominent. And as Stone (2022a) makes frighteningly clear, it is also "heading south," threatening to disrupt the social, ecological, and economic worlds of global peasantries.

With these structural trends in mind, one very important response of the "new peasantries" then is a "struggle for autonomy." For van der Ploeg (2008), the struggle for autonomy refers to the concerted effort by smallholders to incrementally divorce their production from these dominant structures of dependence. He notes,

> Central to the peasant condition, then, is the *struggle for autonomy* that takes place *in a context characterized by dependency relations, marginalization and deprivation*. It aims at and materializes as the *creation and development of a self-controlled and self-managed resource base*, which in turn allows for *those forms of co-production of man and living nature* that *interact with the market, allow for survival and for further prospects* and *feed back into and strengthen the resource base, improve the process of co-production, enlarge autonomy* and, thus, *reduce dependency*. (pg. 23, emphasis original)

The effort is at limiting the interaction with corporate agri-business and its handmaidens that alienate farmers from their labor, landscapes, and logics. Van der Ploeg's term for the goal of this struggle is "room to maneuver," which affords a condition of relative independence from the

dominant and dominating structures that constrain agricultural praxis. What that autonomy actually looks like is a matter or ongoing debate by critical agrarian scholars and anthropologists (Jansen et al. 2021). In general, as we've seen, it is a capacity for self-determination. Van der Ploeg's theorization is mainly production oriented, focused on economic structures and market autonomy. Stone (2022a) offers a novel focus on the "informational relations of production," arguing that autonomy pertains to farmer decision-making, knowledge, and other social factors. Referring to advances of agro-industry in the form of big data outlined above, Stone suggests that it is likely to disrupt key social process: "the individuation that is inherent to—indeed is the boast of—surveillance-based decision-making poses an existential threat to peasant autonomy" (2022, 19). I would suggest that in addition political economic factors, analyses of autonomy must also attend to the cultural aspects of agrarian practice. For farming is also moral (Pandian 2009), and ways of knowing and ways of being in the world—unique ontologies and epistemologies—are a key part of the struggle for autonomy.

Throughout this dissertation I underline how alternative farmers in the United States are, like peasant communities in the global south, pushing back at each of these dependencies in turn, attempting to carve out space to think/act/interact differently. Indeed, how they struggle to cultivate "room to maneuver." Much has been written about this form of sovereignty from a social movement perspective and at the policy/collective action level (for instance, on La Via Campesina or the MST). Less however, do we know about how smallholder farmers are actually working to mitigate risks, build on-the-ground capacity, and imagine alternatives to agri-business as usual. This dissertation strives to fill part of that gap. At the same time, in the wake of the Anthropocene—the geological epoch where we recognize the depth of human disturbance—environmental social scientists and humanists alike are demanding new ways of working with

and knowing nature. That is, they are calling for a reimagination of our relations with human and non-human others alike. But what do these alternatives look like? How do we get there?

Summarizing, scholars and practitioners alike emphasize the ongoing struggle for autonomy across agrarian landscapes and the importance of institutionalizing ways of thinking and acting otherwise. I suggest that the emerging knowledge complex of alternative agriculture is a response to these dependency relations. It works to counteract them, functioning as, what might be called, an *infrastructure of emancipation*. The aim is to break away from the dominant structure(s) of power and its narrow productivist visions, its reductive ecological worldviews. In the process of transcending dependencies, however, I argue that farmers do not (strive to) achieve independence so much as new forms of interdependence, human and non-human. Such institutions *sustain* sustainable farming practices and paradigms and develop communities of practice capable of reproducing themselves.

1.3 Life in the Aftermath

Highlighting the emergence of alternative agriculture and the promising knowledge communities it fosters, and doing so amid ongoing, indeed increasing, forms of agrarian capture, I am inspired by the work of anthropologist Anna Tsing (2015). In her research on matsutake mushrooms, its picker communities, and the global commodity chains it travels, Tsing emphasizes the importance of looking for life across damaged landscapes. She underlines the significance of moving beyond mere critique (see also, Latour 2004a) to orient research agendas towards potentially or partially positive signs of livability. Indeed, as old growth forests are logged and transformed into plantations of commodity pine, she underlines that this process is one of erosion but also emergence, deterioration but also a setting of the scene for new life forms

and livelihoods. Through "arts of noticing," a paradigm that informs her mushroom hunting interlocutors as well as herself, Tsing promotes an approach to understanding socio-ecological relationships that is attentive to not only loss, disturbance, and ruination—prominent and overwhelming as those might be—but also emerging forms of collaborative survival. In the interstices of the global political economy, Tsing suggests, crops up promising human and more-than-human ways of being. "In a global state of precarity," Tsing argues, "we don't have choices other than looking for life in this ruin" (2015, 6). More still, attention to loss, dispossession, and deprivation only further entrenches the all-encompassing discursive and material reach of capital, what Gibson-Graham (2006) call capitalocentricism. For Tsing and Gibson-Graham alike the goal is to highlight economic and ecological diversity that transcends the logics and logistics of capital, Modernity, and the state. It is an effort to promote the "possibility of life in capitalist ruins" and ensure that there remains some semblance of "hope in a blasted landscape" (Kirksey et al. 2014)

Seeking life in the ruins that modernity has made is a critically important task of contemporary anthropology, a discipline that has for so long given primary attention to what Joel Robbins (2013) calls the "suffering subject"—those individuals and communities experiencing the sharpest edges of global capitalism through trauma, dispossession, displacement, and sometimes death. This is important research that must continue. Yet Robbins calls for renewed attention to an "anthropology of the good," an approach that centers the efforts of people striving to live and live well amid ongoing global crises of capitalism as well as climate. Ortner puts it differently but with similar emphasis, underling how anthropology has spent three decades focused on the dark aspects of social life (power, inequality, domination, and oppression) while recent theory has at least warmed to "anthropologies of the good" (2016, 1). I side with the

importance and necessity of emphasizing both good and bad, light as well as dark. For as political ecologist Paul Robbins (2004) aptly puts it, the task of the social scientist is in offering both a "hatchet" and a "seed," a critical analysis that exposes the often nefarious working and outcomes of hegemonic power as well as a more promising perspective that affords, at least embryonically, the possibility of life in the aftermath. Such is the dual meaning of this dissertation's title *Cultivating Life*—at once an exploration of what life is like for alternative farmers as well as a reflection on the potentially promising human/environmental relations such agrarians labor to bring into being.

As such while this dissertation focuses on emergent knowledge regimes in alternative agriculture and the aspirational efforts of its practitioners, it likewise underlines the tensions and enclosures that militate against the possibilities of escape. Often, this takes the form of prominent political economies and ecologies and their manifestation in subtle ways in the agrarian everyday. Consider Claire's experience for instance.[1] Claire was an apprentice at a well-known and well-respected farm in the Hudson Valley, and was as eager as anyone I'd met in my fieldwork to cultivate change through organic agriculture. She was tough, intelligent, bright, and committed. She brought energy and enthusiasm to the movement for alternative agriculture. But by the end of her first season farming, she was ready to toss in the towel. The following two diary entries of Claire's offer insights into the toll taken by agriculture:

> - December 2018
>
> The same things that make me feel happy and strong and proud to farm also make me frustrated and feel deprived or pitiful. How I'm dirty all the time. And how much I have to use my body and muscles. How I always have scratches and cuts and bruises. I don't keep track of all the bruises on my shins and knees anymore. There's always a few around from various things. Uneventful to remember. Like closing a stanchion at 5:30 in the morning and scraping your knuckle. Or pushing and carrying fork after forkful of hay

[1] Pseudonyms are used throughout for purposes of anonymity

> wet or dry. That one gives me pride but also despair. I'm sick of having to work so hard sometimes. These cuts and bruises. When I just want to sit inside. Not sweat in the snow. Or deal with deep lost orange twine stuck in a bale with a horned cow thrashing at it from underneath. Being squeezed and kicked and swayed and bumped. Swatted in the eye with a dried manure tail. And always pushing sweeping carrying."
>
> - August 2018
>
> When I'm out here standing in the pasture. Or leaning against a cow in the barn. Feeling the beauty, seeing the joy. Then I like this place. Then I'm happy I'm still here and can be here for longer. But this morning with all the fucking sawdust making everything dirty, the machine falling off, Frannie [the cow] sitting on me. I broke down and started crying. Felt like I couldn't do it anymore. Wanted to walk out. But I couldn't. And once Frannie was done I recovered. Found my stride again and could laugh and smile and look people in the eye. There was just too much going on. DHIA [Dairy Herd Improvement Association]. The farm manager talking serious business about veal. Frannie. Just overwhelming."

The trials and tribulations of alternative agriculture will be further elaborated in Chapter 2. Important to note here is the way in which frictions, manifesting in a variety of forms, constrain possibilities for living outside the dominant agro-ecological system. Indeed, while the infrastructures of alternative agriculture tend towards emancipation, this process is only ever partial, always limited by conservative centripetal influences that reign in significant change. Indeed, change is constantly in tension with dominant worldviews, embodied subjectivities, and established infrastructures. If some alternative forms of agriculture are oriented to "cultivating utopia, (Hetherington 2006), it is only ever an ambiguous utopia (Le Guin 1974), indeed an ambivalent one. Pregnant with possibility but riddled with precarity.

1.4 Skill, Knowledge, and Sovereignty

The contemporary landscape of alternative agriculture in the United States offers myriad fertile possibilities for exploring the seeding of sovereignty amid dependence. There are very interesting transformations occurring across a number of critical junctures. FarmHack, farm OS,

and Atelier Paysan are nascent communities for the production and open-source dissemination of technologies designed for small scale sustainable agriculture. Such efforts push back against the enclosures of proprietary technologies, right to repair laws, and a century of technological development designed for large-scale commodity production and the companies that buttress and profit from it. The Agrarian Commons, land trusts, and other non-profit entities are striving to place large swaths of land in easement, extricating it from the market, and potentially from its subsequent dictates of profit and productivism. Likewise the advancement of CSA (community-supported agriculture) offers emerging forms of mutualism in which customers and producers collaborate to ensure enterprise success, reducing alienation of the "fruits of one's labor" and decommodifying food. Crowd source funding platforms such as Kiva and Kickstarter offer alternative forms of financing that seek to disrupt the debt and dependency relations of agricultural investment, affording expanded opportunities to collectively own enterprises and pay back monetary loans without or with limited interest. Seed keeping initiatives such as the Open Source Seed Initiative and the Indigenous Seed Keepers network, among many others, strive to return seeds to collective commons, along the way encouraging biodiversity, improving varieties for resilient production without chemical inputs, and promoting the understanding of seeds as cultural heritage and not just a technology of agricultural growth. Each of these aspects of alternative agriculture is ripe for further research on if and how they relate to and/or push beyond, the structures of agrarian dependence. Some very good analysis is already emerging on these topics (see for instance: Carlisle et al 2019; Hoover Forthcoming; Kloppenburg 2014; Montenegro de Wit 2019; Paul 2019; and Wittman et al. 2017)

While there are many fruitful foci for better understanding the struggle for autonomy in alternative agriculture, this dissertation narrows the scope to focus on a particularly important

aspect, skill and the emerging knowledge communities of U.S. sustainable agriculture. Knowledge, and the capacity to apply it, is critical to the shift towards agricultural sovereignty. As we saw above, deskilling has been a key component in the industrialization of agriculture, in which the capacity to perform in farming is increasingly eroded and often externalized in the form of technologies and the knowledge networks of commodity agricultural production governed by corporations and the state (see Stone 2007). In this study I examine the skilling institutions of alternative agriculture focusing on what forms they take and the outcomes and ideologies they (re)produce. The institutions for generating and disseminating agricultural management information—here termed skilling institutions—are central elements in an agricultural system. As noted above, Robert Netting (1993) emphasizes that in smallholder agriculture knowledge and skill are critical to sustaining all viable farm operations but particularly those of smallholders practicing intensive, permanent, diversified agriculture where "skill replaces scale." He identifies the household itself as the key skilling institution for many small-scale farmers globally. However, in contrast, virtually no alternative farmers grow up in alternative farming households and most not in farming households at all. Although some alternative farmers have limited agricultural experience before starting their own farm, many are starting almost entirely from scratch. Alternative farmers lack the indigenous technical knowledge (ITK) critical to success in smallholder agriculture the world over—a highly-adapted repository of information about the local environment and farm context that is embedded in local social institutions (Sillitoe 1998). With a lack of inherited knowledge, and without the support of the dominant knowledge infrastructures oriented to conventional and commodity agriculture, in this dissertation I ask: how do alternative farmers learn to farm sustainably. More still, how does

the knowledge acquired in and through these institutions mediate and potentially transform human/environmental relationships?

In response to high demand for skilling from the thousands of alternative farms constantly opening nationwide, an extraordinary variety of skilling institutions is emerging. These include NGO classes, consultancies, online forums, how-to manuals, peer-to-peer networks, pasture walks, fairs, conferences, field days, and especially apprenticeships. A variety of alternative skilling institutions have recently emerged largely to overcome power disparities between experts and farmers and a lack of "local knowledge." While these institutions have received limited scholarly attention, some insights prove helpful. For instance, we know that peer-to-peer knowledge networks—"where people experiment with creating local knowledge in the form of new practices, ideas, and organizational principles" as they "reinterpret norms and develop institutions" (Hassanein 1999, 33-34)—have been shown to flatten hierarchies and support economic and ecological sustainability (Kloppenburg and Hassanein 1995, Warner 2007). Moreover, Carolan (2008) suggests that farmer field days are an important skilling institution that democratizes knowledge and transmits explicitly-local information, but argues that outcomes are likely to vary significantly depending on the orientation of facilitating organizations and the geographic and historical specificity of skilling institutions (2006: 330). We also know that agricultural knowledge is characterized by three types of learning, specifically environmental (empirical observation and experimentation), social (emulating peers), and didactic (Stone 2016). This third aspect, didactic learning—in which farmers accrue agricultural knowledge vis-à-vis outside interests including commercial, government, and NGO entities—remains underexamined, particularly in the context of alternative agriculture. Didacts are largely theorized to operate with different, at times opposing, interests than the farmer. But

the peer-to-peer knowledge communities of alternative agriculture offer fertile ground for examining social and didactic learning within a context of a rising tide lifts all ships mentality, where interests may not be the same but are often quite parallel. It provides a chance to better outline the specificity of the tripartite model, and more still, give it greater ethnographic flesh. Overall, my research contributes to this emerging scholarship on skilling institutions by examining how alternative farmers generate, acquire, and apply knowledge in a U.S. landscape in which farmers are poorly served by dominant institutions. Moreover, it is among the first to bring theories of global "repeasantization" (van der Ploeg 2008) to bear on the U.S.—the mecca of agricultural modernization—to examine how farmers struggle to institutionalize autonomy from the vagaries of market dependence through the development of alternative knowledge systems.

I argue throughout this dissertation that these communities of knowledge production and dissemination in alternative agriculture work to establish two essential elements. First is the technical capacity for sustainable farming. Second are the norms, beliefs, values, and shared ways of seeing that comprise a community of skilled practice. Skilling institutions, as *institutions*, provide insights then into processes of both enskillment and enculturation. As such, the analysis in the chapters that follow extends core concerns of cultural ecology and political ecology by bringing them into sustained dialogue with broader anthropological interest in meaning/ideology and recent environmental anthropology on more-than-human worldmaking. For farming has never been a matter of agronomics alone and the knowledge communities of alternative agriculture reconceive economy, ethics, and ecology, inculcating not only other ways of practicing agriculture but also other ways of conceptualizing human and environmental

relations. In all, alternative farmers, and the knowledge communities they foster, offer a vital lens into the possibilities and limits of efforts to cultivate more livable worlds.

In a recent article in the *New Yorker*, well known agrarian philosopher and poet Wendell Berry (2019) offers significant insight into the contemporary condition of agricultural knowledge for smallholder sustainable farmers. Consider at length:

> If we should decide to replace the chemicals and some of the machinery with humans, as for health or survival we need to do, that would be very difficult and it would take a long time…[Why?] Because there is no farmer pool from which farmers can be recruited ready-made. Once, we could more or less expect good farmers to be the parents of good farmers. That kind of succession was hardly a public concern. When farmers are taught, starting in childhood, by parents and grandparents and neighbors, their education comes "naturally," and at little cost to the land. A good farmer is one who brings competent knowledge, work wisdom, and a locally adapted agrarian culture to a particular farm that has been lovingly studied and learned over a number of years. We are not talking here about "job training" but rather about the lifelong education of an artist, the wisdom that come from unceasing attention and practice. A young-adult non-farmer can learn to farm from reading, apprenticeship to a farmer, advice from neighbors, trial and error—but that is more awkward, is personally risky, and it may be costly to the land.

In this short passage Berry highlights many of the challenges of skilling and knowledge dissemination in alternative agriculture. The critically-important effort to replace chemical-intensive farming with sustainable approaches is encumbered by a lack of already existing neo-agrarians, knowledgeable and prepared to take up the task. Farmers lack the skill and knowledge that comes naturally through inherited ITK, so to speak, missing out on know-how acquired from extensive experience on agricultural landscapes and passed down through generations. Job training often fails to provide adequate information and farmers are forced to rely on significant trial and error, a hazardous approach that puts enterprises as well as ecologies at risk. What is needed, he intimates, is a form of knowledge acquisition that is similar to the "education of an artist," and exemplifying wisdom born of repeated practice and heightened attentions. In other words, what is needed is skilling institutions oriented to the (re)production of *metis*—contextual,

particular, and highly-practical knowledge—"best learned by daily practice and experience" either through apprenticeship or growing up in farming household (Scott 1998, 319). This dissertation offers an analysis of how young farmers struggle to institutionalize such forms of agrarian knowledge. It asks what practical agricultural activities become possible and what ways of knowing and being in the world are actively enculturated. The acquisition of craft knowledge, like other forms of learning to labor, produces skills as well as subjectivities (Grasseni 2007, Ingold 2000, Pallson 1994, Paxson 2013). The way such knowledge transmission impacts the agricultural communities of alternative farming, their capacities at reproduction and an opening up of possibilities for promising more-than-human entanglements (or not), is a key concern of this study.

1.5 Methodology and Data Collection

With the goal of examining how U.S. alternative farmers develop, exchange, and apply agricultural knowledge I conducted 15 months of ethnographic research in the Hudson Valley of New York and Central Appalachia, among alternative farmers and the knowledge communities they foster. I collected data from farmers, agricultural experts, and program staff at a variety of sites including alternative farms, beginning farmer training programs, and non-profit advocacy organizations, as well as at an array of training events, field days, and farm conferences. Overall, I interviewed more than 50 alternative farmers asking about learning, navigating challenges, and the many meanings they ascribe to agriculture. Many interviews also included significant participant observation, over a single day or often several days. In addition to farmers, I also interviewed more than 30 non-profit advocacy organization/farming training program staff and trainees at approximately ten skilling programs.

Apprenticeship was also a key aspect of this research. As an important institution for skilling on alternative farmers, as an apprentice I "learned about learning," attending to the transmission of tacit, embodied knowledge to novice practitioners. This also provided the context for long-term participant observation at specific sites. I participated in four apprenticeships for durations of one to up to four months, respectively. Participating in everyday activities, labor, conversations, and training, I collected information on how apprentices acquire knowledge through hands-on experience, what resources are consulted in response to challenges, and how that skilling information moves in relation to local specificity. Moreover, I attended to social dynamics and informal conversations, tuned towards relations of expertise as well as the transmission of ideology, values, ways of seeing, and other norms. I gathered ethnographic data on the variables (economic, environmental, ethical) influencing farmers business strategies, agricultural decision-making, and social relations with peers and other market actors. I also joined fellow apprentices and mentors in off-farm activities, attentive to aspects of informal training and socialization.

I attended 9 local/regional farm conferences focused on agricultural education, often multi-day events. It quickly became clear, as we saw in the opening "fieldnote" to this chapter, that these were particularly rich sites for conveying knowledge as well excellent windows into the diversity of technical and ideological perspectives in the alternative farming community. At these conferences I participated in training workshops and presentations and collected relevant literature (brochures, adverts, farming guides, etc.) for document analysis. I purchased and closely analyzed prominent books that were regularly featured on sales tables in the lobby or were the topic of popular conversation. While textual analysis is perhaps a less common methodological approach for anthropologists, it is crucial in the context of examining (the

transmission of) agricultural knowledge. In reading textbooks, farming memoirs, and agrarian philosophy (e.g. Wendell Berry), I ultimately offer a "reading-with," an analysis of diverse forms of agricultural knowledge as I and my interlocutors come to terms with these texts together. I also attend roughly 40 educational field days or organized workshops of various sorts. Data was collected on the topics covered and questions asked during the presentations, tours, and discussion, and in several cases participants and field day hosts were interviewed, collecting information on reasons for participation, desired outcomes, and skilling challenges faced by different parties involved. Founders and current organizers of each program were also interviewed, inquiring about collaborations and challenges.

For this research I developed a comparative project to better understand how these processes and practices are bearing out in rather different environmental and economic contexts. As noted above, the fieldwork was divided between central Appalachia and the Hudson Valley of New York, spending roughly equivalent time in each. In Central Appalachia—a loosely defined region consisting of West Virginia, Eastern Kentucky, Southwest Virginia, East Tennessee, and Western North Carolina— alternative agriculture has recently emerged in policy and economic development sectors as an important alternative to coal mining and a means of mitigating the region's entrenched problems of unemployment, obesity, and malnutrition. As a recent documentary dubs it, Appalachia is struggling to rise "From the Ashes," of coal dispossession and dependency. Flush with federal and private funding, non-profits are organizing training programs largely oriented towards enrolling individuals with low educational backgrounds and limited financial resources including out-of-work miners, military veterans, backyard gardeners, and a smattering of young folks. In West Virginia, the part of Central Appalachia where I spent much of my ethnographic attention for this study, there likewise

remains a longer history of subsistence gardening, hunting, and small-scale agriculture that is a remnant of historical homesteading. Across the mountains and hollers, it is not uncommon for families to have lived in and of place for multiple generations, and vegetable gardening and the keeping of small livestock continues to offer nourishment and extra cash when wages are low or grocers too far distant. Despite efforts of industry to eliminate or reduce the subsistence and ecological base to promote reliance on the market economy and thereby waged work, the legacy of self-provisioning lingers across the region's degraded rural landscapes (on Appalachian agrarianism see Black 2015 and Stoll 2017; on Appalachian subsistence strategies generally, see Halperin 1990).

In the Hudson Valley of New York, things differ markedly. As a national hub for the nascent "young farmer" movement, here a legion of ideologically-minded aspiring agrarians are driving development of an alternative agriculture organically, so to speak, from the ground up. Advocacy and training programs are largely organized by and for beginning farmers and offer a variety of resources including apprenticeship programs and seminars on alternative production systems such as permaculture, biodynamics, and holistic farming methods. Many are peer-to-peer exchange programs, where folks meet to share resources and cultivate collaborative knowledge networks. As I further outline in Chapter 2, the Hudson Valley is something of an epicenter of the new agrarian movement in the U.S. with a number of prominent nonprofits and institutions focused on experimentation in regenerative agriculture and the cultivation of an ecologically-resilient food system. It is not incidental that the National Young Farmers Coalition is based here, or that from this region grew the Greenhorns whose goal is to promote, recruit, and support the next generation of farmers. The animus of the regional effort and ethos is well captured on the Greenhorns website About page: "Transitioning our farming systems is a multi-

generational project. It is physical, it is technical, it is spiritual. This work re-animates our relationship with our home and watershed, helping us tune into the destiny and the immediacy of the land that feeds us. The work of repair is a collective one- Greenhorns occupy ourselves with story telling, skill building, network-creating and animation of the young farmers movement." The Hudson Valley is a fertile site for exploring the cultivation of life and the life of cultivation across the landscape of alternative agriculture.

Together, information gleaned from the Hudson Valley and central Appalachia offer key insights into the worlds of alternative agriculture and the knowledge communities it fosters. Other U.S. locations could have perhaps furnished similar or related findings. For instance, central California has its own prominent young farmer movement and systems of training in agroecology fruitful for analysis. It would indeed be especially ripe for exploring the role that dominant educational institutions actually do play in alternative agriculture as the UC system seemingly has a heavy hand in training, research, and advocacy. My analysis is focused on regions further from the gravitational orbits of state-level farming education, which, as I outline above, is more the norm than the outlier for alternative agriculture. The juxtaposition of the Hudson Valley and Central Appalachia then—with their disparities of resources, access to power, economic development, environmental degradation, and farmer identities—offer particularly fertile landscapes for understanding the work of skilling institutions, as well as the experiences of the farmers that create and circulate through them.

Drawing on data collected at disparate sites in service of better understanding a set of central research questions, this analysis is in fundamental ways a multi-sited ethnography. Moving beyond the bread and butter of classic anthropology and its emphasis on long-term immersion in a single field-site, typically a tribal or village setting, multi-sited ethnography was

introduced more than three decades ago in recognition of the unbounded nature of cultures in an increasingly globalized world. Advanced by George Marcus (1995) and others in the "writing culture" school, multi-sited ethnography is a research method in which the fact that people, things, and ideas move around is not only recognized but recognized as central to the questions of concern for many anthropologists. As such, the approach toggles across sites as well as scales of analysis, tracking flows of information or elements that compose world systems. Long gone are the days in which anthropologists were stranded on foreign beaches in the Malinowskian mode—a research imaginary always more idealized than real. Increasingly scholars work across multiple communities, following "people, stories, metaphors, or objects, as they themselves travel from place to place" (Candea 2009). For those of us undertaking graduate training in anthropology in the second decade of the twentieth century, multi-sited ethnography has become so commonplace in goes nearly without saying.

Although multi-sited ethnography increasingly goes without saying as a contemporary research method in anthropological analysis, this does not mean—as some in the discipline initially worried—that the approach encourages a form of "saying without going." Indeed, the importance of long-term, deeply immersive experience in a field-site or field sites continues to distinguish anthropological approaches from those in other disciplines perhaps less concerned with understanding the so-called everyday and less interested in distinguishing, for instance, between twitches and winks (Geertz 1973). However, such queries remain central to anthropological project, and rightly so. While multi-sited approaches perhaps lessen the duration of data collection or the focus on singular communities, the difference is one of degree and not of kind. As such, multi-sited analysis continues to emphasize a deep and nuanced appreciation for the minutia that make up the human experience, without the blinders of seeing "people without

history" (Wolf 1982), and with attention to the way in which communities and cultures are caught up in systems that often demand telescoping scales of examination.

Building on multi-sited approaches to anthropological research, in what follows I offer a compo-sited ethnography. Derived from the latin *compositus,* composite refers to putting or placing together. By definition a composite material is one that is "made from two or more different materials that, when combined, are stronger than those individual materials themselves." Such an analysis, I contend, moves beyond an examination that strives to say something comprehensive about a single people or place, as would have been the case with classic village ethnography. Likewise it is not strictly comparative in that the goal is not to illuminate through rigid juxtaposition, identifying differences or subtle distinctions by way of holding variables constant across multiple case contexts or observing them in rigorous tension. Moreover, beyond multi-sited approaches, the goal here is not to strictly follow a thing, or an idea, across scales of analysis. By compo-sited, rather, I draw on an assortment of ethnographic material that when combined, I suggest, offer themselves as more than the sum of their individual parts. I bring insights from the Hudson Valley and Appalachia, acquired from across an array of sites and scenes, into dialogue with one another in a manner that speaks to aspects of alternative agriculture, and the knowledge communities it fosters, that a single site would insufficiently reveal and that strict comparative analysis would likely obscure or treat as marginal. A compo-sited ethnography is both a research method and manner of writing. It relies on putting disparate elements into conversation to produce a patchwork composition. The sites of analysis, like the chapters themselves, articulate such that the many become one. A conceptual whole made up of related but distinct parts (see Vocabulary.com).

Another important note on methodological approach has to do with researcher positionality. We know that positionality matters in ethnographic research and that it shapes queries, conversations, and community access. Further, as feminist theorists such as Donna Haraway (1988) underline, we all see and speak with a point of view, that is, a view from a point. Whether that position is made explicit or is implied, knowledge is always already situated and efforts at the "god trick" view from nowhere often obscure as much as they reveal. In the anthropological enterprise, there has been a substantial and ongoing debate in the literature about the politics, ethics, and ultimately the epistemological validity of studying down, studying up, studying the self (reflexive or auto-ethnography), etc. Each approach offers distinct vantages and advantages, and combine to offer a more robust view of the social and environmental worlds we study. My approach in this dissertation is most closely akin to "studying sideways." Ulf Hannerz (1998, 109) offers the first word on this approach:

> In a well-known essay from more than twenty years ago, Laura Nader (1972) argued that anthropologists have mostly engaged in studying people less powerful and prosperous than themselves, that is, studying down - now the time had come to study up. What I have in mind here is rather more a question of studying sideways: looking at others who are, like anthropologists, in a transnational contact zone, and engaged there in managing meaning across distances, although perhaps with different interests, under other constraints.

Hannerz then turns his attention to other actors in what he calls the "transnational contact zone," analyzing the experience and impact of journalists, spies, missionaries and others whose goal is, like an anthropologist, a better understanding of the so-called other, even if generalizable knowledge is not the ultimate aim of their efforts. I mean something rather different. If studying sideways to Hannerz refers mainly to shared or similar task, sideways in this study suggests parallel positionality. In other words, the subjectivity of the subjects under analysis and I, the ethnographer, while certainly not the same, do share a good deal of overlap. The crux of studying

sideways then is the latter half of anthropological axiom, a deliberate and rigorous effort to make the strange familiar, and *the familiar strange*.

Let me briefly elaborate. I am a white cis-gender male, college-educated, that comes from an upper middle-class background in the suburbs of a mid-sized city in the United States. My politics are progressive and I have, over the years, developed an environmental consciousness that informs my behavior and worldview. Prior to graduate school I spent time, off and on over several years, working on organic farms in the U.S. and Europe, less honing a craft or vocation than striving to find greater connectivity with nature. Indeed, part of the impulse of this research was the clarifying juxtaposition offered by my parents who simply could not understand why I was spending my time, not in law or medical school, but as an itinerant manual laborer. Wasn't my liberal education and privileged positionality precisely the leverage to "get off the farm" so to speak, to seek and succeed in white collar work, to strive for the middle-class, consumerist, comfortable lifestyle that had been the foundation (ultimately only for some) of so-called American modernity? Indeed, growing up in a suburb of Indianapolis, I and most of those that I knew growing up were only a generation or two from farm life. And our grandparents did not see agriculture as part of a viable future. What was I, and those laboring alongside me ankle deep in mud, after in respect to our organic farming? In this dissertation the "after" of that sentence takes on a dual meaning, as both a meaningful pursuit and a sense of coming to terms with that which proceeds.

Similarly, the interlocutors and collaborators that contribute to this study, in many cases, share significant resemblance to my positionality. There are of course differences. Some identify as queer. Many, if not most, are women. Too few, still, are people of color (though that is changing). Nevertheless things we do share, on the main, is having been brought up in a cultural,

economic, and environmental milieu that informs our ongoing efforts towards human and more-than-human justice. The lion's share come from middle-class backgrounds. Most are liberally-educated at reputable colleges and many even, like myself, studied anthropology and environmental studies.[2] Some have turned to agriculture as a second career after burning out from finance, marketing, or another cubicle-based endeavor. Many cite Thoreau or Wendell Berry or Annie Dillard or Jack Kerouac as favorite authors. More interesting still, whether from their collegiate education or merely their continued interest, in conversation some will refer to Heidegger and Karl Marx, others to William Cronon, or Tim Ingold, or Anna Tsing, or Robin Wall Kimmerer. Indeed, Kimmerer's Braiding Sweetgrass was a topic of surprisingly common interest and conversation, and a frequent selection for reading groups. I participated in several workshops on food sovereignty for black farmers and was so pleased to hear references to Judith Carney's work on the origins of knowledge in American agriculture. What are we, as anthropologists, to make of interlocuters who read much of the same literature as we do, whether the fiction that shapes our worldviews, or the scholarly texts that inform our politics, environmental ethos, and even our research?

As an extra-ordinary example that proves the rule, after realizing our similar interests in emancipatory politics, one interlocuter and I frequently swapped texts. To this co-owner of a cooperatively managed farm, I suggested Arturo Escobar and J.K. Gibson-Graham and Naomi Klein; she in turn recommended a different Gibson-Graham text, Ursula Le Guin's *The Dispossessed*, and research on reinventing the commons by David Bollier. In another instance, which we will return to in Chapter 2, one of my informants happened to be casually reading Seth

[2] Though certainly not all alternative farmers would identify as liberals. As one recent news article rightly puts it, "Tea Party Libertarians and Small Organic Farmers make Strange Political Bedfellows." This association, of course, relates back to the struggle for autonomy in interesting, divergent ways.

Holmes' *Fresh Fruit, Broken Bodies,* a seminal text in cultural/medical anthropology. Still another, while we weeded her permaculture garden, lamented the state of the world while simultaneously hoping and working for a better future—she quoted Gramsci, "The old world is dying, and the new world struggles to be born." Fitting, I came to realize, for these are organic intellectuals, in the fullest meaning of that term (see Gramsci, the Prison Notebooks). Again, how to come to terms with research subjects whose ways of understanding and ways of being in the world are informed through similar experiences and forms of expertise. This is a critically important question for any anthropologist striving to study sideways. Still more, it's an epistemological obstacle as well as opportunity for those of us interested in knowledge, ways of knowing, and the transformation of subjectivities and ontologies towards the cultivation of more-livable, more-than-human worlds. In certain ways, I and my interlocutors were both studying sideways, gleaning insights from one another, peer-to-peer. Less an anthropology *of,* than an anthropology *alongside* or *adjacent.* Such queries are less the focus than the context of what follows. The positionality and orientation to studying sideways informs the questions asked, the insights gleaned, and ultimately the ethnographic world that this dissertation brings further into focus.

1.6 Outline of the Chapters that Follow

Chapter II *Down on the Farm: Aspiring Agrarians, Burnout, and Exhausted Labor* sets the scene for the chapters that follow by offering ethnographically-rich insights into everyday farm life and the myriad challenges experienced by aspiring agrarians. I underline how myriad aspirations for social justice, economic restructuring, ecological sustainability, and the so-called good life are always already challenged by the struggles of collaborating—that is, working

together—with the human and more-than-human world. This chapter draws on extensive participant-observation conducted in and on agricultural apprenticeship programs, offering insights into the internal dynamics of these skilling institutions. While recent research reveals the inadequacies of apprentice training programs, the barriers of entry to small-scale agriculture, and the complex reasons beginning farmers fail (MacAuley and Niewolny 2016; Rissing 2019), this chapter foregrounds how everyday exhaustion impedes farmer training and farm success. Romantic representations offered in books and glossy mass-market magazines of agrarians working pleasantly with nature—leisurely tending to plants and pastures—elide the experience that many farmers are one breakdown (of machinery, of relations, of composure) away from burnout. I argue that the diverse constraints of the political economy of agriculture—that put aspiring agrarians in positions of exploitation and exhaustion—limit the prospects, promise, and transformative potential of alternative agriculture

Foregrounding first-hand farming experience and the reflections of several struggling agrarians, in this chapter I develop the concept of *exhausted labor* to capture two key aspects of alternative agriculture: both the gravity of embodied, chronic fatigue and the way that labor—often interns and apprentices—are used and used up and ultimately forced out through burn out. Passionate about the work and emotionally-invested in both the farm and farmer, these tensions lead to considerable self-exploitation and, underpaid and overworked, often to conflict. Much has been written about the development of technology to replace the drudgery of agricultural labor, even to replace the labor itself. But with "skill replacing scale" (Netting 1993) skilled labor is critical in smallholder settings. I suggest that exhaustion as the expense of the everyday and extra-ordinary demands of demanding agricultural work is a critical limitation on the reproduction of skill/labor in alternative agriculture. There is a lack of opportunity to learn, and

eventually, a limited desire to do so. “Down on the farm” captures both the everyday activities and idealizations of agrarian life as well as the affective experience of feeling down—tired, hopeless, ready to give up.

Chapter III *Skilled Environments: Towards a Political Ecology of Agricultural Enskillment* explores the way agricultural practice is structured by the political economy of alternative agriculture while also examining the subsequent effects on human/environmental relations. Bringing theories of agricultural performance and skilling into dialogue with literature on apprentice learning and craft practice, I underline how pressures of productivity impact—and largely inhibit—the skilling process. Successful farming, as with all craft forms of production, demands significant practice and gradual perfection that accrues through repeated trial and error and improvement. In such a manner *techne* becomes *metis,* so to speak, a know-how that resides not in the brain but in a habituated, conditioned, contextually dependent body. In most apprenticeship models of training, from glassblowing to cheesemaking, room is allocated for mistakes and for the production of products of inferior quality. This allocates space for the procurement of proficiency. However, the particular political economy of agricultural apprenticeship, in which learning laborers are nearly always instrumental to farm viability, affords minimal margin for error. Small disruptions of quality, efficiency, or workflow often have substantial effects on the bottom line. There is no room to mess up. As a result, and particularly relevant given that alternative farms require significant embodied skill, farm managers mitigate risks by arranging agrarian environments that require limited tacit knowledge. One evocative example comes from horse farming, a seemingly anachronistic form of agriculture that many farmers actually privilege for both practical and ideological reasons. Indeed, many farmers prefer draft animals to fuel-based machinery but managing equine is exceedingly

challenging to master. I argue that farmers "room to maneuver" with alternative production techniques are quite-literally reined, restrained by limits of skill.

Drawing on ethnography of variety of skilling institutions—apprenticeships, educational workshops, and prominent training guides—in this chapter I underline how in the absence of proficient knowledge and in the context of consistent economic insecurity, "agricultural didacts" (Stone 2016) hold considerable influence. Didacts offer pre-packaged solutions that are often rapidly adopted, ambivalently successful, and yet always transformative of environmental and ideological landscapes. To highlight the effects, ambivalent at best, I offer a detailed analysis of "lean farming," an increasingly prominent management approach that promises productivity, pleasure and profit to struggling alternative farmers as they "cut the fat" out of their production systems. But directly imported form the Japanese automotive industry, lean principles—relentlessly cutting waste, streamlining efficiency, maximizing value—are merely the most recent effort to make "every farm a factory" (Fitzgerald 2003). The so-called fat of farming is what, for many, makes alternative agriculture alterative: the cultivation of meaning and more-than-human connection alongside vegetables; the (re)incorporation of "waste" as compost into the agro-ecological fertility system. The tensions inherent in the sustainability of alternative agriculture, pressures born at the often conflict-laden intersection of ethics and economics, render alterative agriculture ripe for management regimes and industrial logics that alternative agriculture was established to resist. The term *skilled environments* then, captures the relationship between the taskscapes (Ingold 1993) of skilled agricultural practice and the more-than-human landscapes they bring into being.

While skilled practice is the focus of preceding chapters, the emphasis of Chapter IV is on alternative forms of knowledge and ways of knowing. In *Fields of Vision: On Ecological*

Entanglement and the Nature of Knowledge I argue that the "room to manuever" central to sovereignty in alternative farming is not only political-economic—concerned with the systems and structure of agriculture—but also epistemic and even ontological. Ecological knowledge in these alternative farming communities is hardly traditional in any conventional sense. However, as with other forms of TEK, knowledge in alternative agriculture transmits not only technical capacity but also unique ways of understanding the natural world and the human place in it. In this chapter I emphasize how alternative farming communities cultivate alternative ways of working with and knowing nature. To frame the argument, I extend the analysis of agricultural industrialization foregrounded in the introduction and set up the last century of agrarian change as one dominated by instruction in seeing nature from a particular, and particularly narrow, point of view. Dominant Western modes of agricultural science and practice are characterized by command and control designs on Nature and radical simplifications born of the techno-scientific reductionist lens (Jasanoff 2005, Scott 2008). The agricultural landscapes cultivated through and from such ways of knowing are instrumentalized nature, landscapes rendered tame through techniques of legibility, mastery, standardization. They leave out a great deal from their field of vision, with a great deal of importance for human and more-than-human livability.

The ethnographic analysis in this chapter examines and emerges from a particular skilling institution—alternative farming workshops. These offer training in particular aspects and versions of alternative agriculture, in this case on permaculture and biodynamics. 1) A farm design course utilizing nature-as-model, 2) a guided pasture-walk in careful observation of ruminant animals, and 3) a seminar presentation exploring the plant/people interactions of what's called "quantum agriculture," these workshops strive to cultivate a community of practice with a holistic way of seeing the intricate relations and interconnections of nature. Instructors seek to

instill an alter-scientific approach that re-educates attention, expanding fields of vision (beyond the reductionist lens) while integrating knowers as ecologically entangled. At the intersection of environmental anthropology and (feminist) science and technology studies, this chapter responds to recent calls to notice alternative forms of life emerging in the ruins of Modernity and its problematic logics as well as emancipatory efforts to stage more-than-human relations otherwise (Tsing 2015, Myers 2019).

The final body chapter is entitled *Alchemy, Vital Nature, and (Bio)Dynamic Matters: On Knowledge and More-than-Human Transformation*. Chapter V returns our attention to an alternative form of agricultural production known as biodynamics and foregrounds its emic theory of social and environmental change through the lens of alchemy. Drawing on extensive ethnographic research with biodynamic farmers and the extensive knowledge communities they foster, I first introduce biodynamics as a fringe form of agricultural practice with extra-ordinary elements—complete with homeopathic compost teas, planetary consciousness, a perspective of people as plants/plants as people, and transubstantiations of matter. Building on this foundation, the analysis is grounded in a series of experiential training workshops producing biodynamic preparations, ritually-produced organic soils and solutions that are understood to enliven nature through exposure to cosmic forces. Preparations are considered to be medicines for the more-than-human world, concoctions that concentrate and increase in efficacy as they transform, even transubstantiate, through natural cycles.

The theory of alchemy that informs these practices is an internal element of biodynamic praxis and its specific alter-scientific way of working with and knowing nature. Offering interpretative perspective on the workshops, this chapter analyzes prep making practice alongside a series of prominent biodynamic training guides. I argue that training in biodynamic

practices and paradigms ultimately offer lessons in learning to be affected (Despret 2004, Latour 2004), an education that at once transforms those learning to labor as well as more-than-human worlds through the cultivation of "receptivity." Entangling meaning and lively matter (Barad 2007, Bennett 2010, Keller and Rubenstein 2017), this knowledge and way of knowing works to engender orientations to living and dying otherwise on an ecologically damaged planet (Tsing et al. 2017). Turning the activist slogan for social transformation, they make an other world possible. About biodynamics but not only, these lessons underline how skilling institutions work to instill technical capacity as well as culture. Ultimately they transform farms and farmers, cultivating life and livelihoods seeded through ways of knowing and ways of being entangled with the more-than-human collaborators that (de)compose our shared world.

Chapter 2

"Down on the Farm": Aspiring Agrarians, Burnout, and Exhausted Labor

My first morning at Shared Spades farm, the other apprentices and I sat at a picnic table prepared to go over the task plan for the day. Eagerly awaiting the chance to get my hands dirty and learn about the farm and farmers, I was already spry, well caffeinated, and attentive despite the 5:30 wake up call. My fellow farmers, not so much. Rick sat staring blankly at his morning coffee, clearly yet to kick in. Samantha gazed off in the distance, across the fields of kale and squash, still glistening in its heavy layer of morning dew. The other two apprentices likewise had shuffled in, there in body but barely in mind. Their soiled Carhart overalls, work boots, and baseball caps had been hastily adorned. They concealed—as I came to learn—an embodied exhaustion reaching its peak, and it wasn't yet mid-summer.

The farm owner/manager, Chris, having surveyed the fields and market orders, sat down with his scratched out to do list. 40 bunches of carrots, 32 bunches of chard, all the spinach and salad mix, 36 bunches of kale, the list went on and on. As he prepared to read off the tasks for the day, I readied my pen and notebook, attempting to keep up, indeed to catch up, with a field crew that had been working since the still frigid early spring. The others did not. And Chris did not begin as I'd expected. "It's that time of the year when the seeds we set early in the season are starting to fruit. All the beautiful vegetables yes, but also the tractor repairs, the weeds, the other challenges. Things come up. The seeds we planted and those we didn't. It's a difficult time of the year." He continued, "The weeds have taken over. We're going to try to save the beet crop this afternoon, if we have time, but it may not make it. It can be stressful, the days are long and its

hot, I know, but we have to do our best to keep our heads up. That's farming." It wasn't clear if Chris was talking to the apprentices or to himself. And the weeds were of more than the botanical kind. The farm was *dans le merde* or—as restaurant line cooks translate, struggling to keep up with the number of orders at the height of the dinner rush—in the weeds. It is an apt agricultural metaphor for the feeling of overwhelm, exhaustion, and frantic pace so characteristic of life down on the farm.

I spent the next several months working intensively at Shared Spades and, to a lesser degree, at many other farms around the Hudson Valley. My task was to discover what it was like to actually be a neophyte farmer, a goal that required more than an occasional volunteer session, or lunch time conversation, or stroll through a market stall. Such surveys can certainly tell us something important about the state of organic agriculture. But they often veil as much as they reveal. They fail to ask a set of more difficult questions best answered through first-person embodied experience. What is it actually like to perform difficult manual labor, day in and day out for months on end? How does a novice farmer actually acquire skills and speed through farming practice? What are the everyday ways in which sustainable farming is obstructed by the myriad obstacles it faces? And ultimately, what do we need to know about the challenges of daily farm life and labor, if the task is to work towards a more sustainable future for farms and famers?

This chapter sets the scene for those that follow by offering ethnographically-rich insights into everyday farm life and the myriad challenges experienced by aspiring agrarians. I underline how diverse desires—for social change, economic viability, and environmental conservation—are in constant tension with the significant struggles of working collaboratively with humans and nature (from weather to weeds) as well as within an agro-industrial economy that militates

against them. This chapter draws on extensive participant-observation conducted in and on agricultural apprenticeship programs, offering insights into the internal dynamics of these skilling institutions. While recent research reveals the inadequacies of apprentice training programs, the barriers of entry to small-scale agriculture, and the complex reasons beginning farmers fail (MacAuley and Niewolny 2016; Rissing 2019), this chapter foregrounds how exhaustion and dejection interfere with farmer training and farm success. Romantic depictions offered in popular books and magazines of back-to-the-landers working in harmony with nature—leisurely tending to plants and pastures—obscure the reality that many neophyte farmers are one breakdown (of machinery, of relations, of composure) away from burnout.

I develop the concept of *exhausted labor* to index both the burden of fatigue (in particular at the height of the brutally-hot harvest season) and the way interns/apprentices are often literally run into the ground—used and used up—only to be replaced. Passionate about the work and emotionally-invested in both the farm and farmer, these frictions lead to considerable self-exploitation and, underpaid and overworked, eventually to conflict. Indeed, "mutiny" is not uncommon—as one farm-owner dubbed it, and I first-hand experienced—with full labor crews dropping spades and collectively calling it quits. Given that a "we're all in the same boat" mentality is essential to farm organization, the term is particularly apt. Much has been written about the development of technology to replace the drudgery of agricultural labor, even to replace the labor itself. But with "skill replacing scale" (Netting 1993) skilled labor is critical in smallholder settings. I suggest that the embodied experience of fatigue due to the everyday and extra-ordinary demands of drudgerous agricultural work has profound implications on the reproduction of skill and of labor. "Down on the farm" thus captures both the everyday activities

and aspirations of agrarian life in alternative agriculture as well as the affective experience of feeling down—tired, hopeless, ready to give up.

The drudgeries of agricultural life are well documented in the social scientific literature. Indeed it is often cited as the impetus of early and ongoing technological transformations as well as continuing rural outmigration. It is, not incidentally, characteristic of not only smallholder agriculture but its modernized, highly-capitalized forms as well, albeit in different ways. But as Chayanov famously emphasized, peasant-style farming is characterized by considerable self-exploitation which makes the sector sufficiently viable amid capitalist economic transformation and expansion (Chayanov 1986, van der Ploeg 2003). Shanin (1986, 6), elaborating Chayanov, suggests that peasant self-exploitation refers to "the excruciating labour by underfed peasant families damaging their physical and mental selves for a return which is below that of ordinary wages." While there are certain and clear differences between the peasant families that were and are the object of such analysis and the aspiring agrarians in the (over)developed West—in terms of class, identity, privilege, opportunity, education, etc.—I suggest that their experiences share surprising similarities (see also Ekers et al. 2016 and Galt 2013). Whether a) a farm owner struggling to get by and willing to mortgage current and future wellbeing (body and mind) to maximize minimal gains or b) an apprentice willing to invest time, mental energy, and physical labor into an enterprise for the promise of knowledge acquisition, stipend wages, outdoor experience, or investment in the mission of the farm and farm owner, both experience extensive labor demands for meager returns. Exhausted labor then refers to those weary from the investment of energy and identity into a vocation that taxes and tires in nuanced ways. And to how those same folks with bad experiences might leave what they consider good work—where economics and ethics align— ultimately behind.

In what follows I first set the scene for an analysis of the experience of agricultural life and labor on small-scale sustainable farms by introducing the Hudson Valley as flourishing space for beginning farmers and proliferation of regional alternative agriculture. At the same time, I also point to the ways in which area organizations, as well as much of the dominant narrative found in memoirs and other media, present discourses of life on the land that emphasize a romantic, even bourgeois experience, somewhere between Thoreau idly hoeing beans as he communes with nature and the gentleman farmer leisurely going about agricultural recreation. The following two sections disabuse such notions by first highlighting the actual reality of life down on the farm and then reflecting on aspiring agrarians interpretation of these experiences, for better but mostly for worse. The conclusion pulls back the lens to emphasize what such conditions mean for the project of advancing alternative agriculture; limiting the production of high-quality environmentally friendly food and restricting the (re)production of skilled labor.

2.1 Back to the Land

The Hudson Valley of New York has long been the hinterland of the country's great metropolis: if New York City is colloquially known as the Big Apple, it is this fertile landscape between the Catskill and Berkshire mountains where those apples derive. Or at least they did. Henry Hudson traversed the river valley in the 17th century arguing it to be "the finest land for cultivation I have ever set foot upon." Dutch and English settlers built the extensive agrarian economy of the region over the next two centuries but economic and technological transformations—namely industrialization and railroad expansion—as with so many other places, shifted the locus of agricultural production and left the region reeling (Adams 1996). Despite, or perhaps because of, the decline in the rural farm economy, in the last 15 years the

Hudson Valley has seen a resurgence of young farmers, many of whom are going "back to the land" for the very first time. As one farmer put it, "there's a pipeline of millennials from their colleges to Brooklyn, and when they burn out of Brooklyn, the next stop is often here, upstate."

The valley is saturated with some of the most important, and well-known institutions in the U.S. sustainable farming movement. The Stone Barns Center for Food and Agriculture sits just 30 miles north of Manhattan, a spectacular Rockefeller funded farm that hosts visitors, holds conferences, and supplies city green markets. Further north is the Glynwood Center for Regional Food and Farming, then the Hudson Valley Farm Hub, then Churchtown Dairy, and on to Albany where the conference for the Northeast Organic Farmers Association is regularly held. Between Tarrytown and state capital there are some 5,000 farms, not to mention the Culinary Institute of America, offering the country's most prestigious training in fine dining, a bastion for the local food movement. Hudson, NY is the headquarters of the National Young Farmers Coalition. It is likewise the home of Modern Farmer magazine, a glossy, highly-stylized periodical that pitches the pros of organic agriculture and the appeals of farm life to mainly urban dwellers. Until 2018, when it went fully online, it could be found at the checkout line nationally at the high-end grocer Whole Foods.

Modern Farmer magazine is actually a useful entrée into key characteristics of the sustainable farming movement, underlining tensions between romantic expectations, bourgeois aspirations, and gritty reality. Articles on the dangers of GMO agriculture, the rise of floating farms, and the challenges of the modern dairy farm are peppered amongst advertisements for dodge ram trucks, high-end whisky, and soymilk. Cornell's College of Agriculture has a promotion with the (less than) witty tagline "We're outstanding in our fields." Adverts for expensive farm stays with plush accommodations abut a pitch for made-in-America backpacks

comprised of sturdy waxed cotton twill. The "Farm Goods" section features must have items for every modern farmer, complete with $300 raincoats, $250 work boots that "you can wear to dinner," a $160 V-neck sweater adorned with a pin exclaiming "Kale is Kool," and a $75 winter cap. Following a section on "Gentlemen Farmers: They're Just Like Us," is a blurb on Urban Goes Rural. It reads, "To help would-be country mice find the right home, here is a brief guide to the proper rural equivalent to your city of choice. Our highly subjective criteria included proximity to urban areas and concentration of good cocktails." Perhaps unsurprisingly, Hudson NY tops the list.

Hudson is also where the popular young farmer organization The Greenhorns was founded. No organization, perhaps, has done more to bring a culture of celebration, commitment, and community to this emerging back-to-the-land movement. If kale is cool, it's the work of The Greenhorns that helps make it so, less to eat and more to its craft-scale production. Their cultural work—in the form of podcasts, film, manifestos, almanacs, and event organizing—amplifies the romance of alternative agriculture. Their 2010 documentary is a terrific case in point. Arriving in a paper case with a hand-stamped logo reading "Young Farmers, take back American Agriculture" in stylized lettering, the documentary features interviews with beginning farmers intermixed with historical reflections on a hundred years of agrarian transformation in the United States, and its many deleterious effects for land, food, farmers, politics, and the nation itself. As the film's producer, and the founder of the organization, notes in the trailer, "We're making a film about young farmers, their struggle and their valor, the redemptive force they have for our society, for our culture, for our agriculture, for our countryside, for our nation." Farming is farming, the production of high-quality organic food, but not only. It is also a "redemptive force" to reclaim landscapes in the service of alternative American and agrarian futures. The filmmaker

further reflects, “Everywhere we went I met amazing young farmers, earnest young people working like dogs and eating like kings, making it happen, improvising, building communities, building the food system back up…[they are] protagonists of the American agricultural revival.”

The challenges of small-scale sustainable agriculture are highlighted throughout, mainly in an attempt to promote policy changes related to the farm bill in favor of alternative agriculture. As the film concludes, “We need farmers to mentor us, we need extension on our side, we need land grant education on our side. We need credit on our side. We want to serve our country food, we’re here, we’re ready. We’re committed to this with our whole lives and our whole money. President Obama always talks about programs that are shovel ready, we are shovel sharpened.” But it’s not the struggles of agrarian livelihood that are the dominant ethos, rather it’s the framing of farming through romantic shades. One farmer emphasizes the moral righteousness of the cause, and what gave him the courage to get his hands dirty, “That’s sort of what gave me the balls to do it, I started doing it and its started rolling and I was like I could actually do something that I was morally down with and still pay the mortgage, that hadn’t happened to me in a sort of obvious way in the past, where it was so clear that there was absolutely nothing wrong with it and everything was right.” In curious juxtaposition the following featured farmers reveal the quixotic optimism of the pursuit and likewise the extraordinary naivete. They reflect, “When we showed up we had absolutely no idea what we were doing and we took every book out of the public library that we could find on growing plants and vegetables and farming. Neither of us had really set foot on a working farm. Maybe once before that, so we were pretty green.” The conflict between a cockeyed commitment to an ethical cause and an utter lack of preparation for the realities of the practice itself discloses a key tension in alternative agriculture, one that the cultural efforts of initiatives such as The

Greenhorns—intentionally or not and for better as for worse—mainly work to conceal. The trailer concludes with the filmmaker looking down upon a verdant valley and exclaiming the following, prior to a shot of her frolicking joyously through the fields: “I mean gosh what a gorgeous place, 70000 acres of wilderness, and then 4 acres of tomatoes. What’s not to love.” As we will see in sections that follow, it turns out a great deal.

Returning briefly to Modern Farmer magazine, one featured story well captures the way in which the realities of farm life are obscured by romantic imaginaries of laboring on the land. Amid the glossy adverts for overpriced and excessively stylized consumer products, this article promises “real talk” to offer a behind the scenes look at what farming is really like, for those considering the path and the profession. Entitled, “So you want to be a farmer…Ever dream of a chucking it all for the simple life, read this first” (Hirsch 2014), the article first offers the predominant (mis)conception “Farming dreams are a modern seduction. For city dwellers, the vision of making a living from the earth salves the psychic wounds of the day job, and acts as an antidote to urban malaise. If you could just get out there on the land, far from spreadsheets and stress, cubicles and car alarms, things would surely be different. Eating overripe tomatoes, fresh from the vine and bursting with juice. Cavorting with the goats.” But as the story continues, “there’s a big difference between oogling barn listings online and standing knee-deep in pig manure.” So far so good, the introduction sets the scene for warding away would-be farmers with a taste of harsh realities, a reality which, as we will see, actually does bring with it a surprising amount of spreadsheets and stress. And yet, after sections highlighting some challenges to “learning the ropes, finding your own farm, experimentation, and scaling up” the story concludes with the common refrain— its noble, fulfilling work, and it’s worth it. After a week volunteering on a farm the author reflects, “I often wanted to throw in the towel, when farm work seemed like

sheer drudgery, tedious tasks stretching out to infinity. I shocked myself multiple times on electric fencing. My sunburnt skin took the shade of country ham. Everything hurt. I spent one long day on my knees in the mud, mounding up long rows of soil. That night I lay awake on a foam mattress, miles of dirt streaming behind my eyelids. Another day, I had to muck out the deep crust of piss and shit from a sweltering pig barn. Sheer force of will kept my breakfast down." But the conclusion just a quickly turns the tale, from struggle to satisfying vocation. "And yet—I feel great. There were moments of transcendence: watching piglets frolic in the pasture for the first time, or quietly weeding while honey-bees buzzed about. But even beyond that, there was something purifying and warm about all the hard work, something that washed away the static my head…once you give it a shot, there's a chance you won't be able to let it go." What for one moonlighting farmer is "purifying and warm" for many others is soiled, in the service of overheating, and indeed ultimately of burning out.

As with so many other accounts of agricultural life, from Wendell Berry's manifestos for old-timey husbandry to Kirstin Kimball's well-read "The Dirty Life: A Memoir of Farming, Food, and Love," even in an article ostensibly about the drudgeries and difficulties of agriculture the conclusion is ultimately the same, farmers farm for the love of farming. Which makes any challenges surmountable. And yet the passion projects described might offer "real talk" but rarely insights into real life. Indeed, the article "so you want to be a farmer" is introduced with an illustration, depicting the life of a farmer as a game of life. With whimsical pictures of pigs and peppers, the winding route offers spaces that move the player forwards and reverse: from finding a deal on a tractor, moving up, to a late frost wiping out plant seedlings, moving back. But playful portrayals to the contrary, farm life is not a game. It involves real people with real aspirations that put their bodies and wellbeing into their often drudgerous, at time degrading,

labor. In the section that follows I offer insights into the daily life of agriculture, experiences derived not from short-term sojourn to pitch an article to a major magazine, nor to emphasize the positives of living on the land to promote young farmers and farming. I return us to Shared Spades farm, introduced at the outset, not because there is something exceptional about it, but because it is in many ways perfectly ordinary. A day in the life at Shared Spades, as with so many alternative farms, is one where the rewards of work are in frequent friction with its drudgery, a mundane form of misery.

2.2 A Day in the Life: Shared Spades Farm

Farm work starts at sunrise or shortly thereafter in the long months of summer. The early morning wake up calls are challenging—at first because they take getting used to, later because they body simply begs for rest—but they are far superior to the alternative, working at the height of the midday sun. Work starts early not just to try to beat the heat, but the summer months are also the busiest of the agricultural season: the produce is at its peak abundance, the weeds are growing with pace, and the markets have high and constant expectations. In late July we gather by 6 am with our coffees in hand to prep for the day. With a farmers market in the late afternoon, tasks left incomplete yesterday, several restaurant orders to fill, and only a few apprentices available to work, there is never enough time in the day to get it all accomplished. Eventually, you learn to live with the always unfinished nature of it all. The jobs undone. The expectations unmet. There is simply no other choice.

After a rundown of the orders and what's in the fields, by 6:30 we're boarding the back of the pickup truck with our knives, rubber bands, and plastic totes. We don't have far to go, just

down the hill some hundred yards, but we need the truck to transport the produce, so the six of us hop into the bed or squat on the railings and try our best not to tumble out. Difficult at first, you get your bearings over time. Through the deer fence, and past the greenhouse that still doesn't have its plastic tarping (and is therefore useless), we disembark. The most perishable, salad greens always come first while it's still cool and the dew persists. First is the Salanova. A hybrid variety produced by Johnny's Selected Seeds, the "newest innovation in salad mix production and a superior hydroponic lettuce," this baby lettuce is designed to offer variety without the need for post-processing mixing and grow sufficiently snug as to ensure that the weed and grass seeds can't come up. In theory. It's bred to allow harvest with a single cut which can save precious time, once you get the knack. The left hand holds the leaves tight while the right hand slips with the knife below, this swift and fluid motion is repeated until several bins are brimming over. This can take awhile but we only have 20 minutes. On hands and knees in firm pathways, and hunched over the greens, speed not only accomplishes the task with efficiency it also allows a reprieve from a most uncomfortable comportment.

The crew proceeds to divide and conquer for the rest of the first round of tasks. Two go off for the head lettuces and arugula, one for the green onions. The rest of us are tasked with kale. Kale is a staple on organic farms and its popularity is perhaps rightly ridiculed. But kale makes sense, a multi season crop that will keep yielding without much maintenance, hearty through weather changes, grows tightly together, and fetches a good price at market. It is also a good example of a farm task where time is of the essence. For neophytes it can take as long as you allow it, gently ripping leaf by leaf and arranging them neatly while still in the field to make for a full and firm and banded bunch. In the cool summer mornings and as the coffee wakes the workers and the world, it can be a rather pleasant task. But this morning, as with most others, we

need 35 bunches and simply don't have the time. We call out how many each of us have harvested in the first ten minutes. 6, 12, and 7. I Still in my first few weeks of training, ashamedly admit three. Chris comes over for less-than gentle reminder. "You can't be so delicate about it. You need to stand directly over the plant, in a stance, looking directly down on it, and put both hands to work. If you're doing it right, it's just three motions: right side strip, left side strip, flip them so they bunch full not flat. Look, its 10 seconds." The movements are deft and somewhat shocking. I improve through time, but never quite master it. Finding full size leaves without damage is easier said than done. The banding and arranging looks easy but isn't. Chris, working at speed, operates at an order of magnitude faster. It is a could-be-pleasant task that ultimately taxes.

With greens in hand, two from the group stay back at the prep house—little more than a tractor shed equipped with large plastic wash basins and converted clothes dryer used to spin dry salad greens— to wash and pack out orders. The rest of us head out to lower field for the next round of harvest. Two are on chard, two on beets, the others tasked with carrots. The carrot harvest is a particularly grueling one. The pitchfork is used to gently dislodge the soil while the carrot tops are pulled and the root vegetable unearthed. Unfortunately for us, the weeds had taken over much of the carrot section and so digging carrots is digging ditches. More still, the weed pressure saps nutrients from the vegetable making them smaller and their leafy tops more brittle. Unearthing enough roots to merely make a bunch takes many heavy press and levers of the shovel, mostly loosening weeds and tiny carrots. Two rows and forty yards later, we painstakingly manage thirty bunches. We then hoist the bins to our hips and hike back up the hill, each with an awkward forty pounds of produce. From there it's on to cucumbers, and tomatoes, and onions, and string beans. Before you know it, the sun is high, the heat intensifying,

the body tiring, and there is nothing left of morning. There may be ideal and idealized pastoral landscapes all around but there's rarely a moment to take them in. Farming is a life of labor rather than leisure.

Between the 5 and 6 hour mark of the day, the crew breaks for lunch—usually a hastily thrown together ensemble of what's excess, aesthetically unsellable, or tending towards rot. It is nevertheless delicious, but nearly anything is in times of famish. The lunch break takes an hour, in the height of summer sometimes two to dodge the heat, and it is a needed reprieve. But stuck at work, and worn out, it offers little more than a chance to cat nap, tidy up, or mindlessly browse the latest seed catalog. It feels like an interregnum and would better skipped altogether if it wasn't just so necessary to rest and rehydrate. There is more to come.

With the harvest handled the afternoon is a time of catching up and looking forward. Tasks can consist of many things but the most common are planting and cultivating. It's time spent on hands and knees and baking in the sun. Little is directly seeded as starting plants in the greenhouse can greatly improve germination rates, with its improved conditions of water and weather. Getting the next round of produce in the ground is thus a job of pinching and pressing from trays to terra firma. Prior to planting a row has usually been stale-bedded, which means the prior crop was tilled in and the ground left to rest, less for compost purposes and more to stimulate the weed seeds. Gone over again with the tiller prior to transplant the effect is to loosen the soil and to give the seedlings a healthy head start with minimal competition. Anyone who has ever kept a backyard garden knows that transplanting can be a pleasant task, a meditative moment spent in the soil with a few starts promising to be bounteous plants. Shift the soil to the side with a finger or trowel, extract the transplant as intact as possible, insert and recover the soil. Repeat. The pains of the task are not of scope but scale. As with most farm tasks, similar to the

kitchen and exemplified by the salad greens and kale, efficiency is speed and skill. Movements should be swift and seamless. Extract and insert with one hand, make space and mound soil with the other. Done right it proceeds at a metronymic rhythm and about as quickly. Again, time is of the essence because there's always more to do. But it's the bending, crawling along, and ultimately the baking that pressures performance. Every second saved is a second standing or sitting out of the sun. In theory anyway, rarely so in practice.

If transplanting is made difficult by the intensity at which it takes place—amplified by the heat, humidity, and desire to complete the always too-many tasks ahead—cultivation is the height of drudgery. Cultivation is the euphemistic term for weeding. Like transplanting, weeding can be an enjoyable experience. Seeing an overgrown field, threatening to or already engulfing the transplants of a few weeks prior, and working to liberate the teenage plantlings is a noble task. Completing it can feel deeply satisfying, a job done and done well. Order from chaos. Cleanliness from disarray. But yet again, on hands and knees and down row after fifty foot rows, the task can seem endless. If the weeding is kept up, a spade can be a useful tool, allowing the precise motions that engender efficiency. Excess movements here cost time but also aches and pains. A 4-pound garden hoe isn't heavy until it strikes firm earth and stubborn roots for the umteenth time and it quickly becomes laborious. But my experience, on several farms, is that the spade is only useful if the farm is already ahead of its own growth, which is exceedingly rare. In such circumstances it is again, a bringing back down to earth. A humbling experience. Crawling on all fours, ripping and tugging and scraping knees. Thorns through gloves. Stubborn roots systems. The insufferable sun. The fact that the job itself is only necessary because the work has already gotten away from the crew, and become all consuming. Literally *dans la merde,* in the weeds. It smothers human and vegetal life.

On most days the work, finally, ends here. A bed transplanted and perhaps a few weeded. But a few days a week is also the farmers market. The moment when the rest of the work actually pays off. In such cases, the crew assigned to market duty breaks off around 2:30 to get the van in order. Bin after bin of beautiful produce is brought out and rapidly arranged, a game of Tetris in three dimensions. From there it's the thirty-minute drive into town in the uncooled van, with windows that barely draw down, and yet despite the sauna it's a brief and very welcome reprieve to simply sit. Arriving at the market, the tent and tables are set up, and the produce yet again hauled and unpacked, and arranged to the specs of aesthetics and abundance that actually effectively attract customers. It takes a concerted mental gymnastic to shift gears from the go-go-go of the manual farm tasks to the labor of welcoming customers, encouraging interest, and dealing with patrons who more often than not exude entitlement. They don't see the days, weeks, months worth of work that went into producing the bountiful table, they see a farmer keeping up a façade, giving them the illusion of the gentle pastoral ideal that so many expect with their purchase. But these are the good days, the ones when all that work pays off because the weather held up, the rains stayed away and there was nice breeze, and customers actually showed up; there is little worse than all that work to make few sales and bring home all that produce just to see it wither in the walk in cooler. Packing up at seven and making the drive back to the farm, hopefully arriving with the last vestiges of summer daylight left, you might get home by 8:30 if you hustle. The body needs water but all it wants is a beer. At this point, after maybe managing a shower, mindlessly scrolling Instagram is about all that one is good for, for a short hour, prior to passing out. For in July the night is short and the days are long, and tomorrow brings a new dawn, but alas, little more than more of the same.

2.3 The True Cost

> "The cost of a thing is the amount of what I call life which is required to be exchanged for it, immediately or in the long run." Henry David Thoreau (1992, 21)

In the summer in the Hudson Valley one of the area dairy farms and cheese makers hosts a monthly burger night. With terrific grass-fed beef, scenic vistas, and the opportunity to mingle with the herd as well as like-minded locavores it is a popular place to gather. Such events are great marketing for the farm as well, an excuse to get people on site, open the farm stand, and sell a value-added product along with an experience "down on the farm." Beneath the farm store sign is another, more recent addition, a dangling plaque exclaiming "black lives matter." The food is served from the window of a converted horse trailer with a makeshift charcoal grill out back. Unseemly as it is to be eating Bessie forty feet from her grazing kin, the occasion offers a chance to "know where your food comes from" for local residents, and for farmers and those farm-adjacent, a chance to catch up, sit back, and soak in a scene that many are all-too familiar with but rarely have the time to legitimately enjoy.

I joined a small group of fellow farmers on one of their rare afternoons off following the Saturday market. After waiting out the lines for burgers and salad greens we settled on a picnic blanket on the hillside and chatted about life and labors. There were perhaps 6-7 of us in total, one young woman who worked for an area farming advocacy organization, another who ran a local non-profit food pantry, and a couple members of a farm field crew. Beth, who co-owns a 3-acre farm known as Organic Futures Farm, was having a conversation about dealing with the aftermath of Lyme disease. The Hudson Valley is not far from Lyme CT, ground zero, and is a hotspot for the malady. Farmers are especially susceptible due to the significant amount of time they spend outside, and thereby face increased exposure. Beth and the others discussed how

many people they know who have had the disease and the several others who think they've had it. Notoriously difficult to diagnose, the symptoms are flu-like, and range from acute fatigue, to joint pain, to severe headaches and a general unshakeable malaise. Beth turned and quipped, catching me up to speed, that the joke around here among her peers is, when folks are feeling blue, they ask "is it Lyme disease or just farming, Lyme disease or is it farming?" With nods of approval all around, it turns out the side-effects are effectively the same.

The weight of this "joke" is less about the serious public health concern that frequently afflicts farmers in the region—the reality of Lyme disease is no laughing matter—but that the everyday experience of life as an agrarian so closely resembles a diseased state that the two are nearly indistinguishable. It took time in the field and first-hand experience of my own to truly understand the embodiment of this condition. After seemingly unending string of early mornings and long days, in took only a few months of farm labor for the practice to take its heavy toll. By the end of a day's work you are mentally and physically drained. I recall the challenge of even composing daily field notes, a seemingly straightforward task, but one that feels herculean after the (Augean) stalls are mucked, and not on a single day but for days on end. To transition from manual to mental labors was rarely smooth. To accomplish anything besides the maintenance of bare life felt gargantuan. The end of days in agricultural fields brings new meaning to the desire to veg out.

But my experience of agriculture as toilsome, grueling, and exhausting was far from my own. Indeed, I suggest that it is more the rule than the exception. By August in farm country morale has reached a new low, and it only takes a little prodding for folks to talk about it. Beth, who had revealed the tragic irony of a life of Lyme and labor, describes how in the summer there would be a real demand for a farmer meal prep service, a food truck that would go from farm to

farm and ensure the farmers are well fed. She shook her head as she suggested that, after a difficult day's work, "you're surrounded by beautiful organic food but you barely have the energy to eat it." She continues, "I'm ashamed to tell you the number of times I've ordered Chinese takeout or made frozen pizza. Sometimes all I can manage is to munch on carrots."

If for Beth the experience of embodied exhaustion is well captured in the sad reality that farmers can't manage the time or energy to eat well, for Claire the ennui is even more straightforward. Claire was an apprentice at an area farm and was, when I first met her early in the season and much of the time, filled with enthusiasm. She was thrilled to learn about agriculture and always asking questions to the lead farmer. She enjoyed pushing herself to see how fast she could harvest the necessary turnips or how quickly she could weed the carrot bed. When not on the farm she read voraciously all about agriculture and ecology. She was eager to understand and improve on every aspect of farm life, the epitome of an aspiring agrarian. But by August in her second year, no longer an apprentice and now a production manager, she clearly bore the heavy weight of her endless labors. She reflects,

> It's just that time of the season. There's always going to be more work to do, and not enough time in the day and too many weeds and too much to harvest and not enough people. You're just never going to be able to get it all done. It's awful. And that's at every farm. But that said, it's particularly bad here right now. I'm having a hard time keeping up with it. We're just exhausted all the time. And it's one thing if it's a community feeling, like we're all in this together. But it feels like there's just no support. And that's the most draining. I'm definitely at a burn out point.

For Claire, the ceaseless catching up with undone tasks and the lack of support both in the fields and psychologically, had led her to a place of mental and physical exhaustion. In August the tank is on empty and there's always more to do.

An important part of the problem is the length of days and work weeks. Farm tasks don't go neatly by the 9-5 office clock and (unpaid) overtime is often built into the nature of the labor. Here's how Claire describes the hours:

> We get some Saturday's off. We were working half days on Saturday with one full day off a month. But that wasn't really working out. We were working way past half days, you know, because stuff needs done. So it ended up being a full day anyway. Even if it wasn't, just being on the farm and putting in 6 hours is exhausting and eats the whole day. So we decided to do two full Saturdays and two off. That's been a lot better even if it's technically less time away. [My fellow manager] was saying the other day how she doesn't like it, and she doesn't like it because how much she enjoys it. It's dangerous being away that long. Two full days off in a row. Hard to get back at it Monday morning.

Claire provides insight into not only the extent of the work schedule, but the way that even half days on the farm feel all consuming. Moreover, in an effort to organize necessary days off, for rest and recuperation and ultimately more productive labor, she and her colleague found that that taste of time off was an alluring siren song. It made it all the more difficult getting back to the drudgerous grind on Monday. You lose track of the ever-evolving farm tasks and, with weekend leisure, learn what you've been missing.

More than mere burn out, the challenges of agricultural life and labor impede the skilling process, with productivity more often than not taking priority over the learning. As Claire reflects, "They said it was an education farm. That education comes first. But it's not. It's a production farm. And education is a very distant second. It's all about speed and efficiency these days. There's no time to learn or teach about anything." She continues,

> I just wish I had some more book learning. I mean, I wanted to farm hands on and there's lot you can take away from that. I've learned a ton about weeds, how to name them, prevent them, deal with them. But that took a couple years. And then someone hands me a book on weeds and ecology and all of that is right there in chapter 1. I could have learned it in 2 days not two years. So I just feel like now I need some of the book learning to balance out the hands on stuff. I'm looking into agroecology programs.

The way in which the reality of agricultural labor and the impulse to maximize speed and production limits the capacity to actually acquire agricultural knowledge, even in an apprenticeship program ostensibly designed with education in mind, is a topic I explore in greater depth in Chapter 3. What is important to emphasize here however is that, for the farmers such as Claire, the frustration of farm life is amplified by the fact that the promised educational component of daily activity is overshadowed by the work itself. And while knowledge does of course accrue through experience, some things can be better and more quickly learned through the acquired wisdom distilled in textual form. Claire had to learn the hard way. And her wellbeing and willingness to continue farming are the casualty of such conditions.

By the time Claire and I discussed her experience of a second agricultural season, she had reached a near breaking point. She sighs on the verge of tears, "I just can't do another season here. I'd leave tomorrow if I could. But there's just no way I would quit mid-season, leave everyone hanging." Claire's commitment to tolerate the exhaustion and exasperation of everyday agriculture is held barely together by the fact that she is part of a team, and she recognizes that everyone else is likewise sharing her experience. The farm managers and owners often even more so. More still, if she would leave, their jobs would only get that much harder; it's a significant challenge to replace a field crew midseason. And therein lies the rub. For aspiring agrarians such as Claire, a good deal of self-exploitation is tolerated, often for far too long, because farmers understand themselves as part of a team effort. They put up with challenging work conditions, excessively long hours, and exceedingly little pay because of the collaborative, shared, indeed social nature of the work. What's more, they see their efforts as mission driven, even moral, and oriented towards the larger task of producing food supportive of the health of humans and landscapes. Together, the ethically-driven rationale and co-laborative nature of the

work put many farmers in a position to withstand intolerable conditions that would be untolerated in most other work environments. Aspiring agrarians push themselves beyond the brink and in doing so, grow to despise the work of growing vegetables.

Claire completed the season despite the difficult conditions. But that is not always the case. Back at Shared Spades, where I spent many months apprenticing, I experienced firsthand how everyday exhaustion can lead to not only burn out, but break down. The day that Chris spoke of the weediness of the summer farm landscape, referred to in the introduction, the farm crew consisted of Chris and five full-season apprentices. Less than a month later three were gone. The reasons for leaving are many. One left because they got into graduate school, and wanted a break prior to starting. Another emphasized that she wasn't learning nearly as much as she expected and spent far too much time watering and preparing seed trays in the scorching greenhouse. For another it was social dynamics, a frustration with how the farm was (mis)managed, and a deeply held sense that the social justice mission of the farm was not being adequately attended to. Whatever the stated reason for departure, whether its interpersonal conflict or the finding of greener pastures elsewhere, watching things unravel in real time it became clear to me that the core of the issue was an emotional and physical burnout. What might have been manageable at the beginning of the season, simply was no longer. The weeds had gone to seed, gotten away from the farmers, and recovery was no longer an option. This was the second year in a row Chris had lost his field crew. The year prior, in an act of the orchestrated refusal, the apprentices simply walked off the farm mid-harvest. On both sides it feels like an act of betrayal.

Farm management is clearly a critical part of the issue. At Shared Spades the apprentices, still hanging on, once described the farm as "a circus with a farm attached to it." The green house

was the big top tent. And it's certainly true that the farm could have been better managed with more-functional systems in place. Little aggravates an apprentice more than having to do something again, or doing something but not seeing the fruits of the labor, because of a lack of organizational foresight. But the challenge is that, in Chris's case and a reality that bears out consistently elsewhere, the manager or owner is already giving it their all, and then some. Chris had not had a weekend off in more than two years. In the aftermath of the fall out Chris reflected in exasperation, "At the end of the day it's my farm and my responsibility. I'm underperforming across the board right now, organizationally and administratively. Especially big tasks. The social mission. Just sweeping the garage. Stuff constantly comes up. It's impossible to get ahead of it all." In an email to the staff he put it this way,

> I hope you know that I am doing my best against many odds to try and keep all of the parts of the business afloat. Adequate tools, working on vehicles, equipment, irrigation, keeping up on supplies, keeping up on all of the tractor work, sending out all of the sales lists and talking with chefs, delivering, invoicing, banking and accounting, landowner relationships, our social mission and on top of all of that my priority is to you guys as a farmer you came here to learn from. This cannot all be done by one person, but I am trying to hold all of those roles together until I one day I have the funds to share that responsibility in a fair way.

For everyone involved the issues feel personal but the problem is clearly structural. At the heart of the matter is too much to do and too few resources or too limited organizational knowledge to successfully accomplish it. The result is frustrated farmers—from top to bottom—struggling farm businesses, and apprenticeship programs that at times, hardly deserve the name.

Beth's experience is likewise a telling one and it reveals a great deal about how the myriad aspirations of farmers to achieve social and ecological justice gets buried in the backbreaking labor and the burnout. Of all the people I worked with Beth was a master systems thinker. She brings to every agricultural effort a great deal of thought and intentionality. Unlike

Chris, she had the organization down to science, and was in many respects quite successful getting high-quality vegetables out of the ground and maximizing potential profit. More still, her farming was always in the service of imagining alternative economies and she wrote and taught about cooperative farming models, the implementation of alternative currencies, and the need for shared and socialized resources from money to machines. But Beth was frustrated by the way in which the realities of actual agriculture get in the way of all the broader aspirations she hoped to achieve in and through her farm. She reflects,

> Food systems and policy people have no idea of the lived experience of a farmer, and all the various things they're up against. They don't work in the fields, go to the markets, fix the tractors when they break down. Farmers aren't dumb, neither alternative nor conventional, but they're caught up in constraints. And they act accordingly.
>
> I always think I'll have the chance to extricate myself from the farm for other projects, that this year we'll have the systems set up where it will work out. But something always comes up, something goes wrong, something breaks down. This May it was the cooler. I was supposed to get my first day off in three weeks and was going to see a friend coming to town. But I had to sit in the barn til eleven at night and flip the circuit every three minutes to keep a whole harvest from going bad.
>
> The hard part about it is that it's such a passion project. We want to get out but we just can't imagine ourselves doing anything else as important. What am I going to do, go direct some social media campaign for a corporation. What's important about that. We just don't know what else we would do as meaningful. So 6 years in, here I am, grinding away. Because I know what I'm doing, hard as it is, is making a difference.

Beth's experience captures the tensions inherent in alternative agriculture. Despite her grand aspirations for precisely the sort of systems change that is not only reflective of her ethical aspirations towards mutualism but also of the practical collaborations that might mitigate many farmers most intractable problems, the farming itself becomes an obstacle. Whether because of a lack of time or energy, or because an employee doesn't show up or a machine (the cooler) breaks down, Beth struggles to carve space for the broader ambitions that otherwise buttress her everyday labors in the field. When I asked her if she found more time in the winter, when

presumably the agricultural season is the slowest, to teach, write, and organize she shook her head with a wry laugh, riddled with frustration. “Everybody thinks we just sit around in winter,” she says, “but you know what winter is for? Doing all the same administrative tasks that we do the rest of the year we’re just not forced to do it before dawn or after dusk. Our jobs just finally become 9-5 like everyone else’s the rest of the year. I can’t stand when people think that.” The supposition that winter offers a life of leisure only amplifies Beth’s frustration. From Beth, to Chris, to Claire, to the Shared Spades apprentices, the exhaustion inherent in the work limits energies for extracurricular endeavors, from classroom education to cooperative organizing. Worse still, when it comes to the general public and their romantic imaginary of farm life, all that effort goes unnoticed.

2.4 Conclusion

Towards the end of my fieldwork in the Hudson Valley I attended a small gathering of fellow farmers. Bill had arrived early and was settling into the couch with a beer and a book. Bill had dropped out of college after a few years (and was at that time considering reenrolling) and worked full time as a dairy herd manager at a nearby organic farm. His days were long and laborious, up by 4:30 to move the herd of many dozen bovine and conduct the first milking, then parlor clean up followed by hay feedings and sometimes, depending on who else happened to be working (or not), another round of milking and clean up in the late afternoon. The cows were better treated than any dairy farm I had been on then or since. They fed on pasture to the greatest extent afforded by the seasons. Calves were allowed to stay with their mothers and their milk, a practice nearly nonexistent in modern dairying and its ideological commitments to maximizing production. Likewise the cows are “allowed” to keep their horns, another rarity in an industry

that tends towards taming, closely managing animals, and the prevention of injury in all-too close quarters. The humane treatment of the herd however did not make it any easier on the herd manager. All the various corner cutting and simplification that occurs on industrial dairies saves (in theory) money, time, and labor. Work, more than anything else, makes up the gap between "traditional" and technological agriculture. And routines of work are made manifest on bodies. As often as not, it is a habitus engendered through harm.

The book that Bill had brought with him to read while the others arrived surprised me, not exactly light reading after a long day's work. In other ways it was not surprising at all. Seth Holmes' *Fresh Fruit Broken Bodies* offers insights into the experience of migrant laborers in the California fruit industry. It relays, with gut-wrenching detail, how immigrant farmers exist at the sharp end of structural violence, their work producing extraordinary pain alongside produce. Holmes shows "how the poor suffer," through aches, and injuries, and illness, a result of a system of exploitative labor in which profits are extracted from damaged landscapes and distressed bodies. When I asked Bill about the book he simply said, "its terrible how much they suffer. There's so much wrong with industrial agriculture."

But whether Bill recognized it or not, I couldn't help but think he felt some sympathy through shared experience. His was of course, nothing in comparison, his own struggles mitigated by privilege and power and an absence of the systemic inequality the puts migrant bodies in positions of use and abject abuse (see also Benson 2008, Guthman 2019, Mares 2019). As Guthman (2017) has argued, the use of volunteer labor on organic farmers puts willing (white) workers in positions of precarity—work that is "extremely demanding, painful, and has been historically demeaning" (15)—temporarily but not structurally. She dubs them the privileged precariat. And yet, it should nevertheless be emphasized that despite the ostensible

opportunity to exit, many aspiring agrarians put themselves in a position to experience considerable self-exploitation that leaves them frustrated, exhausted, and physically and emotionally burned out. As one farmer told me, regarding his use of volunteers, "I try not to give them any of the difficult work to do. If they saw what the reality of this life is like, they wouldn't come back. And they may lose their support for the organic movement altogether." So while the volunteers pick cherry tomatoes at whatever pace they please, he saves the dirty work from himself and the other tired bodies in the trenches. The volunteers may well be sheltered to encourage ongoing investment in the farm and the sustainable farm movement, lest they make an exit. But for many farmers that exit isn't such a ready option—apprentices have often dedicated lives and livelihoods to it, owner operators have staked their identity as well as their financial future.

The fact is that the exhaustive labors of alternative agriculture too often go unnoticed. The sustainability of sustainable agriculture is undermined by a complex of constraints that render agriculture livelihoods difficult to maintain. The "good life" imagery offered in magazines and memoirs and sold to city folks at market stalls and commodified in high-end apparel obscures the reality that most farms and farmers are struggling—physically, emotionally, and financially—to get by. As Beth tells me, "I don't need fancy leather boots and distressed denim, I need something that is waterproof with steel toes, and cargo overalls with knee pads in them." Despite dominant depictions, ethnographic research reveals what I call "exhausted labor." Many neophytes striving to learn the trade get burned out in the tiresome and demanding apprenticeship process: used, used up, and ultimately forced out. But for those that stay, and there are many, the experience is often an underlying and yet overwhelming exhaustion of body and spirit. This reality complicates even scholarly perspectives that are perhaps too sanguine

about processes of repeasantization. Van der Ploeg (2013), for instance, suggests that "those building new, multifunctional farms grounded on a relatively autonomous resource base, are coming to redefine drudgery. Such farmers mention working outside, highly diversified tasks, independence and working with living nature as being among the more attractive aspects of this work. They experience far less drudgery…" (130-131). Agrarians may well "mention" such benefits, and indeed mean them, but immersive experience amongst such farm communities suggests that there is a weariness that lies just below the surface. If farmers get into craft food production, as with other forms of artisan labor, aspiring to achieve the cultivation and integration of muscles, morals, and mind (Marchand 2008) the constraints of agriculture frequently engender the opposite. Diverse forms of degradation and embodied ennui.

I spent a long afternoon with a well-known farmer in the Hudson Valley, a woman prominent for helping to cultivate the young farmer movement in the region. In collaboration with a handful of others, in the heady days of the early 2010's Daphne brought artistic sensibilities and refined aesthetic to agriculture, pushing the envelope of what a farmer is or is expected to be. As another farmer had told me, "Daphne is just so cool. She's making farming cool again. I would love to meet her." My time with Daphne was eye opening. We worked for a while in the cobbled together pack-house, a collection of repurposed appliances in an open air barn, and afterwards toured the small farm. She showed me the pigeons she had recently brought down to Brooklyn for a performance art show, each with a glow in the dark LED foot tag, in a nighttime spectacle that lit up the sky and was meant to celebrate the lost art, and age old more-than-human companionship between humans and birds. Daphne laughed off the pigeons, "yeah, that was a fun project," and was more interested in telling me about her struggles this season. And not this season alone. Some phrases stand out: "I'm so tired of being nomadic…I just need

to grow up, make a mature investment of my money and time. This is the least lucrative job I've ever had, even as an artist…it rained all spring and we got off to a really slow start…we're not as young as we used to be, I don't want to keep starting over." And perhaps most telling of all, "I feel bad, this probably isn't exactly the utopia you were looking for." She was talking to me of course, but might as well have been speaking to a younger, more quixotic version of herself.

Clearly, alternative agriculture isn't exactly cultivating utopia (see Hetherington 2005). That matters not just to simply set it straight that sustainable farming is less idealistic recreation in nature than it is dogged drudgery with limited prospects of success. Indeed, beyond that reality of the experience itself, the point it to emphasize that exhausted labor limits the possibilities of agrarian transition and likewise the promise of skilling skilled labor. Chris's reflections here are once again poignant,

> People were so stoked at the beginning of the season. I think I'll move to the 12-week model [of apprenticeship] where people are still excited and energized by the learning as well as the work. That thirteenth week is a killer. Really hard to keep a crew after that. Better to have greater turnover but have people be invested who either want to learn, or really want to learn what it's all about to farm. People need choice, to stay inspired. And I want to always be able to give them that. I'm not actually in this to be a farmer. I'm interested in the stuff you are.

Chris is here coming to terms and attempting to reconcile the difficulties of the apprenticeship program. He at once wishes to maintain an active and engaged farm crew to get the necessary work done, and done well, while also living up to educational promise of the training. The goal of the later is not only to skill farmers for their own future success in the field, so to speak, but also because education and educating others in agriculture, in ecology, in community economics, and in the more-than-human worlds that alternative agriculture engenders, motivates his ongoing efforts as a farm owner. In rethinking the education program, he strives to cultivate the necessary "room to manuever" that would allow legitimate knowledge transfer while also affording the

possibility of a viable business. Nevertheless the diverse constraints of the political economy of agriculture—that put aspiring agrarians in positions of exploitation and exhaustion—limit the prospects, promise, and transformative potential of alternative agriculture. In the meantime, it's mainly burned out agrarians, down on the farm.

Chapter 3

Skilled Environments: Towards a Political Ecology of Agricultural Skilling

"Fundamentally my whole career as a farmer has been learning to let go of control, let go of the rules, the protocols, the schedules and the standard way of doing things." So opens Robert's workshop presentation to a packed conference room of practicing and aspiring farmers hungry for knowledge. At a major regional farming conference, amid a long weekend of seemingly endless workshops and programming on diverse aspects of alternative agriculture—from running a CSA to building raised garden beds to saving heirloom seeds—Robert tells us there's only so much to be gleaned in listening to and learning from others. His presentation on this crisp summer morning, addresses the topic of what he calls "guerilla gardening," an approach to small scale sustainable agriculture that is flexible, innovative, and willing to experiment. His claim is that you don't have to go by the book to farm well and that by breaking the rules, distancing yourself from so-called conventional wisdom—from the information contained on seed packets to the advice in the farming handbooks being sold in the conference lobby—you can often do things cheaper, with less effort, and better suited to specificities of your own operation.

In his 90-minute presentation, Robert gives an overview of his farm and farming history, highlighting things that work well, how he came to adopt certain approaches, and why others—if widely practiced and frequently taught— he has decided ultimately to forego. He describes the rationale behind his philosophy as such:

> breaking the rules, pushing the envelope, and doing with our hands slower simpler and more gracefully than the commercial farms, this became a theme for me. What I realized

> was there is always an easier way, there's always a simpler way, there's always a low-tech way. You only have to find it, it's always there…A guerilla solution is the unsung, the unknown, the mysterious, the way that hasn't been discovered, or looked at. With gardening and farming, this is the essential tool that I discovered. Because what happens is those of us who are impassioned by growing food by-hand, on small acreage, especially those of us pushing the age envelope—I'm in my 60's now just beginning to experience the decrepitude of the body—you can be swallowed, eaten whole, by the minutiae: by the details, the weeds, by the absolute extensiveness of all the things that need to be done. All the plants and seeds and animals and schedules, its endless! Isn't it! It can be endless and all consuming.

In these reflections, Robert reiterates the key theme of Chapter 2 that farming can be endlessly exhausting, even all-consuming. As we've seen, farming takes a significant toll on both minds and bodies, often leaving practitoners—experienced and aspiring agrarians alike—exhausted and limiting their capacity to not only learn to farm, but to practice farming in a way that better cares for people, plant, and planet. But Robert here proposes a strategy, even a solution, to these challenges in the form of commitment to an alternative focus: in short, a concentration on simplifying through patient practice. To farm successfully, he suggests, all you need is DIY ingenuity and an inclination to experiment. There is no one right way to farm.

And yet, for the several hundred farmers spending scarce time and money to attend these seminars, the right way to farm is precisely what they're after. If not the "right way" exactly, certainly they seek a better way, striving to acquire useful information, tactics, tools, and skills directly applicable to their own operations. Techniques and technologies that will, at the very least, improve their ability to farm and farm well. Indeed, Robert's disillusionment with farm instruction and instructors stands out as particularly striking, offered as it is in a context—the agricultural conference—premised on the focused dissemination of agricultural knowledge by so-called experts. Striking too, if not ironic, is that the instructor, while discouraging the audience from going "by the book" or taking lessons that have not been tried and trialed on their

own farm, is here nevertheless lecturing on farming practice. More striking still, that audience, frantic to ask follow-up questions and furiously taking notes, clearly eats it up.

What to make of this tension: on the one hand a desire, even a demand, to experiment with place-based approaches born out of first-hand farming experience and on the other hand a relentless search for pre-packaged solutions that promise an answer to the endless enigmas of agriculture? What is the relationship between the solutions offered in these educational conference presentations and popular training manuals and the aspirations of those that wish to farm in a way that is not only economically sustainable but also environmentally and even ethically sustainable, aligned with their own myriad aspirations for picking up the plow in the first place? How does knowledge move in communities of alternative agriculture, what aspects influence knowledge needs, and what are the effects of the particular forms of knowledge that circulate?

To get at these questions, this chapter traces the way agricultural practice is facilitated or impeded by the political economy of alternative agriculture while also examining subsequent impacts on agricultural skilling and on human/environmental relations. Bringing theories of agricultural performance and skilling into dialogue with literature on apprentice learning and craft practice, I underline how pressures of productivity impact—and largely inhibit—the skilling process. Indeed, learning to farm well requires extensive practice, ongoing experiment, and not-inconsiderable failure as the cognitive becomes tacit, the belabored becomes efficient, and the exceptional becomes everyday routine—a matter of habit. In most apprenticeship models of training, space is allocated for mistakes and for the production of substandard, inferior quality products, affording opportunities for greater proficiency through repetition. However, the particular political economy of agricultural apprenticeship, in which learning laborers are nearly

always instrumental to farm viability, provides little margin for error. Small disruptions of quality, efficiency, or workflow often have substantial effects on the bottom line.

As a result, and particularly relevant given that all alternative farms demand extensive skill, farm managers hedge risks by cultivating environments requiring as little tacit knowledge as possible. The case of farming with horses is offered as an example. For both ideological and practical reasons many farmers prefer draft animals to small tractors but horse-handling is difficult to learn, challenging to impart, and laborious to master. Farmer's "room to maneuver" (van der Ploeg 2008)—their ability to flexibly co-exist and experiment outside of conventional economic, social, and ideological formations—with alternative production techniques are quite-literally reined, restrained by limits of skill.

Drawing on ethnography of a variety of agricultural skilling institutions including apprenticeships and conference workshops as well as analysis of prominent farm training guides—I underline how in the absence of proficient knowledge and in the context of consistent economic insecurity, "agricultural didacts" (Stone 2016) exercise considerable influence. From Joel Salatin, to Jean Martin Fortier, to Eliot Coleman, didacts offer ready-at-hand solutions—packaged recipes that are often rapidly adopted, ambivalently successful, and yet always transformative of environmental and ideological landscapes. In the second half of the chapter, I offer a detailed analysis of "lean farming," an increasingly prominent management approach that promises productivity, pleasure and profit to struggling alternative farmers as they "cut the fat" out of their production systems. But directly imported form the Japanese automotive industry, lean principles—relentlessly cutting waste, streamlining efficiency, maximizing value—are merely the most recent effort to make "every farm a factory" (Fitzgerald 2003). The so-called fat of farming is what makes the labor meaningful for many and the cycling (not elimination) of

"waste" is the foundation of fertility in alternative production systems as well as ecology writ large.

The tensions inherent in the sustainability of alternative agriculture, frictions arising at the often conflict-laden intersection of economic viability and ecological ethics, both cede and seed ground for management regimes and industrial logics that, in many respects, alternative agriculture was originally established to resist. In doing so nature is cultured and cultivated anew. In what follows I offer the term *skilled environments* then, to capture something of the relationship between the taskscapes (Ingold 2000) of skilled agricultural practice and the compositional forms of nature that result. If agriculture is cultured nature, then the technologies, techniques, capacities, and ideologies of agricultural practice remake more-than-human ecologies in their own image. Skilled environments suggests that such ecologies are an outcome of embodied knowledges, as well as their absence.

3.1 Skilling Revisited: On Artisan and Agricultural Knowledge

Research on skill and skilling has two prominent, parallel bodies of literature infrequently brought together in regards to agriculture. Placing literature on craft and artisan production into dialogue with research on agricultural knowledge provides an opportunity to underline critical aspects of learning and labor, in particular forms of work engaged directly with raw material and the environment. More still, they lay the groundwork for better understanding agricultural skilling in the context of alternative agriculture, a knowledge-intensive activity that requires perception, performance, and embodied capacity in addition to codified (or codifiable) technical information.

An extensive body of anthropological research highlights key aspects of craft learning. Craft in these studies signals work that is manually-engaged, highly-skilled, and involved in the process of transforming raw materials into high-quality finished goods. From Cretan cobblers to Vermont cheesemakers, New York glassblowers to Malinese masons, Indian matweavers to French chocolatiers, studies underline the embodied, dexterous, flexible, and experience-based foundations of craft production (Herzfeld 2004, Paxson 2013, O'Connor 2005, Marchand 2009, Venkatesan 2010, and Terrio 2000). Drawing on practice theory, phenomenology, and the praxis of habitus, this research emphasizes that craft or artisan knowledge is a working knowledge requiring substantial investments of time and labor to perfect as skills develop through constant repetition, frequent failure, and guided application. In other words, skilling in craft production implies the transformation of knowledge from technical to tacit, explicit to embodied. Recipes, routines, and instructions are seldom sufficient in the production of craft goods. Knowledge and productive capacity derives from ongoing embodied interaction with the natural world, as opposed to from a pre-fixed inheritance of mental scripts (Ingold 2000). The transmission of craft knowledge, therefore, generally takes place under structures of apprenticeship in which learners are slowly integrated into communities of skilled practice and specific social relations of life and labor (see Grasseni 2009). Apprenticeship models afford the gradual acquisition of embodied skill and an opportunity to train awareness, tune perceptions, develop dexterity, and acquire necessary bodily and emotional comportment. They structure guided rediscovery (Ingold 2000)

One particularly instructive example of craft learning is offered in Gisli Pálsson's wave-making article *Enskilment at Sea* (1994). Here, Pálsson offers insights derived from ethnographic experience among Iceland fisherfolk to argue that fishing skill does not derive from an inherited

and acquired stock of scripted knowledge but from deep immersion in skillful activity. It is the capacity to act acquired from lived experience in the "lived-in world." The process of "getting one's sea legs," becoming comfortable and capable at work on the water, is an experiential and often exhausting activity, and the end result of ongoing "practical engagement with the environment." Because of the vagaries of fishing labor—the ebbs of flows of waves and weather as well as capable crews, novel technologies, and mobile fishing stock, Pálsson underlines that formal school training does little to prepare novices for the flexibility and variability of real-world activity. Rather, situated learning and situated knowledge is fundamental, in which a neophyte, guided by an experienced skipper, gradually develops confidence and capacity, attentiveness and awareness. It for this reason the apprenticeship is critical, and in particular the institutionalization of "legitimate peripheral participation" (see Lave and Wenger 1991) which affords security, experimentation, and divergent degrees of skill and accountability for collective productive endeavors. In short, enskillment is a process involving the "whole person interacting with the social and natural environment" and one best achieved through apprenticeship, the situated immersion in everyday activity among a community of skilled practice.

The literature on skill in artisan production importantly underlines the embodied nature of this form of production, emphasizing that capacity develops in immersive engagement, sustained experience, and guided rediscovery. However, analysis of artisan skill and skilling often misses the political economy in which apprenticeship and artisan production takes place. While much attention is paid to the deskilling of production through large-scale industrial and technological change (*à la* Braverman 1974), there is little account of how skilling is disrupted by more everyday influences. In Pálsson's study, for instance, there is little mention of the depletion of fish stock through over-fishing, the demands for profit that limit capacities to adequately train

neophyte fishers, or the rapidly shifting technological landscape that inhibits sufficient skilling. An important exception, that nevertheless proves the rule, is Gieser's study of British horticulturalists (2014) whom he argues experience the inhibition of enskillment because of shifting expectations of management, efficiency, compensation, and institutionalized experiential education. Work in park groundskeeping, Geiser shows, actually prevents the acquisition of proficient knowledge to perform skilled labor, as the structures of learning (or lack thereof) inhibit acquisition of embodied knowledge across diverse contexts with divergent demands.

There is however quite an extensive literature on the effects of political economic changes on *agricultural* skilling. This literature is all too rarely referenced in theories of artisan skilling, surprising given the critical importance of skill in smallholder agriculture (Netting 1993) and much so-called traditional farming continues to be performed with hand-scale technologies and conducted under conditions of significant variability—seasonal, geographic, market, etc. In a series of influential articles, Stone proposes a general theory of agricultural knowledge production (2016) and highlights how global and local transformations have led to deskilling in smallholder farming (2007). Writ large, Stone underlines, agricultural knowledge is a product of social, environmental, and didactic learning. The first two forms of learning—in essence, the emulation of peers and experimentation—he argues are increasingly disrupted by the rapid introduction of novel agricultural innovations, in particular green-revolution technologies and genetically-modified seeds. In India, for instance, Stone as well as collaborators (Flachs 2017, 2019; Stone et al. 2014) have shown that new seed varieties have led to maladaptive fads and even herd behavior in which farmers, lacking sufficient environmental information, emulate peers with frequently negative consequences for yield, pest management, profitability, and ultimately long-term success. In short, transformations in the global political economy of

agriculture have accelerated deskilling. Deskilling in this model (Stone 2007) is a tripartite process: the disruption of continual skilling, the disruption of a balance between environmental and social learning, and the disruption of a farmer's capacity to perform (see also Flachs and Richards 2018)—that is, to innovate, experiment, and rapidly respond to ever-changing ecological and economic conditions.

Stone (2016) also emphasizes that didactic learning has played an outsized role in recent years yet remains undertheorized. Agricultural didacts are the third-party external actors who seek to influence farm behavior. Whether extension agents, development practitioners, seed purveyors, or other input salespersons, didacts ostensibly work to "improve" agriculture but often with their own interests in mind—political, economic, status, or otherwise. Stone highlights, "[w]hether external parties pursue their interests through instruction, demonstration, exhortation, advertising, regulation, coercion, adulation, or shaming, farmers whose practices result from such interventions are engaged in didactic learning" (2016, 10). Stone suggests that through the breakdown of environmental and social learning at the heart of contemporary deskilling, agricultural didacts hold considerable influence over farmer decision making, and ultimately the availability and applicability of agricultural knowledge.

Theories of agricultural knowledge and skilling make critical contributions by underlining diverse political economic influences on farm learning and labor. Yet most such studies underemphasize the key aspects of skilling identified in analysis of craft knowledge. In particular, the importance of manual-dexterity, embodied experience, and institutions of apprenticeship for skill development. This is likely because, for so many of the communities that are the focus of smallholder farming research, agricultural knowledge is largely part of inherited ITK, and agricultural skill is typically developed through practice at an early age and by

consulting a culturally-embedded stock of technical information. In U.S. alternative agriculture however, despite many similarities in agro-ecological production techniques with global smallholders, farmers are rarely able to rely on such stores of information or structures of experiential education. The problem of skill becomes especially pronounced as deskilling is less at stake than processes of *reskilling*. Furthermore, the didacts that influence alternative farmers in the U.S. may well be external parties with something to sell or gain, but as often as not, those that lecture at conferences or write educational books come from inside the community itself. What then do US alternative farmers teach us about theories of agricultural skilling, and in particular the role of didactics? Moreover, how does bringing insights from craft production into dialogue with theories of farm knowledge bring us closer to a political ecology of agricultural skilling that is at once attentive to the acquisition of embodied capacity as well as to the effects of conditions of political, economic, and ecological constraints on the skilling process?

These are questions that beg further research and theorizing, necessitating substantial studies that would offer important insights into transitions towards sustainability and the challenges that impede it. In what follows I focus on key aspects, examining how agricultural skilling is disrupted by the particular, and particularly pronounced, economic challenges of alternative farming. I query how an absence of sufficient knowledge and economic security creates space for agricultural didacts to be especially influential. With this in mind, I then shift focus to the didacts promoting a specific management strategy, lean farming, highlighting that didacts work to not only alter production techniques but to subtly shift the logics and ideals constitutive of alternative agriculture.

3.2 Getting a Handle on Horses

The most frequent form of production power on alternative farms in the U.S. is the BCS tractor, a small but strong two-wheeled walk behind implement that can be adapted to a variety of hitches for tilling, weeding, and other forms of bed prep. But draft horses are surprisingly common too, particularly in places where there is an established culture of horse farming. Whether because the agricultural region is too far off-the-grid to rely on purchased tractor inputs, the farmer ascribes to a value-system that discourages advanced technology use, or they strive to establish a self-contained and self-sufficient production system, horses are often used for a variety of reasons that are practical, aesthetic, and ethical. As one recent article dubs it, draft power is "the life affirming alternative to Big Ag."

There are parts of New York state that have especially pronounced cultures of horse farming, and it is there they I am first exposed to their important role on alternative farms. After a day working and weeding the vegetable garden together, Jeremy, a farmer in upstate NY, leads me on a tour of their 5-acre horse-powered production farm. I inquire about the role of the horses, a seemingly anachronistic technology, yet one found frequently in the area. "A lot of it, I'll honestly say, is aesthetic for me. The sounds and the smells and just the interaction with another living being rather than a tractor just things that make the job more pleasant." He continues, "I mean, we're not getting rich doing this. We might as well make a few choices that favor our happiness. So that's one of the things." For Jeremy a connection with a living being, and a quiet life without roaring engines, is an important part of their farm's turn to horse power.

The other part is practical. "For us it's a traction thing. We don't have a 4-wheel drive tractor. Even if we did a lot of the time, we tend to be a wet farm. We're at the bottom of this mountain and just a lot of seeps and we have clay soils and it tends to be on the wet side. For us, there are times when we wouldn't be able to do field work or we wouldn't be able to do things in

the winter or the mud season if we didn't have horses." On Jeremy's farm, prone to saturation, horses give greater traction than tractors. "For us that is key, the confidence in knowing that we can get out and do something regardless of weather with those guys and all the while minimizing our disturbance in the fields. If I did have a 4-wheel drive tractor and I had to go across a really wet field, it would still probably make deeper ruts and more compaction than what I can accomplish with these guys." In addition to needed traction, they make their own fuel each summer, Jeremy reiterates, by helping to cultivate the fodder that is their feed and by providing ample compost for the fields. In other words, they allow the farm to get by without expensive and polluting fossil fuels, an ideological as well as financial decision, fueling the farm sustainably for free.

An hour south, Brian also enjoys farming with horses, utilizing them for compost, tillage, and eradicating weeds. But in addition to their usefulness and how they align with his family's environmental ethos, there's also a level of more-than-human connection to it. As well as communication. "I don't love tractors. Horses are definitely more work, but I have a relationship with them. It's really good practice to communicate with them across a very obvious language divide. But all communication is across a divide in some respect or not. It forces me to be very clear about my plans and expectations and to articulate that in the simplest most straightforward way possible so that they can understand. They don't always but it's the goal. It's good practice for me. And I find that it translates into my communication with other people." This connection and communication is clear, as Brian goes to unbridle the team after several hours of work, and spends considerable time brushing them, speaking softly with them, and showing significant care. Efforts that are economic, but only indirectly. He and I talk as we return the pair to their neatly-kept stall, he tells me that they have to trust you if you want them to work and to work

well. A lot of that is in the subtle interactions, the attention, the clarity of commands, and in the confidence of the handler—that they know what they're doing so that the horse does too.

Many neophyte alternative farmers are quite interested in farming with horses. A workshop I attended on draft-power agriculture, associated with a major farming conference in the northeast, had nearly 50 participants, all the more impressive on a frigid January day fraught with freezing rain. Such a workshop could not take place indoors, however, as so much of horse farming is about experiential engagement with the animals on the land. While several books tout the logics and best practices of horse-drawn farming, only by taking the reins can an aspiring agrarian hope to develop a feel for maneuvering the team. Indeed, from lifting heavy harnesses (some more than 70lbs), to applying the subtle tugs that indicate changes in direction, to the articulation of clear and competent commands, even well-trained and bred horses require significant embodied capabilities, tactile skill, and expert communication. Despite their many advantages, from superior traction and a fuel of grass rather than gas, to a greater connection with the environment and even the possibility of deriving greater income from it (draft horse log timbering is a common form of winter labor in colder climes), horse farming is simply not for everyone. Indeed, as one farmer put it, you can't just fill it up and turn a key like a tractor.

Even for those that do take to working with horses, they present many obstacles. One farmer I spoke with, who farmed with horses for mainly ideological reasons, suggested it was adequate care for the animals but also maximizing production acreage that necessitated his turn to tractors. He reflects, "we stopped using the draft horses. They spend most of the time standing around, and it's not healthy for them. They need to be working. It's also really hard to use them in the fields, and we end up using them like a tractor anyway. They require enormous amounts of space to turn around and its cutting into the garden." Indeed, room to maneuver at a fields

margins is critical for utilizing horses. As one former apprentice tells me of a prominent horse powered farm, “The fields there are six and seven hundred feet long, really much longer than you normally see at these farms. And the reason for that is that with the draft horses their slowest moment is in turning around and so the idea is you get them going straight for as long as you possibly can.” In order to have any measure of efficiency and therefore profitability, no time can be lost idling along the edge. As a result, the landscape is modified to fit the requirements of the horses, and on particularly small acreage landscapes (as are most alternative farms) the horses are hardly useful at all. From time to space, they simply take too much to turn around.

The other major obstacle with horses is, and this is key, the amount of dedicated training and practice it takes to develop proficiency at the reins. For most alternative farms, even minor mistakes that lead to loss of viable crop or disruption of workflow are enough to encourage a change or drop a practice. With a too-rarely balanced bottom line, there is quite literally little margin for error. As one former apprentice told me, of their time recently working at a well-known horse-powered farm, “I worked at the farm for a while and they do use horses, but it’s less of a key role in their operation that used to be. That’s not because they would prefer it. Or even that is not suitable to scale. The real issue is that their apprentices cycle through every year and it takes a long time to train somebody on using draft horses for agriculture. It just stopped being worth the time it takes to teach and to get really very proficient at it.” As such the horses spend much of the time in their stalls, and apprentices train on them only at rare moments when little is at stake, and therefore seldom.

In short, despite a farm or farmers interest in utilizing horse labor for agriculture, whether that interest is practical, ideological, or otherwise, working with horses presents myriad challenges. One of the most daunting of which is the developing the capacity to maneuver them

effectively across often tricky terrain, in addition to the subtle but extensive skills it takes to direct, steer, and generally care for them. The problem becomes even more acute as these very same difficulties discourage hands-on training of future farmers because doing so takes significant time and returns little immediate reward. In many cases the lead farmer will simply do it themselves, tasking trainees with less risky or complicated pursuits. In other cases the horses will simply sit idly by altogether, prized for little more than their aesthetics after all.

That the suite of skill necessary to mobilize horses for agriculture can "rein in" a farm operation, is perhaps unsurprising. As Fitzgerald (2003, 144) reflects of the early industrialization of US agriculture,

> …manufacturers did not see their tractors and combines as 'labor saving' in the sense that we are accustomed to thinking about, either in industry or elsewhere. The general view was that when machines were introduced into workplaces, it was because they would do something humans had been doing but machines could do much faster or more accurately or more safely. Machines were seen primarily as skill replacers rather than skill enhancers. For farmers, tractors and combines were attractive because they made field work go faster, and therefore farmers could do more field work. The main attribute was speed.

But in another respect the rapid sea change in agriculture marked by the shift from animal to mechanical labor is precisely the reverse now as it was then. Fitzgerald (2003) suggests,

> Tractors were replacing horses; then, both horses and tractors pulled implements that plowed the ground, or planted seed, or reaped grain. One did not need to be highly skilled to drive a horse and implements through the field; a little observation and experience were usually all the training one received before starting the work. Tractors were quite different, for two reasons. First, it was not obvious how to drive a tractor, particularly if one had never driven a car or truck before. How to start the engine, how and when the use the brakes, and how to judge speed and distance were things that one was shown by an expert or practitioner. Second, the machinery was so expensive that most farmers would not put their least skillful worker on it, reserving it for their more reliable people." (144).

Today precisely the inverse is true. Nearly all neophyte farmers can drive a car and many have been doing so since a young age. Tractor training presents challenges certainly but is intuitive to

most learners. Not so with horses. Beginning farmers often have little to no experience with animal husbandry, less still with putting an animal to actual work. Furthermore, with the investment of care, labor, and money necessary to purchase and keep a team of horses, they can often be more expensive, or anyway more fragile, than a tractor. As such unskilled workers may still not be allowed to operate the tractor, but neither would they be let near the horses. With the high-risk and heavy investment necessary to bring a neophyte farmer up to speed, coupled with the low reward and limited margin for error, there is generally too much at stake to institute the experience and experiences necessary to skill on this form of animal agriculture. The room to maneuver away from fossil-fuel tractors is constrained by limits of skill.

In this absence of sufficient knowledge, skilling opportunities, and economic security, agricultural didacts become especially instructive. Lean farming is one such management strategy promoted by didacts, and it works to not only alter production techniques, but to shift the logics and ideals at the root of alternative agriculture.

3.3 Every Farm a Toyota Factory

"What is lean?" Steven rhetorically asked the audience." Lean is if it doesn't add value, then its waste. That's how we look at things." Steven was speaking to a small group of farmers and local food systems practitioners in central Appalachia. A consultant who teaches and translates the principles of lean management, Steven reflected on an improvement he had recently recommended supporting the production of a nearby farm by minimizing movement:

> I noticed that people were walking from the greenhouse all the way up to the barn to get whatever tools they needed, and then walking back. So I made the suggestion to put the toolhouse there [pointing to the middle of the farm on an aerial map] so that the walking distance wasn't as bad. One of the reasons for that is it saves the time it takes to walk

> back. But the other is like, once you walk there then you might say hey to someone, and the time grows. The longer the time your away from what you're supposed to be doing, the worse it's going to get.

Movement is time, and time is money. Covering how his consultations on lean techniques work, he notes: "we come into a business or a farm or wherever and we figure out what their process is to make whatever kind of widget, whether it's a cucumber or forensics lab or whatever, and we follow that process from the very last thing back to the beginning." He continues. "Once we have that process plotted out we make a value stream map, we can look at it and see where your using too much time, what we need to take out, or what we need to sort, things like that." The point, he proposes to us in the audience, is to cut out excess, to eliminate waste, and "lean up" the production process. Whatever the kind of widget, lean principles aim towards process perfection: "that's basically what we do, we find ways to shorten the throughput, whatever it is your creating, to make the process cheaper. For purposes of improvement, easier is better is faster is cheaper."

Learned from a farmer/educator named Ben Hartmann, Steven now evangelizes lean management techniques widely, on farms, in small factories, and beyond. "Like I said Ben Hartmann, he's the man, I actually got to meet him at a conference in 2018. Absolute Genius. absolute genius. Pretty much all the stuff I'm covering right now, it's the first couple chapters of that book." Holding high a well-worn text, he continues to speak praise: "The Lean Farm, this book, if you're farming and you don't have this book you probably should get it. It's awesome."

Of the myriad systems packaged and sold to alternative farmers, in the last five years "lean farming" has quickly become one of the most prominent. Pioneered by Ben Hartman of Clay Bottom Farm in northern IN, lean farming is now comprehensively detailed in several popular training manuals, frequently lectured on at agricultural conferences, and even has its

own dedicated farming consultants—such as Steven—that share the gospel of the lean approach. Lean is both a method and mentality. It is derived directly from Japanese auto manufacturing with an essential commitment to "the absolute elimination of waste," with the end goal of "zero waste and one hundred percent work." As a lean farming training guide puts it, the system teaches practitioners "how to minimize waste, increase efficiency, and maximize value and profits with less work." Committed to rooting out anything that does not create customer value and to ruthlessly streamlining production systems, the lean approach is Mitsubishi meets Marie Kondo.

At the heart of the lean production system and sensibility is a dedicated effort to take principles originating in the post-fordist automotive industry and apply them agriculture. Whether a manufacturing firm or a small-scale farm, the logic goes, lean management principles can streamline productive activity such that producers and customers both win, and every effort is oriented towards maximizing customer value and the capacity to produce more. As key theorists of the production approach frame it, lean is "a way to do more and more with less and less—less human effort, less equipment, less time, and less space—while coming closer and closer to providing customers exactly what they want" (Womack and Jones 2003).

Translated to the farm context lean takes a variety of forms, and these are well explicated in Ben Hartmann's popular series of training books on *The Lean Farm* (2015). As a back cover blurb suggests, the lean farm "demonstrates just how effective applying lean principles can be whether you produce cars or carrots." Ben introduces the manual with the origin and rationale of adopting the lean approach. Like so many, his farm had grown in the early days through "a flurry of high-energy experimentation and construction" and while the farm was managing a meager living, workdays were long and laborious and leisure limited: "Some days we worked from

sunup to well past sundown and still had supper to prepare. We hadn't been on a vacation in several years." After a tour of a local manufacturing plant producing aluminum trailers, Hartmann became fascinated by lean ideals and the productivity and efficiency they promised. He came back to his farm imagining "what if no movement was wasted, and every single seed turned into a product that sold." He reflects "farms and factories are very different places, but in the end our task is the same." With lean, Hartmann had "something to strive for, a new vision" that might enhance his farm, improving work conditions, producing more, and ultimately freeing up more time for fun and family. With a commitment to working smarter not harder, the lean farming approach, expounded in books and workshops, "aims to prevent the kind of burnout that start up farmers often encounter and enable a new generation of young people to choose farming as a viable career path" (2015, 1-4).

The full-scope of lean farming techniques and tactics are too numerous to comprehensively explicate here. Moreover, in important respects, focus on actual farm management protocols misses the point: as a prominent theorist of lean puts it, "lean is a way of thinking, not a list of things to do." Nevertheless, Hartmann's books offer a flavor of the life of lean, applied down on the farm. In the aptly named chapter "every tool in its place" (2015, 19-32), Hartmann's goes through the 5S system, what he refers to as "lean's weapon for streamlining production environments." Translated from Japanese, each s refers to: sort, set in order, shine, standardize, and sustain. The 5S approach, Hartmann notes, allowed his farm and farmers "to see through the thick layers of waste that were slowing down [their] work." Sort refers to mercilessly eradicating anything—rusted tools, spare parts, or an idle form of infrastructure—not undeniably essential to the system of production. Standardize means routinizing farm activities, such that tasks can be executed in identical fashion no matter who

does the work or when. To do so, systems are kept as simple as possible. From standardizing the color of totes for specific tasks (such as weeding) to the use of uniform irrigation technologies, from tidying workspaces in a specific set sequence to consistently setting up the market stand, standardizing the farm creates consistency and clarity so that no movements are wasted, or worse, wrong. Standardize also applies to the layout of the farm itself. Rather than establishing growing areas of different shapes and sizes—responding to subtle changes in landscape topography for instance—Hartmann proposes consistent design. On his farm, Hartmann notes, "we divided our farm into eight plots of the same length, and we use uniform growing beds in those plots." Standardizing the plots and growing beds allows consistent application of other techniques and technologies as well, including walk-behind tractors/tillers, plastic mulches, and drip tape.

Set in order encourages organizing for efficiency. This is the principle that Steven emphasized at the outset of this section, in reference to the toolshed location, an approach oriented towards minimizing movements for maximum effectiveness. No action should be wasted. In practice this means keeping tools where they are most frequently used, within easy reach, to limit excess steps. It also means organizing them simply: "Our goal is to organize our tools in such a way that a ten-year-old can walk into a room and easily get us a shovel or a digging fork or whatever." Setting in order speeds up production by "cutting out the fat" of farm activities, those motions considered idle because they don't contribute, and indeed actively detract from, the economic bottom line. To achieve setting in order, Hartmann suggests minimizing moves by "straightening, shortening, and eliminating noodles"— those movements that amble towards their goal. By creating straight lines in the landscape layout, decreasing the size of beds and locating them closer to primary infrastructure, and in some cases removing

moves altogether (such as lengthy deliveries) Hartmann cultivates a lean farm landscape: “Many if not most farm tasks contain unnecessary moves and can be completed more efficiently with the selective use of technology or by economizing motion.” Setting in order speeds up farm activities, allowing workers to get more done. The process eliminates wasted movements and unnecessary thinking: such that “even a ten-year-old” could do it.

Another key lean practice is the process of “learning to see value” (2015, 47-65). Hartmann elaborates this visioning approach through the example of a carrot, asking farmer-learners to imagine the carrot’s flow throughout its life and across the landscape. By visualizing the carrot from seed through maturation, from harvesting with efficient motions to expedient delivery, these “value stream maps” allow mangers to create value, with minimal interruptions. As Hartmann reflects, “The idea was to learn how to see value, to distinguish value creation from wastes, like waiting time and unnecessary movement. The exercise helped us calculate our costs, figure out our hourly wage, and start to identify targets for getting faster. This work—learning to see value—is the first and primary task of lean managers.” The critically important task then, is to perfect the ability to “visualize our products as they travelled around on our farm, gaining value.” The carrot, through such a lens loses its specificity as a living being in an ecological context, and becomes an instrument through which value can be created or diminished. Lean perfects a way of seeing where each step produces profit, and that which doesn’t is rendered waste, demanding to be rooted out.

Hartmann recalls that early in his discovery of lean principles, he had questioned if the translation of lean from automobile manufacturing to agriculture was worthwhile, more still, if it was wise. He asked “did lean principles really have a place on a farm? Aren’t factories and farms very different places? Did I really want to turn our organic vegetable farm into an assembly line?

Besides, what does manufacturing a trailer have to do with growing a tomato?" Yet with a confidence and resolve, he concludes, "as it turns out, plenty" (2015, 1). His book, as we have seen, is a detailed depiction of the application of lean paradigms and principles to food production. And yet, in applying lean management techniques "whether you produce cars or carrots," can those concerns be so easily whisked away? Can farms, indeed, be likened to factories? If so, what are the tangible and ideological effects? In a purported effort to make a small-scale sustainable farms economically viable and afford opportunities for off-farm activities, I suggest that lean reworks the logics and ideals of alternative agriculture. It shifts ecological farming, in subtle yet straightforward ways, from values-based to value-based and transforms perceptions of both the environment and agricultural labor.

Deborah Fitzgerald (2003) argues that in the early industrialization of US agriculture, it was not only changes in the political economy of the farm sector that led to the vast rural transformations of working landscapes. It was also a shift in the "larger ideological framework" in which agriculture was practiced. Indeed, it was not only the "substitution and appropriation" of discrete production elements in the service of industry that remade the agricultural sector (Goodman et al. 1987), but also the emergence and proliferation of an industrial ideal. She shows that agriculture modernized on the model of the factory system, with principles and practices derived directly from the latest industrial approaches. The application of rational management techniques—"timeliness of operations, large-scale production sites, mechanization, standardization of product, specialization, speed of throughput, routinization of the workforce, and a belief that success was based first and foremost upon a notion of 'efficiency'" (5)—translated from the industrial firm and applied widely to food production, had the ultimate effect of making "every farm a factory" by inculcating not only industrial practices but industrial

logics. Such profound changes in thought and practice, though they did not happen overnight, were buttressed and bolstered by the so-called modernizers in the countryside—the "agents of industrialism" including "economists, farm mangers, employees of agricultural colleges, and particularly farm and home demonstration agents, rural banks and insurance companies, and agricultural businesses" (6). In short, the practices and paradigms of industrial agriculture, explicitly modeled on factory and business practices, remade food production in the image of the modernized manufacturing sector. Such changes were the wedge and the leading edge of the profound transformations of agriculture over the course of the 20th century, and they laid the landscape for the problematic and much-maligned farming sector that continues to proliferate today.

Lean farming works in subtly similar ways. As we have seen, the language and logic of lean is one of efficiency, waste-elimination, value creation, and the generalized "cutting of the fat" of food production. While Fitzgerald identified the incursion of Fordist industrial ideals into farming in the early 20th century, I suggest that lean leverages Japanese industrial ideals and smuggles them into the contemporary alternative farm sector. While distinct in important ways, these processes share much in common. Both mark profound changes in thought and practice from business-as-usual. Both find their appeal in the clear, and very real concern, that farming—as a business—is not only rarely lucrative, but that those that who do succeed often expose themselves to considerable self-exploitation. Finally, both have their dedicated change agents, their agricultural didacts, who promote and proselytize the methods and mindset. Today, this may take the form of financial literacy and market education (Rissing 2019), but also, as I have shown, farm management protocols and paradigms. More still, if the early industrialization of agriculture found its cheerleaders in ag colleges and economists, the shift towards lean

approaches is arriving from the inside, from ostensible peers, who out of apparent benevolence seek to seed space for some semblance of leisure and profit. That they don't appear to be especially powerful, or even to be peddling anything at all (a commoditized input for instance), may well make them all the more effective as they operate under the guise of good-will. While many of the practices may well read as mere common sense—don't walk further than you have to, don't leave the toolshed a mess—the dominating rationale for operating in such a manner delicately displaces the myriad alternative logics that buttress small farms and farmers; replacing them with the ideals of productivity and profit, efficiency and economizing, usefulness and utility-maximization.

The chapter "Ten Types of Farm Waste" (2015, 55-65) is introduced with an epigraph by Henry David Thoreau that reads: "It is astonishing as well as sad, how many trivial affairs even the wisest thinks he must attend to in a day." Hartman spends the rest of the chapter underlining key strategies for the ruthless elimination of waste, a term derived from the Japanese word *muda*, and encompassing everything from physical waste—such as rotting vegetables—to certain problematic dispositions—such as "idleness, futility, and uselessness." The goal, as we've seen above, is to encourage farmers to avoid any activity that does not ultimately add tangible value—customer, monetary, and otherwise. I find this odd juxtaposition telling and it usefully underscores the key tension highlighted in this section.

Thoreau famously cast off the trappings of civilization amid the burgeoning industrial era in an effort to "put to rout all that was not life," and make space for contemplation, ethical commitment, and ecological observation. Indeed, the idleness reckoned by the industrious and industrial, those activities that do not produce profit for factory owners or—in our terms here—value for customers, was not to be ruthlessly eliminated, but cultivated and patiently practiced.

Idleness, precisely that margin between "waste and 100 percent work," was to be widened, it was a consummate virtue. Thoreau reflects on his activities at Walden pond, "this was sheer idleness to my fellow townsmen, no doubt; but if the birds and flowers had tried me by their standard, I should not have been found wanting" (1992, 76). For many alternative farmers, if there is but one text most likely to be shelved next to the agricultural guides and the seed catalogs, it is Walden (it is not incidental that Thoreau is so regularly referenced in *The Lean Farm*). Their agricultural project, much like Thoreau's own well-tended field of beans, is so often in the service of a greater goal, not productivity and profit, efficiency or income, but all they myriad things that such a frame of reckoning treats as waste. Making a livelihood, for them, is but a necessary means to making a life.

3.4 Conclusion

Let us return to Robert, the self-proclaimed guerilla farmer introduced at the outset. Robert recalls attending a workshop by prominent agricultural didact Eliot Coleman, an expert on winter food production, where he first learned the importance of, and opportunities afforded by, breaking the rules. It is worth explicating at length, as it summarizes many of the key themes offered in this chapter:

> There were a 100 people, and we were all listening to Eliot go on about the beauty of winter gardening and low-tech tunnels and greenhouses, and cold hardy varieties and everyone is writing down every detail. And someone says, tell us how you plant in the fall, tell us about your schedule. So he goes on: 'okay, September you start the spinach and radishes, October you do a round of carrots and beets and chard, and November kale and keep planting.' And then Eliot said, 'come December 15 quit planting.' And everyone [scribbling in their notebook] Dec 15 quit planting, just writing it down. And I'm like, hmm… All the way home, I'm thinking Eliot Coleman says don't plant after Dec 15, and I'm wondering what happens if we did. So on Jan 1 I took a whole bunch of seeds, leeks and lettuce and spinach, cold hardy seeds, and in my greenhouse I bedded in trays of each of these, just as an experiment! I didn't want to disrespect the great Eliot

> Coleman because he said don't plant after Dec 15. But I just wanted to know what would happen?

Speaking to an audience of neophyte farmers about a time when he was likewise in their shoes, Robert sets up the way agricultural expertise is often treated as gospel, and that the knowledge gleaned from conferences and farming handbooks applied inviolate. But he was curious to find out for himself if there was any "room to manuever." He reflects:

> What do you think happened? They grew! Did they grow quickly, no. Did they grow pretty, no. Did they grow uniformly, no. But they grew. And by spring we had small quantities of beautiful cold hardy, grown in the cold, born in the cold, greens, alliums, brassicas, lettuce spinach.

The moral of the story, Robert reiterates, is not necessarily that Coleman was incorrect about planting schedules, yield, and viability. It is that his advice only holds under certain constraints in certain contexts:

> Now was Coleman wrong, was he mistaken? Of course not, he knew that if you grew seeds some would come up. But he was describing a commercial endeavor where people are measuring their costs and profits and harvests. He was saying if you want to go to market with those greens, and evaluate your inputs, it's no longer worth it. So what made that experiment possible for me, was the fact that a year prior I had been turned on to the magic and miracle of seed saving. This whole guerilla gardening technique of throwing down seeds and planting in bunches [two techniques of propagation he describes earlier in the workshop], you couldn't do this if you were buying from Burpee and Johnny's half a gram of seeds of $4.95. There's no way that you could come up with this cavalier attitude of throwing down large quantities of seed, this do nothing gardening method, throwing down and then propagating clumps into smaller clumps and keeping them alive all winter long. So seed saving is one of the lucrative endeavors that everyone should be doing. I used to think you have to know a lot, you have to isolate, and cross pollinate and hand pollinate, what a mess. Nothing of the kind! Since we are not a commercial endeavor any longer, and because we thrive on diversity, not a problem if a yellow beet comes out of the seeds that you thought were pink, hey we love the golden beets, they end up being beautiful. If your "Marina de Chiogga" accidently crosses with your Hubbard, we learned that crosses in the first generation are always delicious. Now Burpee or Johnnys, they would get calls, but for us this type of diversity, this type of throwing lots of bullets, seeds let us say, into the wind, becomes a magical formula, what we get is an incredible diversity that not only occupies physical space but also

chronological space.

In applying a method of production that would be very costly with purchased inputs from the prominent seed companies, Robert discovers that through seed saving he is able to cast seed broadly, worry less about germination rates, and more about making the most of the available space in his greenhouse in the dead of New England winter when few others are growing, or believe it possible. Through the laborious process of saving seed, combined with the willingness to test out alternatives to received wisdom, Robert realizes a system that may not produce perfect produce, but that does yield high-quality vegetables in abundance during a time in the season when labor is available and demand for locally-grown organic food is high, including his own farm family's.

Robert's ability to experiment to find guerilla solutions to agricultural challenges is a product of his distance from the dictates of alternative agricultural economies. Indeed, although Robert farmed commercially for many years, deriving much of his family income, he now selectively chooses when and what to sell, which he describes as great freedom, while continuing to teach others:

> We did CSA [community supported agriculture] for ten years. I realized I was working my butt off for people that like the politics and the idea of the food, but they didn't need my food, they went out to eat every other night. These days we're mostly an educational farm. We take wwoofers, we host workshops, we put out you tube videos. I have the great good fortune of not having to sell everything I grow… Guerilla farming became a viable method for us to grow a lot of food and also to work less. Now people laugh when I say that, because I work all the time. But the kind of work that I do now, instead of wandering around looking for all the jobs that I need to do, I wander around looking for all the things that I can get away with not doing. Lo and behold, there's a lot of things you can get away with not doing. Nature, if we allow the worms, the microbes, gravity, rain, decomposition, neighbors, young volunteers, if we embrace the insurgency of allies we can do a lot of what we have been doing for years with far less labor and a more peaceful outlook.

Partially emancipated from the expectations of yield, aesthetics, and the constant pressures of securing a livelihood, Robert is able to test new methods, toss the so-called rule book, overcome the "all-consuming minutiae" of smallholder agriculture, and ultimately find ways to produce food that are efficient, abundant, and aligned with his values. His experiments invite an "insurgency of allies" that work to make life and labor easier by mobilizing more-than-human metabolic labors in the service of economic and environmental sustainability (see also Bello 2017, Besky and Blanchette 2019)

For others more closely constricted by economic dictates, however, their ability to innovate is bridled by market constraints. They can rarely afford, quite literally, to make mistakes. The outcome of such pressures is that farmers actually turn to individuals like Robert who offer tested and packaged solutions. Indeed, the agricultural didacts that present at conferences and write popular books become especially influential as few alternative farmers have the "room to maneuver" to experiment with unscripted practices. And in some cases, as we saw in the lean farming example, the demands of market production in combination with the advice of agricultural didactics seeds and cedes fertile ground for the advance of industrial logics into a sphere of production ostensibly less dictated by such ideals. When a carrot is likened to a Camry, and treated as such in an effort to maximize production and minimize waste, what remains of the alt in alternative farming anyway? What will become of the alternative farm sector if the only way to make it commercially viable is through the sacrifice or slow erosion of the values that brought farmers to farming in the first place?

The other important limitation to Robert's ethos of DIY experimentation is that production practices take *practice*. They demand embodied experience tried and tested over time. For this reason particularly-skilled production approaches are infrequently adopted, and more

still, rarely taught. The result is that even for neophytes moving through apprenticeship programs—those socio-economic institutions that have historically structured the space for "guided rediscovery" and trialed, patient, perfection of abilities—skilled practices are often the first cut to the curriculum. Seeding, weeding, washing, market set-up and sales are all critical to farm operations and have their own learned specificities of protocol and practice. But it is the next-level embodied knowledges that suffer, in particular those with serious stakes. From harvesting heirloom tomatoes, fragile and worth their weight in gold, to handling horses that have a mind of their own, skilling that is derivative of both economic necessity and ideological or ethical commitment is disrupted. Alternative farmers may well aspire to see the elimination of tractors, rotational grazing of livestock, cultivation of biodiversity, and experiments to reengineer economies, but in the meantime, they don't bet the farm on it.

It is clear, then, that farms are landscapes requiring significant skill and that the particular political economy of agricultural practice can work to inhibit skilling—thereby carving space for the considerable influence of agricultural didactics on the practice and perspectives of farming. This can be quite problematic given that didacts, as Stone (2016) has shown, often have their own vested interests in mind, not to mention that what may work well in one (ecological, economic, or social) location may falter elsewhere. With this in mind, let us briefly return to the skilling process to better theorize the importance of the acquisition and inhibition of skill. Tim Ingold suggests that "people develop their skills and sensitivities through histories of continuing involvement with human and non-human constituents of their environments" (2002, 10). His orientation to skilling, as we have seen, usefully underlines how knowledge and productive capacity derives from ongoing embodied interaction with the natural world, as opposed to from a pre-fixed inheritance of mental scripts. And yet to understand the importance of skill this does

not go far enough. While it does valuably situate learning as a product of performative engagement with the world beyond the human, it underemphasizes the dynamic, fluctuating nature of those ostensibly external ecologies. Indeed, as environments shape skills and the skilling process, so to do these reciprocally shape environments. The task then is to better understand not only how the human and non-human taskscape influences the acquisition of knowledge but also how these processes of human learning and doing impact the more-than-human worlds of which they are always already constitutively a part. I propose *skilled environments* as a way to conceptualize these critically important entanglements.

Indeed, a farm is a skilled environment in that the tasks performed across the landscape obviously require considerable knowledge and embodied capacity. But at a larger level, I suggest that skilled environments gestures to the way that ecologies are products of human engagement and that such engagements are products of ecologies. The degree to which that interaction is skilled therefore influences what environments take shape. Horse-farming creates a particular kind of agricultural landscape, one able to utilize marginal, even saturated terrain, requiring little fossil fuel, and furthering a farm ecology that cycles much of its own energy and fertility. Lean farming cultivates a different landscape, a landscape of ordered efficiency, of nature increasingly tamed by industrial designs, and one that works to reproduce—in however nascent form—aspects of modernist ideology and aesthetics (see Scott 1998). Both may well operate under the sign of sustainability but with radically different effects. The key, however, is to emphasize the importance of skill in each of these contexts, how its reproduction or inhibition maps onto and remakes landscapes. The task is to track where skilling is impeded and then identify the broader effects on more-than-human ecologies. Better understanding skilled environments is therefore

vital to ensuring the viability of sustainable livelihoods and landscapes in the twenty-first century agrarian Anthropocene (see Hetherington 2020)

Chapter 4

Fields of Vision: On Ecological Entanglement and the Nature of Knowledge

- "The ultimate goal of farming is not the growing of crops, but the cultivation and perfection of human beings." – Masanobu Fukuoka, (2009, 119)

Evan, a farming educator and landscape architect, often opens his workshops with a quote from a Japanese farmer named Masanobu Fukuoka. Featured above, this quote sets the stage for the hour and a half lecture that follows. Through a series of case studies on the benefits of polycultures, cooperative species guilds, and function stacking, Evan's lecture offers insights into agricultural landscapes as symbiotic ecologies, paying particular attention to the intercropping of plants, strategies for integrating biodiversity, and design that mimics natural ecosystems. He speaks at length on the importance observing ecological interrelations and staging working landscapes to ensure they thrive. "Monocultures are degenerative at a large scale," he tells us, "they're control intensive, they're part of the industrial mindset. Polycultures are potentially regenerative…but they're more design and knowledge intensive and they require a relational ecosystem mindset." He continues, "We're looking for things like stability, resilience, self-regulation, self-renewal, self-fertilization, production, clean air and water, soil health, and more, [accruing] over time. I would like to have a farm that has those qualities, wouldn't you. Those are the qualities of ecosystems."

The lecture goes on to outline the properties and principles of intercropping perennial and annual plants, rotationally grazing ruminant livestock, and establishing conditions for soil fertility and pollinator flourishing. We learn about floriferous herbs, ground cover shrubs, and

Asian pears. He has a great deal to say about the famed three-sisters polyculture of corn, beans, and squash, distilling how and why it works, and how similar symbiotic companion plantings might experimentally come together. But here at the outset, under the telling title of "Vision" featured boldly atop the power point slide, Evan spends several minutes underlining not specific principles or practices of farming, but a vernacular philosophy of human/environmental relations. "How we garden reflects our worldview" he tells the audience. Building on the sentiment expressed by the Japanese farmer, he continues "The ultimate goal of ecosystem agriculture is not only the growing of crops, but also the cultivation and perfection of new ways of seeing, of thinking, and of acting in the world."

This workshop was offered as part of a major organic farming conference that takes place annually in the Northeast United States. Ostensibly here to acquire practical information on establishing a productive agricultural landscape, the audience is instead presented with a theory of more-than-human entanglement in which farmers cultivate crops at the same time that crops cultivate them. What the instructor underlines is that lessons in landscape design and agrarian practice are always-already also instructions in attention. For Evan as well as many alternative agrarians, farming—and the process by which one learns to farm—instills new ways of seeing, thinking, and acting. The goal of these and similar workshops is not only, often not even primarily, about transferring technical information on productive agriculture but rather about the cultivation of alternative ways of knowing and being in the world. Evan is making explicit what so often goes without saying, or is actively obscured by the modernist mindset—that we humans are ecologically co-constitutive.

This chapter attends to the unorthodox observational approaches proliferating among alternative farmers. It focuses on alternative forms of knowledge and ways of knowing. I argue

that the "room to maneuver" central to sovereignty in alternative farming is not only political-economic—concerned with the systems and structure of agriculture—but also epistemic and even ontological. Said differently, it has as much to do with both the nature of knowing and the nature of reality as it does with creating autonomous spaces free of direct development inference. I underline that as with other forms of Traditional Ecological Knowledge (TEK), knowledge in and of alternative agriculture transmits not only technical capacity but also unique ways of understanding the natural world and the human place in it. For as Tim Ingold (2000, 37) argues, enculturation is a form of enskillment, the training of perceptual awareness and the transmission of particular ways of seeing that affords the possibility of action in an ever-changing, and thoroughly relational environment. In other words, the twined processes of transmitting culture and technical capacity, are not educations of information so much as what he calls an "education of attention."

Building on Ingold, and attentive to life-sustaining entanglements and more-than-human relations, this chapter examines how alternative farming communities cultivate alternative ways of working with and knowing nature. In what follows I seek to bring novel scholarly attention to the concrete institutional apparatuses and contexts in which individuals construct discourses on reality—in the form human/environmental entanglements—through cultivating divergent knowledge paradigms produced and reproduced in agrarian practice. Whereas much has been written on the alternative ontologies and ways of knowing amongst so-called traditional peasant smallholders, I attend to the emergence—the coming into being—of ontological otherness that is being actively seeded in the skilling institutions of alternative agriculture. That is, I focus ethnographically on the real world sites where ways of knowing become ways of being with more-livable conceptions of the environment at stake.

To frame the argument, I first set up the last century of agrarian change as one dominated by instruction in seeing nature from a particular, and particularly narrow, point of view. These are the discourses and institutions that reproduce the dominant Western modes of agricultural science and practice characterized by command and control designs on Nature and radical simplifications born of the techno-scientific reductionist lens (Jasanoff 2005, Scott 2008). The agricultural landscapes seeded from such knowledge, as James Scott argues, render nature tamed through techniques of legibility, mastery, standardization. As will become clear below, sight, vision, and modes of ordering and observation are at the heart of such problematic paradigms. They likewise furnish clues to partial emancipation. Importantly this form of sovereignty is not one of independence, but of new forms of interdependence, human and non-human.

Specifically, the ethnographic analysis in this chapter is focused on and derives from the skilling institutions of alternative farming workshops and conferences. Offering training in distinct aspects and applications of alternative agriculture, the courses of concern here are informed by permaculture and biodynamics. 1) A farm design course utilizing nature-as-model, 2) a guided pasture-walk in careful observation of ruminant animals, and 3) a seminar presentation exploring the plant/people interactions of what's called "quantum agriculture," these workshops are oriented—in different ways—to cultivating a community of practice with a holistic way of seeing ecological entanglement. Instructors strive to instill an alter-scientific approach that re-educates attention, expanding fields of vision (beyond the reductionist lens) while integrating knowers as ecologically co-constitutive. In other words, the work is aimed at collapsing the nature/culture divide and offers a situated knowledge (Haraway 1988) in which human/environmental relations are reconfigured. Such alternative approaches to working with and knowing nature promise to cultivate a more holistic understanding of ecologies of people,

plant, and planet, even as such approaches remain marginal to and marginalized by mainstream reductionist knowledge regimes.

4.1 Fields of Vision

To better situate the exceptional nature of the knowledge paradigms explored below, it is necessary to first ground ourselves on familiar terrain. In the twentieth century, agrarian change was dominated by the industrial ideal, in which both farms and farmers were made Modern—rational, efficient, technologically-sophisticated—buttressed by ideologies of productivism and progress (Fitzgerald 2003). In the United States these transformations were born of collaboration between research scientists, extension agents, policy makers, and agricultural corporations, resulting in the "capture" of the predominant institutions of knowledge, orienting scientific research problems and technological solutions towards agribusiness and large farm interests (Buttel 2005, Kloppenburg 1988). The development of Modern agriculture globally has been the development of Modern agrarians. Transformed farms transformed farmers in reciprocal ways, producing and reproducing agrarian landscapes governed by a logic of industrial efficiency as well individuals increasingly interpellated by a particular—and particularly problematic—way of seeing.

James Scott (1998) is a particularly astute observer of such shifts in perspective. Synthesizing extensive research on peasant agricultural practice (Richards, Marglin), Scott argues that the fields of vision observable through the techno-scientific lens are always-already simplifications, efforts that render complex phenomena intelligible to the reductionist gaze. Surveying high-modernist forests and farms, Scott shows that the tunnel vision of scientific

simplification “makes the phenomena at the center of the field of vision more legible and hence more susceptible to careful measurement and calculation.” He continues, “combined with similar observations, an overall, aggregate synoptic view of a selective reality is achieved, making possible a high degree of schematic knowledge, control, and manipulation” (11). This synoptic view offers gods-eye observations obscuring the intricate relations between parts in favor of isolated variables. Such visions, Scott argues, afford not knowledge for knowledge’s sake, but for highly-efficient management.

The rationalizing and ordering strategies of high-modern development projects function to create “legibility,” the reduction of vernacular, highly various, infinitely complex social and environmental landscapes into simplified forms conducive to abstraction, generalization, and thereby universal application. Monocultures, he argues, exemplify the dangers of dissolving an extraordinarily “complex and poorly understood set of relations and processes in a foolhardy project of isolating a single constituent element of instrumental value” (21). Not only are actual farmers and their communities more complex than simplified models afford, the ecological spaces in which farmers grow directly contradict the radical simplification of agricultural high modernism and centralized, “cyclopean” shortsighted modernization schemes (262-264). The resilience of indigenous agricultural systems, and thereby indigenous farmers, lies in the maintenance of an intricate ecology of human and non-human relations.

Dominant scientific institutions—including land grant institutions tasked with research and development in the service of agricultural advance—sharpen such views, deepening, disseminating, and inculcating this reductionist approach. Indeed, taken to the extreme, soil science—for example—reveals not synergetic relations between bacteria, fungi, plant species, and terrestrial ecosystems, but rather an inert substrate awaiting finely-tuned applications of

NPK (agroindustry speak for nitrogen, phosphorus, and potassium). More still, such simplifications are inscribed on landscapes, nowhere more obvious than the neatly-ordered cornfields of the American Midwest. As Scott underlines, the standardizations and abstractions of scientific agriculture are "powerful misrepresentations that usually circle back to influence reality. They operate, at a minimum to generate research findings most applicable to farms that meet the description of their schematization: large, monocropped, mechanized, commercial farms producing solely for the market." Ultimately, such schematizations "systematically operate to nudge reality toward the grid of its observations" (300). As Deborah Fitzgerald (2003) has argued, industrial logics produce and are produced by industrial landscapes. In the modernization of the American countryside, agricultural engineering and social engineering were often simultaneous, in crucial ways synonymous.

Importantly, the externalities of the technoscientific approach are beyond the accounting of its narrowly defined field of vision. What drops out of the frame, rendered invisible through inattention, are the side-effects of such simplifications, elements which were once a part of functioning systems only to become excess, indeed pollution, under the techno-scientific managerial regime. The ubiquitous socio-environmental formation of the plantation well indexes the core elements of these logics. It combines the strict ordering of nature and society with an enlightenment faith in technical and scientific progress, human domination of nature, and rational design (see Scott, 4). Plantations are a reshaping of a landscape into a commodity frontier for a single extractive resource. For this reason many social scientists are describing the current impasse of planetary ecological disturbance not the Anthropocene or even the Capitalocene, but indeed the Plantationocene—an aptly-agricultural designation for the intwined

contemporary crises born of the combination of radical simplification, controlled manipulation, and the disciplining of plants and people (Haraway 2015, see also Li 2018).

The 21st century brings with it novel academy/industry relations and new species of biocapital (Helmreich 2008, Sunder Rajan 2012, Kloppenburg 2004). In agriculture they offer a brave new world of biotechnology, robotics, genetic engineering, microbial research, precision agriculture, and data science. Such "advances" remain rooted in the techno-scientific gaze and only extend the productivist approach concerned mainly with efficiency, yield, control, and an instrumentalized nature as "resource." Indeed, they represent the veritable apogee of designs on nature (Jasanoff 2005), manipulations of life from the planetary to the molecular scale. With these advances new research methods and models emerge, informing and informed by the shifting knowledges of agricultural practice. These historical and emerging landscapes of knowledge continue to sediment infrastructures of agricultural science and technology and reproduce the reductionist gaze. But they are also being reimagined to disrupt the present and cultivate alternative futures. If we turn to margins of the so-called Modern, there are glimmers of counter-movement in the emergence of alternative agricultural practices buttressed by alternative ways of knowing. They offer ulterior ways of seeing phenomena and thus reinforce other ways of acting in and with nature, rather than on it or worse-still against it.

I turn now to a series of workshops in which alternative modes of perception are elaborated and instilled for apprenticing agrarians. If apprenticeship is situated learning, an enculturation into a participatory way of seeing among communities of skilled practice (Lave and Wenger 1991, Grasseni 2009), such programming offers unique insights into divergent ways of working with and knowing nature as well as its social reproduction. These are efforts to design worlds in which many worlds fit (de la Cadena and Blaser 2018, Escobar 2018), where

plantation logic and modes of perception are replaced by alternative fields of vision in which humans and non-human are in-relation, interconnected, and intimately entangled.

4.2 Designs on Nature

Evan's workshop that introduced this essay emerges out a theory of agricultural praxis known as permaculture. Permaculture is a form of agroecology that marries indigenous agricultural approaches with landscape architecture in an effort to consciously design holistically-integrated working landscapes. As one practitioner described it to me, permaculture is "a design philosophy that observes patterns in nature and integrates the patterns in order to create efficient systems." The framework was founded in Australia in the mid 1970's but now consists of more than a hundred thousand active practitioners, many who have completed formal certification courses, others who are simply inspired by the techniques and perspectives and study independently through the many popular and readily-available handbooks or training manuals. In the U.S., courses in permaculture— sometimes whole learning tracks—are a mainstay at many regional organic farming conferences, in particular at those organized grassroots by communities of practicing farmers. Evan's opening salvo to his lecture on permaculture design is an exceptionally poignant statement about an increasingly ordinary alternative agricultural approach. While more and more common, what it offers is an extra-ordinary reimagination of more-than-relations as mediated through the practices and paradigms of farming. Evan aptly emphasized the need for new ways of seeing, and an (re)education in attention is at the foundation of permaculture trainings.

A permaculture workshop I attended in Central Appalachia offers a telling example. Much of the conversation over this three-day training revolved around better understanding

ecological entanglements, human and non-human. Consider the foundational permaculture principle of *functional interconnection*, in this instance illustrated through the chicken. During an hour long exercise in holistic conceptualization, participants were asked to identify the needs and contributions of this common critter on many diversified farms, focusing on what it requires to live well and what are the essential elements of its constitution. The collectively crowd sourced list started with innate characteristics and personality traits, then basic needs, and finally the animal's outputs. Requirements, the group decided, were shelter, grit, water, food, and other chickens. Products include eggs, manure, carbon dioxide, but also behaviors such as scratching foraging and fighting. All of this is contingent on the specific breed as some are excellent layers, others more cold tolerant, still others are better mothers. Through this exercise the group developed a better sense of the chicken as a complex being that must be understood in its nuances and particularities.

The lesson does not stop at the chicken. Chickens have innate characteristics and proclivities, but there is no ur-chicken. As we come to learn, there is only a chicken situated within an environment. To demonstrate, the group is then asked to think of the chicken in relation to other elements of the farm, each with its own essential inputs and outputs. From the house, to the vegetable garden, to the greenhouse, to the orchard, to the pond, to other livestock, the group mapped how the chicken exists in relation to other primary elements of organic farms. In the garden, for instance, the chicken tills soil, it forages pests, and provides soil fertility through manure. In the orchard, it reduces pest pressure, roosts in trees, consumes fallen fruit, and grazes weedy grasses. The list goes on. Outside of the appropriate context these behaviors can easily become problematic. The industrial CAFO offers the ultimate example—and one

frequently cited in workshops. Manure becomes pollution, feed requires purchase, natural defense strategies must be tamed. Context is crucial.

The key to the permaculture paradigm of *functional interconnection* elaborated in these lessons is to see the chicken as always already in-relation to other elements on the farm landscape. Rather than as a discrete entity, one learns to see the chicken as part of a system, and working relationships as critical to vital ecologies. One element's needs are situated such that they are filled by the yields of another. Each element is multifunctional and placed in relative location to one another to promote synergy. As a prominent permaculture guidebook puts it, "design is a connection between things. It's not water, or a chicken, or the tree. It's how the water, the chicken, and the tree are connected" (Mollison 2011, 5).

If industrial monoculture offers designs on nature, as Sheila Jasanoff has argued, permaculture provides designs *with* nature. The prepositional twist is important as the former foregrounds control and the manipulation of discrete variables whereas the latter emphasizes holistic interconnection and collaboration. Consider how the approach is described in what is considered by many to be a key textbook on permaculture practice: the philosophy behind permaculture is one of "working with, rather than against nature; of protracted and thoughtful observation rather than protracted and thoughtless labour; and of looking at plants and animals in all of their functions, rather than treating elements as a single-product system" (Mollison 2011, 1). Again, what is emphasized here is an ethos of ecological entanglement in which parts can only be understood in relation to wholes, of (inter)acting as a part of nature rather than apart, and of committed effort towards patient observation rather than imposition. In this model, good design is noticing relations and arranging the conditions for such relations to flourish. In other

words, permaculture offers designs not *on* nature, but "for the pluriverse" of multiple socio-natural configurations (Escobar 2018).

Observation is central to the permaculture approach, a protracted and relatively passive attentiveness that proposes a divergent way of knowing nature from the conventional reductionist approach. As the founder of permaculture Bill Mollison writes, "Scientific method is one of the ways to know about the real world, the world we are part of and live in. Observation and contemplative understanding is another…although we can observe nature, living systems do not lend themselves to strict scientific definition for two reasons. Firstly, life is always in a process of change, and secondly life systems react to investigation or experiments" (Mollison 1988, 11). That life is dynamic and reactive, and thereby resistant to scientific analysis in the reductionist mode, are themes that will be explored in somewhat different ways and in greater depth in the sections that follow. But the key here is to notice the sustained emphasis on observation, and specifically attention towards the complex web of relations of an organism and its environment.

Indeed, one of the first principles of permaculture is *observe and interact*. It is not incidental therefore, that most permaculture trainings do not take place in classrooms but in living laboratories of actually-existing landscapes. During the workshop offered in central Appalachia, the class spent the vast majority of the time outdoors: walking the terrain, identifying the contours and existing vegetation, considering the weather, water and wind, noticing wildlife, flows of energy, and the sites more-than-human metabolism. The instructor notes, "We want to observe this macro all the way to the micro level. So we're looking at how the moon moves, the sun moves, the stars move. We're looking at the seasonal changes. And then we're going out and we're going to sit in the field and we're going to look at a one foot by

one foot square of ground and look at the plants and insects and the soil type all over this property.” He continues

> This barn's been here for a while. It's going to stay here. However, it influences the world around it a little bit. Right. It's going to collect all this rainwater, is creating shade on the north side. And it's also creating a heat sink on the south side, before that wasn't here. So we can tap into those microclimates and those energies that are happening around this building and we can utilize them based on how we want to create these other elements into the landscape. This building right here is the heart of this this land. And it's where everything stems from. So we want to observe that.

Coupling the principle of *functional interconnection* with that of *observe and interact*, neophytes are learning to see in a complex and nuanced way how aspects of the environment exist in fundamental and co-constitutive relation to one another. From the microclimates of the barn, to the alignment of the planets, to the multispecies liveliness of the smallest patch of earth, the lesson is in noticing less obvious aspects of an agricultural landscape in order to design farm ecologies with nature in mind.

Permaculturalists often quip, though quite seriously, that the hammock is their best design tool. For it is from the hammock one is forced to patiently attend to the ecologies in flux, resisting the temptation to impose. As the instructor reflects, “one of our main principles in permaculture is small, slow solutions and I can't emphasize slow enough. As Americans, we are in a coffee society. Let's go, go, go. We're all in a hurry. We have to learn slow down, to breathe. That's why this meditative, contemplative space is so vital. And the hammock is so vital. It forces us to sit down and take time and look at things. Because if we rushed into it, I guarantee you we're gonna make a lot of mistakes.” He continues,

> the [observational] phase could last for years and it should. It's an ongoing process. The initial observation can just take twelve months, which I always encourage people to give it one year before they do anything. So you've got a new piece of land, spend a year on it before you really start doing anything major. That doesn't mean that you don't plant a

> garden, do some things, but *take the time to witness* because the seasonal change will make a big difference.

Here again we see a reiteration of the importance of protracted, patient observation of a dynamic landscape, from the macro to the micro scale. The impulse to control, or to act with culturally-instilled haste, leads to a myopia of vision and ultimately to mistakes. The hammock is vital because it encourages "taking the time to witness."

A truly modest witness, as Donna Haraway (2004) reminds us, is not the objective, authoritative, seemingly magical power of technoscientific rationality, but rather "a more corporeal, inflected, and optically dense, if less elegant, kind of modest witness," a knowledge praxis situated in landscapes intent on embedded relationality rather rationalist remove (224). The instructor describes how he arranged the infrastructure on his farm to encourage this manner of witnessing. He notes, "This is how we observe nature, how we learn from nature. We actually just stand here and the world moves around us, if we just stand in one place and watch. I actually built a bench in my garden and it's my observation bench. It's so that I know that I'm in a fixed position and I can over time, I watch the trees bud out and then fall, and then I watched the moon go up and down. And I watched the sun go up and down. I watched the shadow behind me from one fixed position. So I would encourage everybody to find a fixed position in your garden that you can sit in and observe the world… it's all perspective and how we look at it." Trainings in permaculture are oriented towards a shifting of perspective, away from transcendental visions splicing subjects and objects, humans and nature. In such a conceptual model, the human becomes a being in the world and of it, and knowledge a product of yet another permaculture principle, that of relative location.

A stand alone principle in and of itself, keen observation informs many of the other principles as well. For instance, *Design from Patterns to Details*. Back in the workshop classroom, we outlined the patterns observable in nature: from waves, layers, branches, circles, spirals, to the lemniscape (infinity sign). We learned not only to notice these as they occur in the environment, everywhere around us, but to incorporate them into functional landscapes design. Other principles rely on observation as well. *Catch and Store Energy* advances an attention to energy cycling, building landscape infrastructures such that natural (de)compositions and metabolisms can occur. *Value the Marginal* likewise asks permaculture farmers to broaden perspective and fields of vision, reevaluating waste and worth. Consider:

> think about the marginal as like your peripheral vision. We're looking directly at something. But even though I'm looking directly at something, I am also able to see all these other things around the edges here that are still part of the form and the function of the design. But they might not have the great influence that say this barn does. But yet it's still vitally important that we value that part of the design. This pine forest, That's a great one. It is marginal. It's not the focus here. But yet it has an influence on the P.H. of the soil, on how the water flows down that hill. The species of plants that are growing here, you might look at that pine forest and just be like, oh, it's just a crazy old Christmas tree farm somebody abandoned. But it has a huge influence, even though it's not something that we're actually really necessarily even part of the farm in a real way. So we can't undervalue those elements

In short, lessons in landscape design are an opening of awareness to, and thereby a reconsideration of, the expanse of ecological entanglements. Peripheral vision extends the horizon, expanding fields of view. In doing so, it works to thwart the myopia of the reductionist mindset.

At stake in these workshops is a reeducation of attention and ways of knowing, but not only so. Practitioners are after a more-than-human reorientation, indeed reorganization, of society itself. Returning to a prominent permaculture guidebook often assigned as further reading beyond in-person workshops, consider the quite reflexive scope of these ambitions,

"[permaculture] metaphysics involves envisioning ourselves as part of the natural world and acting in accord with that vision…now is the time to restore ourselves to the ecosystem, and thereby to restore the ecosystem itself." The author continues,

> To do that we must reform ourselves: reform our sense of who we are, of what is right and wrong, of how the world works, and how we operate within its socially, economically, ecologically, and spiritually. [Permaculture] requires us to be open. To listen and look. To hone our skills of observation and discernment. To use these skills before we intervene in our garden, and in our world. To act with respect, humility, and as much wisdom as we can muster. To expand our sense of where our gardens begin and end to include the neighbor's yard, the town, the region, and the planet, with all the inhabitants therein. (Jacke 2005, 52-53)

From seemingly simple acts of observation—a retraining of perception to take into account the marginal and the more-than-human—the permaculture paradigm strives to reintegrate man and nature. Through such a way of seeing, natureculture restoration is understood to be a restoration of the environment itself.

4.3 Lessons for Life

Arturo Escobar argues that to cultivate a transition away from problematic paradigms of human mastery over nature, "we need to step outside existing institutional and epistemic boundaries if we truly want to strive for worlds and practices capable of bringing about the significant transformations needed" (2015, 13). Through lessons in permaculture, as we have seen, one learns principles of design for the cultivation human/environmental relations otherwise. At the heart of such a transition is a shift of perspective and epistemic practice, away from legibility-by-simplification, monocrops, and controlled manipulation, and towards peripheral vision, polycultures, and patient observation of ecological entanglements, in which Man is very much embedded. But such efforts at reintegration are far from unique to

permaculture alone. Indeed, a (re)education of attention towards more-than-human worlds is at the heart of pedagogy in alternative agriculture. One learns about farming, certainly, but the farm also becomes an experiential laboratory for cultivating other ways of seeing, other forms of knowing, and thereby other forms of life.

Another workshop offers a particularly revealing case in point. It is Fall 2018, in the verdant Hudson Valley of New York, long the agricultural and extractive hinterlands of the country's great urban metropolis. The other biodynamic apprentices and I, seven of us in all, sit around a table in a small classroom that resembles a hybrid library and scientific laboratory. Some of us had spent the morning harvesting vegetables for market, others moving, managing, and milking cows, all doing so at the usual rather frantic pace (on the tempo of alt ag, see Chapter 2). This morning the tempo of tasks was all the more accelerated knowing that we would need to get the animals and orders ready prior to our monthly apprentice training session here at the nearby Center for the Environment.

Now in the classroom, the instructor brings from a large closet a well-kept box of bones. He pulls out and holds up a cow skull and begins to describe its morphology, pointing out the placement of the teeth, and their specific relationship to the bovine's horns, still very much and not incidentally intact. He continues by passing around the skull, encouraging the apprentices to notice aspects of the animal's anatomy. In particular, he points out the missing incisors from the upper jaw. The cow we learn does not have incisors and cannot have them, as is the case with any other animal with horns or antlers. It is also why the lion has no horns and cannot have them. "Have you ever noticed that relationship," he asks? The point, he suggests, is that seeing through the lens of Darwinian natural selection, where random variation couples with ecological fitness, tells only a partial story. The animal's organization, he tells us, must be understood holistically

rather than mechanistically, it needs to be thought of dynamically and relationally rather than statically.

After another hour passes examining fragments of ruminants and ungulates, thinking through their diverse digestive processes and discussing their distinct anatomical features, we venture out to one of the nearby pastures where the dairy herd is enthusiastically grazing. Each with our notebook in hand and the cow anatomy exercise still fresh in mind, we spend a cool and misty late morning in quiet observation, attentively watching the behavior of the animals independently and together, making note of what we notice. I myself am captivated by the metronymic motion of the tongue, sweeping back and forth, back and forth, rhythmically ripping grasses destined for the rumen. Another apprentice breaks the silence to foreground how the herd makes its way across the field in unison without any overt consciousness of doing so (fish-like; a school of nature, in the fullest sense.) One of the more artistic among us draws a series of portraits, capturing the cow caught up in its ecology, moving through space in a manner specific and uniquely suited to its species. After the exercise we briefly regroup to recap our observations. The rest of group hurries off to a short lunch before breaking back out into the rush of productive practice, making up for lost time, or so at least it seemed to me. Curiosity peaked, I stick around awhile, hoping to make sense of the wonder-full world I have found here. (on the relation between wonder and knowledge, see Sideris 2017)

The Center for the Environment, our workshop host, seeks to develop qualitative and holistic approaches to understanding nature, science, and technology: “We want to foster a phenomenological approach to doing science and studying nature,” he tells me. The goal of these and similar workshops, the instructor explains, is less to say anything specific about animal anatomy and ecology, though it is that also, than it is to train and transform perspectives. “We

want the apprentices to slow down when they come here, be present for awhile, and simply observe nature," which is of course not so simple. He reflects that the farm apprentices work with the cows everyday but it's easy to lose sight of the bigger picture,

> if I can just give them a little bit of a feeling for something different, [a different way] of thinking and then with observation if we go out and look at the cows…they never do this. They're just working all the time. So just to go out and sit with the cows, especially the ones who've been working with the cows all year long. Just noticing all these things they've never seen. That's a beautiful thing.

When apprentices come for these workshops, he explains, "I want them to better understand how things hold together, how animals exist in relation to other plants, animals, the environment, and us." This is necessary, he suggests, because we need alternative ways of relating to nature: "We need to radically reorient our ways of thinking about, experiencing, and interacting in the world."

The instructor researches and teaches a peculiar way of knowing referred to as Goethean science. Through workshops, scholarship, and other trainings, he and colleagues seek to cultivate a phenomenological approach to the study of animals and plants as dynamic and integrated beings within a larger web of life. This alter-scientific form of natural philosophy has roots in the early 18th century Germany, expressed most cogently in the writing of Johann Wolfgang von Goethe, far more than a poet. A version of this approach—informed by the phenomenology of Morleau-Ponty, Husserl, Heiddegger and others, as well as the spiritual science of Rudolf Steiner—persists marginally into the 21st century, developed by a number of research institutes, mainly in central Europe. The Goethean mode of understanding seeks holism, that is, to see the parts through the prism of the whole, encouraging a way of science that dwells in phenomenon, in and with nature. As leading scholar of Goethean science Henri Bortoft, frames it, the goal of such an approach is to let "things become manifest as they show themselves without forcing our own categories on them. This kind of learning and science goes beyond the surface of the

phenomenon, but not behind it to contribute some causal mechanism described by a model borrowed from somewhere else" (Bortoft 25).

Quite reflexively recognizing the cultural-historical foundation of modern science—its fundamental embeddedness in social context—the Goethean approach strives to resituate knowers as beings in the world rather than abstract knowers, divorced from context. The instructor reflects,

> knowledge is a participatory relationship. So you're always participating with something else and you can't separate yourself completely out of the things. That's an illusion. But you can engage in more or less responsible, authentic and conscientious ways that let the other that you're in a dialog with reveal aspects of its nature to you. You can prohibit that through certain ways of knowing, and you can foster that. So that if your main question in biology is what's the underlying mechanism, then that's what you're going to find. If you find anything, you're going to find that, because that's where your questions are going. But if life happens to be not so much about mechanisms but it's more of a process and it's more fluid and it's more dynamic than mechanisms are, then you're not going to grasp that so easily.

Such a mode for understanding intentionally resists the reductionist approach, and its narrow field of vision. Bortoft emphasizes that "there could be a different science of nature, not contradictory but complementary to mainstream science. Both can be true, not because truth is relative, but because they reveal nature in different ways" (Bortoft xi). The praxis of a Geothean scientific approach promises to disclose Nature in a manner multiple, less about hidden mathematics, causal mechanisms, and controlled manipulation, and more about attentive exploration and conscious participation in a living world.

To achieve this participatory relationship, participants strive to perfect a form of "delicate empiricism." The slow and patient observation of the cows on that cool fall morning exemplified this emic knowledge practice, the task little more than noticing phenomenon in their complexity, and striving to prevent preconceived expectations or concepts from delimiting what is

experienced or seen. The instructor reflects that this is a "a phenomenon based dialogical type of science, [with the goal] not so much to explain but to portray, to show relationships" He continues,

> you're seeing yourself as part of the context, of any given phenomenon. what's the context of, lets say, a plant coming into being and showing itself? And you try to, that understanding becomes more painting a picture of relationships than it does elucidating causal mechanisms. Right. So it's a different characterization of what meaningful knowledge is.

As with permaculture trainings, here again context is crucial. So much so, in fact, that the regular newsletter of the Center is titled "In Context." In conversations and presentations, the instructor regularly uses the phrase "how things hang together." Struck by this peculiar but profound language I inquire further. Caught off guard by his own frequency of usage, he tells me it's a quite literal translation. *Zussammeng*, the German word for in context, quite literally means together hang—hangs together.

An emphasis on context, and an orientation to how things hang together, again foregrounds the importance situation and relation. The task, he tells me, is to develop an "organ of perception" allowing neophytes to better perceive relations and to broaden the capacity to notice. "I want the phenomena to speak. That you come into a relation where the intentionality that you bring towards the phenomenon is one of…Can you show me? Can I let you disclose to me aspects of who you are? Can I get into a mode where that becomes possible?" The careful analysis of the cow skulls offers a case in point. "We can ask the cow what, you know, what is it with your horns and no teeth in the top jaw. Right. What is it? And you might not be able to answer, but just to ask that question, that makes you more, this is then you could say the ethical part of it. When you start working like this, you begin to respect things more." An open-ended capacity for curiosity is closer to the goal than any definitive understanding.

Clearly, objective, distanced, value-neutral empiricism—the heart of modern science—is not what is being instilled through the practice of Geothean observation. Quite intentionally so. If there is an implicit ethics to every way of knowing, as feminist STS scholars have argued, then knowledge comes with obligations. Donna Haraway proposes that "the point is to make a difference in the world, to cast our lot for some ways of life and not others. To do that, one must be in the action, be finite and dirty, not transcendent and clean" (236). The encouragement from both Haraway and the Geothean scientists, then, is a coming to terms with, and even cultivating, the situatedness of knowledge. Embedded relationality is not an unfortunate perspective to be overcome, but the strategic outcome of patient practice and a trained organ of perception. "Nothing comes without its world," Haraway continues, "location is also partial in the sense of being for some worlds and not others. There is no way around this polluting criterion" (237, see also Puig de la Bellacasa 2012). In science and in farming, hands are soiled on way or another.

If "the wider, cultural function of modern science is in the way that it has been instrumental in the cultivation of an analytical mode of consciousness," (Bortoft 329) then the participatory mode of Goethean science offers an alternative to the logics of analysis and abstraction, opening the possibility for modes of non-reductionist thinking, doing, and being in which humans and non-humans are thoroughly enmeshed. As our classroom instructor explains (in his writings), "living thinking is a participatory way of knowing that transcends the dichotomies of man/nature, subject/object, or mind/matter." Animal and plants, we learn, reveal to us that "life is eminently contextual…they prod us, if we pay attention to them, to move beyond object thinking…[offering] the ability to enter into an open-ended dynamic dialogue with the world in our thoughts and actions, so that they can reveal and enhance the living qualities of the world we inhabit."

At the Center for the Environment, apprentices utilize practices of close observation born of Goethean Science in an attempt to, I would argue, skill and reskill vision (Grasseni 2004). If, as suggested, modern science is produced from, and—perhaps more importantly—reproduces, a particular analytical, object-oriented ontology and alienated relations with capital N Nature, the task of epistemic transformation is one of unlearning and relearning, tuning anew our perceptions of the environment towards entanglement. Environmental engagement, as Tim Ingold (2000) suggests, is a socially-mediated education in attention.

4.4 The Nature of Knowledge

"Spirit is never without Matter. Matter never without Spirit." This quote by Rudolf Steiner, the founding figure of biodynamics, was offered as the preamble to another illuminating lesson on the importance of entanglements in more-than-human worlds. Some months after the workshop at the Center for the Environment, I once more found myself among a group of apprentices, this time at a major biodynamic conference. Here we participated in three days of programming on symbiotic agriculture and eco-social justice, all of it underlined by the unique cosmo-vision of sacred ecology at the heart of biodynamic farming (for more on biodynamic agriculture, see Chapter 5). For our purposes one particular session stands out; on the topic of Quantum Agriculture. What, I asked, might the insights of quantum science teach us about educating our attentions otherwise? how exactly could that relate to agriculture?

Over the course of an hour, the instructor walked a packed conference room, some seventy people in all, through basic principles in quantum science and relativity theory. The workshop commenced with a brief foray into the theory of relativity, outlining some if its

essential assumptions and conclusions to ultimately emphasize that "everything is related, there is no point in the cosmos that is not moving and by which everything else can be measured in reference…both time and space are subjective experiences of each observer, they are not independent of each other." The instructor then offers an example of perception and multi-dimensionality, presenting a skewed cylinder moving across a plane through time, noting that at any given snapshot what one perceives on the visual plane differs dramatically. "What we can see here is that a higher dimensional object or being can manifest itself on a lower dimensional world in completely different forms at different times." He continues, "take it back to our world, one looks at a plant and its different stages, each stage is one slice of the being revealed in one moment in time, the whole of the being exists, but in another dimension that we don't have access to. Completely different forms can come from one archetypal being coming from a higher dimension." So is the case with a cylinder as well as with the cyclical manifestations of plant, an observation and a mode of observation at the heart of Goethean science. This is less a vernacular theory of platonic form, where the plane of perception is but illusory shadows on the cave wall, than it is a (re)articulation of what Strathern (2004) might call partial connection—a "post-plural perception of the world" (xvi)—or Mol (2002) might describe as a more than one but less than many.

The core of the workshop centered on a patient depiction of the double split experiment in quantum physics. The instructor notes, "quantum physics was developed because experience or experiments of natural phenomena were not explainable by existing theories of the time. It forced scientists to develop new concepts, to think differently. This experiment is a good introduction to the mystery and behavior of quantum particles or beings." The not-so-basic finding of the experiment is that an electron, atom, or even a molecule is both a particle and a

wave at the same time. Still more, any effort to isolate and measure the molecular movement confounds the analysis itself, it manifests as either one or the other. While there are multiple musings on what is at work in this experiment, the Copenhagen interpretation is the most well received. At its heart is the "complimentary principle." The instructor notes,

> the complimentary principle states that a quantum entity has paired properties and only one of them can be revealed at any given observation. One of them is a wave characteristic the other a particle [showing up in the experiment as polarities of light and darkness]. It's kind of two extremities on the same scale…you can find similarities between this principle and the concept of ying/yang in Daoism, as well as in alchemy—which is the basis of biodynamics—where every phenomenon is an interplay between two extremities. We need them both for adequate understanding. What we see depend on how we look at it, how we set up the experiment.

He concludes, "In quantum physics there is no separation between the phenomena and the observer, you have to take all of it together to understand what is going on. You can't just say it's a particle, it's a particle because this is how you look at it." This same holds true for the uncertainty principle's mathematical model; "if we know something about one aspect, what can we know about the other. The more we know about where the particle is the less we can know about its frequency or wavelength, and the more we know about it wavelength the less we can know about where it is. This is not because there is some limitation on our knowledge or our ability of the measuring devices, its inherent in how at the quantum level things work."

To sum, and worth explicating at length, the instructor returns to the introductory quote on the entanglements of spirit and matter:

> I want to return to what I started with. For me biodynamics is about transforming nature, transforming the natural world through its spiritual knowledge, in order to do that we must to form a connection, we can't really change anything if we don't have a connection to it. Steiner said we need to form a personal relationship with everything in agriculture. For me forming a personal relationship, is being interested in a phenomena. So I think natural science, physical science, is one aspect of the phenomena, and spiritual science is complimentary, and we need both of them to be engaged with a phenomena.

This final thought offered something of a rosetta stone, helping to translate what any of the above has to do with biodynamic agriculture. It does so in multiple modes.

On the most basic level, the lesson is that even the hardest of hard sciences, physics, has findings that are unintuitive and open to interpretation, much like biodynamic practices. But at a deeper level is an underlying emphasis on the importance of connecting to quite literal matters at hand. In other words, not the disinterested gaze of the control experiment or disembodied scientists, but rather the invested and interested attention of an individual seeking to promote personal relations. What kind of optics, what kind of science is this when there are explicit stakes in the outcome? If there is "no separation between the phenomena and the observer" then quantum mechanics affords a theory for valorizing situated knowledges and views from a point rather than points of view. It is less you have your facts and I have mine, nigh but relativism, than it is—following Strathern—a world abounding in personal and partial connections. One might rightly have reservations about so-called "subjective" science but Haraway (1997, 36) persuasively suggests the importance of taking a stance, embedded and emplaced: our task again is to be "in the action, be finite and dirty, not transcendent and clean." This reiterates the essential feminist maxim that there is simply no view from nowhere, and efforts to suggest otherwise is human hubris.

Yet there is still more. What was also being offered was a case for complementarity theorized in and through the material world. One need not think about nature or scientific praxis as either/or, it is always already a both/and. Different approaches depict different natures, plural and partial, both portraying and potentiating unique relationships to world. And both are necessary. How we know nature influences the nature that we know and does so in a

metaphorical and quite material manner. The workshop offered insight into quantum physics, but also and more importantly, a physics refracted, or should I say diffracted, through a biodynamic prism to reveal matter multiple. Diffraction (Barad 2007) is a critical mode of thinking through and with relationality and difference that offers a "mapping of interference." As Barad (2007; 91) thereby argues, "Practices of knowing are specific material engagements that participate in (re)configuring the world." And as with the observational exercise offered at the Center for the Environment above, such practices and paradigms educate attention, offering a way of seeing that is both a heuristic and hermeneutics of nature, divergent from dominant discourses. An understanding and appreciation of intra-action is capable of restoring and restorying—that is, telling tales differently— more-than-human relations.

4.5 Educating Attention, Agriculture, and Arts of Noticing

Much anthropological attention has been paid to the way modernizing forces—whether carried by development practitioners, missionaries, or the market—have worked to eradicate alternative ways of conceptualizing human/environmental relations. Carolyn Merchant (1980) has aptly called the result of such processes the "death of nature," emphasizing how the development and diffusion of western science has played a primary role in inculcating mechanistic thinking, a perspective that interprets nature as manipulable, inert, and lifeless matter. Recent ethnography has highlighted the way frameworks of ontological and epistemic alterity have endured and adapted in the face of constant yet ever-changing external pressures (Kohn 2013, de la Cadena 2013, Chao 2018, see also Gupta 1998). At the intersection of environmental anthropology and (feminist) science and technology studies, this chapter responds to important contemporary calls to notice alternative forms of life emerging in the ruins of

Modernity and its problematic logics as well as emancipatory efforts to stage more-than-human relations otherwise (Tsing 2015, Myers 2019). In the proceeding, I strive to better understand not the loss of lifeworlds or their plighted persistence—amounting to a salvage anthropology of ethnoscience/ecology. Following my interlocutors, in the dual meaning of the phrase, I attend to the process of more-than-human worlds coming together.

Committed to the practice of looking for life in the ruins of capitalism and its problematic logics this chapter exercises an "art of noticing" (Tsing 2015). For Anna Tsing, arts of noticing are efforts to see beyond the tales we already know and, as anthropologists in particular, all-too-easily tell: stories of suffering subjects, damaged environments, industrial abandonment, livelihood loss, and the many other byproducts of colonial and capitalist formations (see also Latour 2004). The shift in analytic focus moves beyond processes of decline or deterioration and towards the lively forms that emerge from the ruined landscapes modernity has made. Arts of noticing, then, are both a research method and a commitment to representation. The task, as Tsing names it, is to "watch unruly edges…to put unpredictable encounters at the center of things" (20). The goal becomes to enliven the landscape as one bustling with beings and relations, with emergent forms of human and non-human life and all their constitutive entanglements.

The strength of "arts of noticing" approach is that this way of seeing is not merely a shift in scholarly attention, an explanatory or interpretative lens imported from elsewhere to understand the phenomena at hand. Rather, it arises internally from the field itself, a reflection—indeed, an amplification—of what Tsing's interlocutors are already attuned to. Just as she finds mushroom hunters in the abandoned industrial pine forests of Oregon, these research subjects likewise find a means to livelihood thriving amongst the leaf litter. Whereas many traversing

damaged landscapes are likely to notice little more than detritus and decay, both her and her informants see fertile forms of life. If the mushroom hunters find themselves "working the edge" of the capitalist periphery (Tsing 61), so too does she. The anthropologist, the foragers, and the mushrooms themselves, all speak to what crops up under conditions of economic and ecological disturbance. The task ahead, Tsing argues, is to notice them.

This chapter practices such arts of noticing, while foregrounding alternative farmers who themselves are noticing aspects of agriculture differently (or are in the process of learning to do so). Through a series of revealing case studies on the knowledge communities of alternative agriculture, this chapter takes up the at once critical and constructive proposal of Natasha Myers: "It's time that anthropologists ask: how are people involving themselves with plants [and animals] and staging relations otherwise? How might such involutions enable other worlds to thrive, even in the midst of ongoing devastation." (2019, 120). The goal is to transcend what eco-feminist physicist Vandana Shiva has described as monocultures of mind; that is, universalizing ways of being and acting in the world cultivated by universalizing practices of thought. Or what John Law (2015) frames as the one-world world. But as de la Cadena and others (2018) rightly argue, the task ahead is to prepare ground not for homogeneity and standardized subjects, but to seed the pluriverse, a world where many worlds fit. I argue that its critical to likewise attend to the institutions, such as the alternative farming courses/workshops featured here, that bring such worlds iteratively into being.

In this chapter I have concretely and ethnographically explored how people are learning alternative knowledge practices and paradigms of/for the living world through institutional engagements with farming workshops, agricultural texts, and marginalized intellectual traditions such as Geothean science. In doing so, I underline the relationship between ways of knowing and

ways of being, a process of educating attentions that is embedded in institutional environments focused on epistemic experimentation. As we've seen these practices and paradigms have often existed alongside the modernist agricultural approach, which mobilizes its own institutions, technologies of governance, and knowledge regimes. Such dominant institutions reinforce a way of seeing antagonistic with the fields of visions practiced by my interlocutors and the knowledge communities they work to foster.

What I've underlined here then is a select set of thought practices peripheral to farming, as such, and I've seemingly left out the agriculture altogether. But this is very much the point. As I've argued throughout this dissertation agriculture is never simply agriculture alone, and that is certainly the case for alternative agriculture where part of the goal of such practices is precisely to prevent the elimination of "culture" from agriculture (see for instance Wendell Berry). Following Natasha Myers' felicitous framing of gardens in the planthropocene, farms stage people/plant/animal relations, producing and reproducing ways of being and becoming in/with/against the world (Myers 2018). They shape landscapes and human subjects. One such staging is the planthropocene's problematic polarity, the plantationocene. Such a way of working with and knowing Nature is born of radical ecological and economic simplifications, alienations, as well as colonial logics of capture and control (see Haraway and Tsing). These are the problematic modes of observation and rendering legible underlined by Scott above, in which seeing like a state, scientist, or capitalist works to tame nature for human ends—techniques of standardization that level fields of vision and make diverse, complex phenomena generalizable, isolated, and divorced from context. They ostensibly offer Latour's (1987) immutable mobiles capable of circulating seemingly everywhere and yet nowhere in particular.

My goal in this chapter has therefore been twofold. The first is to describe in detail the nature of knowledge being inculcated in learning communities of alternative agriculture. The meaning of "nature" here is itself, of course, multiple, underlining both the ontology of the worlds in cultivation but also how these worlds are made, inextricably, of ecological entanglements. The second goal, complimenting the first, is to highlight that the alterity of alternative agriculture lies in exactly these forms difference—not (only) about practical aspects of farming with agroecological principles in mind, but in divergent ways of seeing and knowing nature. If it is ways of seeing nature through a reductionist lens that sits at the heart of the problems of industrial agriculture, such alternative paradigms may well serve to seed farms and farmers otherwise. Another science is possible, Isabelle Stengers urges (2018). I suggest that the agroecological knowledge produced and reproduced in the communities of farmers depicted here cultivates grounds for such a science of agriculture to flourish.

Chapter 5

Alchemy, Vital Nature, and (Bio)Dynamic Matters: On Knowledge and More-than-Human Transformation

It's a cool, misty, early summer morning, and several other students and I sit in a circle, rhythmically stirring small buckets of recently-harvested rainwater. To the liquid we've added a small amount of a finely ground white powder that looks like salt but isn't. It is a quartz-based silica dust that—in the year prior—had been packed into the horn of a cow, buried in spring, and unearthed in autumn. While underground, the workshop instructor tells us, the minerals make use of cosmic centrifugal forces—Nature's seasonal "outbreath" as vegetation ascends towards to sun—amplifying its warmth character and thereby its influence on the fruiting and flowering of plants. Elbow deep in the liquid, we continue to stir, first clockwise for several rotations then regularly reversing the pattern abruptly, counterclockwise. The teacher tells us that our work with water is in creating and dissolving vortexes; that is, in introducing order to the solution, breaking it with chaos, only for order to be restored once more.

Stir it with intention, she implores us, be mindful, create polarity. "We stir with our hands to create connection, bringing the water backwards and forwards but always towards our heart." In the process of stirring, for upwards of an hour, the liquid preparation is said to *potentiate*, to take on the signature of the patterns introduced. "You'll feel the difference when it's ready," she tells us, "you'll feel the water change…you'll know once it has picked up the energetic imprint of the cosmos." Whereas it takes effort to create the vortices at the outset, we learn, by the end they will form at ease; the water will have received its instructions, remembering its shape.

Once ready, the water is gently poured into several sprayer backpacks, the same equipment found on smaller-scale conventional farms and most frequently used to apply various biocides. Other students are handed just the buckets and a broomlike wand. All participants are paired up and tasked with distributing the liquid across the farm, flinging the water in rainbow like motions. We spend forty-five minutes meditatively applying the solution across several acres, patiently ambling across dewy meadows, blanketed by low-lying fog. Through the concealing mist it becomes abundantly clear that this task is a therapeutic exercise for human and non-human alike, a practice of care-full attention and attentiveness. If the sprayer packs are most often used to distribute death in form of chemical pesticides, the mandate here is quite the opposite. We were introducing life across a damaged landscape in the service of remediation—that is, placing ourselves in the middle things, turned towards restoration of more-than human worlds.

Much of the ethnographic attention to alternative nature/culture paradigms comes from the global south; in particular, the indigenous Amerindian communities of South and Central America. Whether thinking with forests or sacred mountains, these perspectives foreground ways of working and worlding otherwise in which humans and non-humans are intimately entangled (de la Cadena 2015, Kohn 2013). Still more, nature is here rendered animate and animating—both alive and giving life. In an era of onrushing extinctions and ecological destruction such approaches offer critical insights into interspecies interdependencies, with human and more-than human livability at stake.

Yet attempts to cultivate more livable worlds proliferate, some (precariously) emerging at the core of Empire. Committed to the practice of looking for life in the ruins of capitalism and its problematic logics (see Tsing 2015), in what follows I think through and with an alternative

mode of agricultural production known as biodynamics and explore the forms of human and non-human life that it engenders. What I am here after are what Bettina Stoezer (2018) describes as "ruderal ecologies," interstitial and unexpected entanglements that crop up in the cracks of the concrete—approaches that are orthogonal, if not directly oppositional, to the dominant Modern modes of conceptualizing the environment and the human place in it.

Biodynamics is often dismissed as merely a fringe form of organic farming. It is frequently derided as pseudo-scientific mysticism, a cult of neo-pagans burying cow horns and planting by the stars. But with practitioners in more than fifty countries, half-a-million acres in cultivation, and its own colleges, scholarly societies, training programs, and audit bodies, biodynamics increasingly flourishes. Rather than facile dismissal or disdain, in this chapter I ask what it would mean to take biodynamic praxis seriously, to stay with the trouble of an aberrant agriculture rooted in a seemingly strange way of knowing. This paper responds to calls to notice alternative forms of life emerging in the ruins of Modernity and its problematic logics as well as efforts to stage more-than-human relations otherwise (Tsing 2015, Myers 2019). I suggest that biodynamics offers "ontological openings" and important insights into the cultivation of more livable worlds (de la Cadena 2015, also de la Cadena and Blaser 2019).

Building on discussions about biodynamics and Geothean science introduced in chapter 4, this chapter brings renewed attention to this alternative form of agricultural production, foregrounding its theory of social and environmental change through the lens of alchemy. Drawing on extensive ethnographic research with biodynamic farmers and the robust knowledge communities they foster, I first introduce biodynamics as a curious agricultural practice with extra-ordinary elements—complete with homeopathic compost teas, planetary consciousness, a perspective of people as plants/plants as people, and transubstantiations of matter. Building on

this foundation, the analysis is grounded in a series of experiential training workshops producing biodynamic preparations, ritually-produced ferments that are believed to enliven nature through exposure to cosmic forces. For example, one such prep consists of yarrow blossoms packed into the bladder of a deer stag, hung in the sun through the summer, buried, and eventually incorporated into compost. Preparations are thought to be medicines to support soil health and plant life, concoctions that concentrate and increase in power as they are processed through natural cycles.

The theory of alchemy that informs these practices is an emic epistemology, an internal element of biodynamics and its specific alter-scientific way of working with and knowing nature. Offering interpretative perspective on the workshops, this chapter analyzes them alongside a series of biodynamic training guides featured on the publishers table at many alternative farming conferences. Their titles are suggestive: *Muck and Mind: Encountering Biodynamic Agriculture, an Alchemical Journey* and *Sacred Agriculture, the Alchemy of Biodynamics*. As one asserts, "every way of knowing becomes a way of living." Examining such a profoundly anthropological claim as elaborated in workshops and guidebooks, I argue that trainings in biodynamic praxis ultimately offer lessons in learning to be affected (Despret 2004, Latour 2004b), an education that at once transforms apprentices as well as more-than-human worlds. Entangling meaning and vital matter (Barad 2007, Bennett 2010) such ways of knowing seed perspectives for living and dying otherwise on an ecologically damaged planet (Tsing et al. 2017). About biodynamics but not only, these lessons underline how skilling institutions work to instill technical capacity as well as culture.

5.1 Lessons in Life

Prior to dawn on a cool Autumn morning, two biodynamic apprentices and I head south from the central Hudson Valley in the direction of the city. We have an hour drive ahead of us and, between sips of coffee and general catch-up conversation on farm life, we discuss the anticipated topic of today's day-long workshop. Part of an experiential training series at one of the foremost centers for biodynamic education—The Steiner School—this is the second such day-long workshop we attended together. The first offered an introduction to the theory and method of biodynamic farming focusing mainly on the approaches' history, basic worldview, and unique orientation to more-than-human entanglement. It was ethereal, quite literally in the stars, covering the critical role of planetary alignments to plant health, cosmic influences on biological life, and the spiritual evolution of humanity, among a good deal more. The workshop was eye-opening to say the least, and interest peaked. This second workshop promised to be more down-to-earth, more practical with an opportunity to learn not only about the curious logics of the infamous if occasionally maligned biodynamic preparations, but also a rare chance to actually make them.

In advance of the workshop, we were assigned a relevant reading from Rudolf Steiner's *Agriculture Course* (1993). Initially offered to small group of agrarians in Eastern Germany in 1924, the series of lectures that forms the book would become the foundation text of biodynamic farming. Although my own copy is a mass-market paperback, it is not uncommon in biodynamic circles to see practitioners carrying leather bound copies of the book with thin pages, ornate designs, and adorned by gilded metallic trim. To the uninitiated it might easily be mistaken for a bible, and indeed to many it is treated with similar reverence and frequent contemplative consultation. For this morning's workshop we were tasked with the fifth chapter which covers

efforts to “replenish the forces of the soil” through manuring and the use of plant preparations for compost piles. The other apprentices, while still new to biodynamics, were currently working on biodynamic farms and so had been introduced to these practices and principles prior. This was the first time they had gone directly into the text with significant studious attention however. As they each reviewed the chapter as we made our morning drive to the workshop Sarah shakes her head, reflecting, “it’s just so hard to get your head around. Transmutation of elements? Cosmic surroundings? This stuff is pretty far out there. Hopefully Paul will help it make more sense. I’m still not sure what to make of it.”

Alternative agriculture, as we have learned, umbrellas a variety of approaches including agroecology, permaculture, organics, and a vast array of indigenous farming practices. One particularly exemplary form briefly introduced in the previous chapter, is referred to as biodynamics. Originating in Germany at the turn of 20th century and born out of the lectures of the “visionary” Rudolf Steiner, biodynamic agriculture has become an international phenomenon. This community of practitioners has its own conferences, workshops, associations, protocols, and governance bodies. Beyond just the agricultural practices, biodynamics is informed by an entire cosmology known as anthroposophy. This worldview is likewise inscribed, and thereby legible, across the agrarian landscape. Biodynamic practice stresses the production and incorporation of manure composts. Farms are designed holistically, with cows (and other ruminants), crops, and soil integrated into a regenerative and rotational system. More still, biodynamic farmers rely heavily on the astrological calendar, planning plantings based on planetary relations. Each of these elements combine to inform the core practice of producing and applying biodynamic preparations.

The Steiner School is located on a 140 acre wooded landscape with cleared segments for farm and pasture as well as buildings for organizational activities. One building stands out as particularly prominent, a massive event and meeting space made in the unique architectural style of much biodynamic infrastructure, composed of ornately hewn wood and perhaps best described as medieval gothic meets middle earth (of Tolkien fame). The site itself exists as a space of apart, a preserved natural space in a vast sea of suburbs. As bridge and highway development made greater portions of the Hudson Valley accessible to easy urban commute, the farm and forest landscapes of these hinterlands quickly transformed into housing for the city's burgeoning upper-middle class. The landscape of the Steiner School stands in striking distinction from its immediate surrounds. Philosophically it may as well be worlds apart.

Now inside the classroom space, the two biodynamic apprentices and I are joined by some twenty other neophyte farmers. Paul, the head instructor, is joined by Mary, the farm manager, in leading the workshop. Paul introduces the day's topic first offering a recap of the previous workshop session, a not-so-basic foundation for making sense of the lessons to follow. We review the notion of the farm as an organism and an individuality, a core concept worth depicting at length. Paul reflects:

> So a very basic concept in biodynamics is the beingness of the farm. That beingness of it, it could be garden, a homestead, a farm of any size. Whatever entity it is it's a human crafted organism. It wouldn't be there if human beings had not crafted it. And so it is very holistic concept and it's very common, I think, now more and more in all kinds of organic movements. But Rudolf Steiner actually goes another step further in that each of these organisms is healthier, the more it can be self-contained, self-sustaining. You have what you need for your fertility sources on your farm: could be animals, could be collecting plants and making compost, could be your cover crops, could be draft power, could be seed saving. Fertility would be the biggest aspect, that you can have the source of fertility on your place.
>
> You can also go a step further, not only is it just a self-contained organism, it actually can become an individuality. Every place is different. You understand that, just go your neighbor's. It's different. It's got different physical makeup, but obviously it's influenced

> by the personalities that are there now and have been in the past. All kinds of minor influences make up life each one of us as an individual. It's almost like a human being. I would say, and this is what we talked about last time, in body soul and spirit. It's got a physical makeup, it has a sensitive nature, a soul. And perhaps it has something where if its sensitive, and if it was developed, can actually have an individuality come into that.

Paul is here underlining the importance of ensuring a self-sustaining form of farm fertility. While many organic farms aspire to such an outcome—limiting off farm inputs through the strategic utilization of the synergies and mutualisms of natural cycles—biodynamics conceptualizes farms as not only organisms but individualities. That is to say, they are complete with organs and they undergo metabolic processes in a similar fashion to humans, processes of digestion, respiration, circulation, and cellular regeneration. In doing so they become unique, composed of elements specific to themselves and capable of self-contained living processes.

The comparisons of the farm being "like a human" is more than mere metaphor. As Paul continues to elaborate, he underlines the peculiar way in which biodynamic practitioners understand not just landscapes as living organisms but also plants as people:

> To go still another step further, Steiner says that individuality of a farm could be viewed as human being upside down. And that the soil line would be like our diaphragm. Soil being different than bedrock, right? People who study soils, good healthy soil is actually 50 percent air. It should breathe, should have a porosity, it should be able to take in air, take in water, give off water, it should be able to evaporate from it or drain through it. Air should be able to come and go, giving off carbon dioxide. We have this image that plants live on carbon dioxide, but roots actually need oxygen. So aeration, breathing. We'll get into this more later, this is just the rough picture.

He then sketches out an image in chalk on the black board, relating the ways in which the anatomy of a plant mirror in inverse that of a human being. The roots are the head, the stem at the soil line the lungs, and the fruiting and flowering aspects the reproductive organs. Paul continues:

> So, again. it's the upside-down human being, but also he [Steiner] says a bit like the young child, of a young human being. I even think of extremely young, like one nursing, the farm is, the farm individuality is of a young baby that needs care, depends on care especially the human offspring. Needs care much longer than most animal offspring we all know that. Kind of like the garden. It wouldn't be there if we would not have created it. So we birth an individuality that needs nurturing and it depends on it. kind of like a young child. That is guiding most important elements.

With this grounding in place, Paul continues to elaborate on the role that earthly elements play in plant growth and more-than-human vitality. What quickly becomes clear is that while the language of self-contained organism gives the initial impression that entities exist independent of one another and that the ultimate goal is isolated self-sustenance, biodynamic thought actually reckons a greater, less-sensible connectivity. While the fertility cycles of the farm should strive to be self-contained and capable of self-reproduction, the means to achieve this is through facilitating earthly and cosmic entanglement. Indeed, as Steiner relates in the Agriculture Course (1993), "from the perspective of the ideal farm, any fertilizers and so forth that are brought in from outside would indeed have to be regarded as remedies for a sickened farm. A healthy farm would be one that could produce everything it needs from within itself" (27). To achieve healthy farm homeostasis might require "medicines" brought in from outside if the farm is diseased, analogous to human health. And again, similarly, once equilibriums and health are restored, the effort and aspiration is to achieve a self-contained entity that functions to ensure its own ongoing vitality. The means by which this is possible is in mobilizing natural forces that support plant and farm life through their relationship with cosmic energies.

To better understand how this process works it is necessary to know something about salt, sulphur, and mercury, the forms by which they are found in nature, as well as their cosmic correspondences. The core of today's lecture, Paul proceeds to explain the relationship between a

farm's individuality, and the alchemical processes and principles that labor to create vitality on a biodynamic farm. He suggests,

> So there are some terms that Steiner uses to describe tendencies in nature, processes that are akin to human processes. One of those is the principle of salt which has to do with consolidating, densifying, which occurs in the earth, a densification, gravity. It tends to take things in, all kinds of sense impressions, things come into focus, stores things as do roots. Even more so it's a bit of a center out of which things come. So there's the salt principle. These are called alchemical principles. In the middle ages there were the alchemists. And they were working with processes of nature, that were akin to human processes and trying to develop medicines and other things. What I'm talking about here is very basic principles in homeopathic, and anthroposophic medicine. So you have a salt principle that's intensifying and you have the opposite, which is called the sulfur principle. I'm not just talking about physical salt, physical sulfur, I'm talking about processes. Sulfur means sun-bearer. There you have, in a way, the opposite of the salt pattern, you have a raying out, a radiant quality, dispersing. It happens and a lot of our metabolic organs are involved with those processes. This is not the consolidating cool thing here [e.g. salt], it's the warm digestive, the excreting. Where we get our metabolic processes in the human being but also the reproductive process—root forming, where the plant forms. And then something that balances those two is given the name Mercury and Mercurial principal. And that in a way kind of weaves and balances these elements.

Paul is emphasizing the need to attend not to particular chemical components, but to processes, both material and metaphoric. He draws directly on the principles of alchemy that inform biodynamic perception to highlight that the biological activities of human and nature resemble one another, and undergo similar transformations of circulation, metabolism, concentration, and expansion. In addition to continually reiterating the way in which human and more-than-human vitalism are cognate processes, and can be understood in parallel to one another, he is identifying the connection between otherwise-anachronistic paradigms for conceptualizing the dynamics and dynamism of life. More still, he seeks to underline how such principles and ways of experiencing and interpreting nature inform the work of making biodynamic preparations, and the work that those preparations do once they have been introduced to the soil. Further in the workshop, Paul makes these connections explicit:

> I'm trying to bring this in relation to the preparations. The first part of lecture five [of the *Agricultural Course*] doesn't talk about a single preparation for 4 or 5 pages, it's just talking about some principles that will lead into these practical things to do. So one of those principles is in making what you need to foster your farm, stay in the realm of life. Don't use chemicals. Those are dead things. They seem to foster life but they don't really. All they do is discourage life. So that leads into the fact that these preparations are made from plants. These particular ones we talk about, they're living things. Another thing he [Steiner] is pointing out is that this soil over time, through man's farming practices has been weakened. He gives us the thought that the earth has become weakened in its ability to absorb fine elements. He says, yes, we need nitrogen potassium phosphorus. We need these kind of bulk elements that you may need to provide like compost, manures, cover crops. The farm needs food. But actually, what he said isn't even considered [in mainstream agricultural science]. And more and more, it's actually being discovered the difference nutrition makes, there's a lot of agricultural groups now getting into quality. What's quality? nutrient density. They're asking how do you achieve that? And it's often more than just the major nutrients NPK. It's the finer trace elements, how do you encourage those? One way is to add them as a mineral, like sulfur is almost like a trace element of boron, you can add those as physical elements. But Rudolf Steiner is going to bring us into another way to open up the processes of those minerals via plants. And we do so through the plant preparations."

The rest of the lecture proceeds to outline the basic elements of biodynamic prep making. We pass around their finished form. We go through each one individually, exploring how they are made, what they're made from, and why. But indeed, to understand the influence of the preparations, is not only to know them in their specific makeup, but to perceive their effect in catalyzing and stimulating alchemical processes, in compost, in soil, and in plants themselves. In addition to foregrounding the importance of observing the subtle synergies and mutualisms of nature, the lesson of these lectures is in better identifying how various elements and additives can amplify natural forces. If synthetic chemicals render life on life-support, biodynamic preparations support self-sustaining vitality. If nitrogen, phosphorous, and potassium provide bare-life, and the NPK mentality reduces beyond recognition processes that are infinitely complex, biodynamic preparations "open up" plants to be able to absorb the trace and lesser minerals that compose the earth and the cosmos. As Steiner relates in chapter 5, "It is not a question of merely augmenting the manure with substances that we believe will be of benefit to

the plants. It is a question of infusing the manure with living forces, which are much more important to the plants than the material forces, the mere substances. Although we might gradually make our soil especially rich in one substance or another, that would not help the plants unless our manuring also enabled them to absorb what the soil offered. That is the important thing" (93). The preparations augment and amplify processes of life.

5.2 Cultivating Vital Entanglements

After concluding the morning classroom session and breaking out for a short lunch, the workshop reconvened for the afternoon experiential component of course. The task this afternoon was to actually make several of the biodynamic preparations, a process that happens on most biodynamic farms with variable frequency, but one dependent upon seasonality. Late October was a ripe opportunity to not only learn the prep making process but a chance to produce them such that they can undergo their distinct transformations over winter and be ready for the following agricultural season. In speaking with workshop participants, most had not made preps before even if they had directly used them. Many had only rudimentary understanding of their role and use on farms with which they affiliated. After the morning's fascinating but lengthy, at times monotonous, lecture, the opportunity to be outside and get hands dirty actually making these seemingly mythical or magic tinctures was met with enthusiasm and a great deal of anticipation for all those present.

The first step for prep making is to acquire the ingredients. Many had been harvested from around the farm in advance of the workshop for either convenience's sake or in rhythm with seasonal flowering. Oak bark however remained a task for the participants. We walked

together into the nearby woods until we found a stand of oaks. Knives were distributed along with several buckets and each of the participants took turns delicately scraping the outer rind of the tree to secure the bark. Not a great deal is needed and it is important to take only a minimal amount to prevent injury to the still living tree. As Paul and Mary emphasize in regards to the harvesting process, it is important to acquire the ingredients from your own farm as much as possible, again in the effort to better ensure a self-contained farm organism. More still, it is imperative to personally harvest the prep making materials because spending time on marginal areas of the farm (such as the woods) and conducting tasks with a great deal of intention that do not appear as straightforwardly productive, encourages a relationship with the farm and forest, the greater natural landscape, in a way easily obscured or actively avoided in the hustle of day-to-day market-driven agricultural activity. Pushing back against the dictates of speed and efficiency examined in Chapter 2, the process of prep making forces participants to slow down, experience the greater farm environment, and be in and with nature whether producing a marketable crop or not. There is decidedly nothing marketable about harvesting oak bark, by a certain logic it is an ultimate waste of time.

Forty-five minutes of scrapping and idle chatter later, with oak shavings in hand, the group convened in an old greenhouse to transform raw material into a nascent biodynamic prep. There were several operations occurring simultaneously and participants cycled between each. One group continued with the oak bark, tasked with making preparation 505. In a wooden box with a worn-down hammer, the bark strippings are pulverized through repeated pounding, chopping, and grinding into a powder. When ready, the crushed bark is mixed with a small amount of water to form a paste and then scooped and pressed into the skull cavity of a ruminant animal. In the workshop we used cow skulls, one processed the year prior, the other processed

only recently and still retaining significant muscle membrane, making for a rather grisly experience. From the gasps and awes when the cow skull was revealed it was clear that this interaction with a recently, but no longer, living animal was quite uncommon and, indeed, the juxtaposition from the cow herd lazily munching grasses a hundred yards away was unnerving. At the workshop in biodynamic prep making, life processes of birth, maturation, death, and decay are all about.

Once stuffed and sealed, the cow skull is then taken to be buried in the ground in a moisture-retaining area of the farm. At the Steiner School, that location was a wooded boggy area, the goal being to choose a site ensuring that water is constantly percolating through it. The group gathered our things and rambled through the pasture, past the cattle herd, to the interment site. In high boots and muck to the knees, two brazen participants readily volunteered, taking the stuffed skulls and submerging them. From fall until the spring, prep 505 undergoes its transformation beneath the earth. It will be recovered in April or May, ready for the next steps in its utilization.

Back in the greenhouse two other preps were being made this day. For prep 503, dried chamomile blossoms, cultivated and harvested on farm early that summer, were moistened with a chamomile tea. Hovering around a small table, the group took the chamomile slurry and stuffed it delicately into the intestinal membrane of a cow, freshly butchered, and tied off to form a kind of chamomile sausage. The sausages are then buried out in the cow pasture, well-marked by a ring of bricks, and again left to overwinter for spring discovery. The final prep produced collectively on this day, known as 506, undergoes a similar process as 503, but the ingredients are dandelion sutured into a cow mesentery. We will return to this prep and process in a section that follows.

Although in this fall workshop we did not harvest nor utilize the completed preps, future workshops covered this aspect of the process. There is one further step; the incorporation into compost. Rather than spreading the preps on the open farm fields, these preps are introduced into compost and do their work in ripening and enlivening the fermenting pile. Foot-deep holes are made with a dibble in separate quadrants of an elongated oval compost heap and the prep powder, closely resembling finished soil at this point, is inoculated in small, teaspoon-sized doses: oak in one corner, chamomile in another, etc. One prep is introduced as a liquid. In a process that resembles the opening anecdote, the Valerian prep is first diluted into water through a rhythmic stirring method that can take upwards of half an hour before the liquid is "ready." Half of the liquid is poured into the compost while the other half is broadcast on the surface. Said to be capable of treating up to 15 tons of unfinished compost, the preps work in concert with fermentation processes. The pile then undergoes its normal transformation from layers of raw organic matter into finished fertilizer through time and occasional turning.

5.3 Alchemical Transformations

Preparations, as we have seen, are a series of compost enhancements and field sprays made through ritualized fermentation practices: a cow horn filled with manure and buried to overwinter; oak bark delicately stripped, ground, stuffed into the skull cavity of a domestic animal, and buried for a season in a moisture retaining area of farm; yarrow blossoms packed into the bladder of a deer stag, hung in the sun through the summer, buried, and ultimately incorporated into compost. Eventually distributed across landscapes, these are thought to be medicines to support soil health and plant life, concoctions that concentrate and increase in power as they process through natural cycles. An alchemy of more-than-human metamorphosis.

Alchemical transformations trace matters of substance and change, processes characterized by ritualized transmutation. Alchemy is often used metaphorically to trace *trans* formations, that is, the betweenness and becoming of malleable forms. From the alchemy of the rainforest (Jacka 2015), to transitions of waste-to-energy (Ahmann 2019), to the manifold realms of decay and (de)composition (Lyons 2020, Papadopoulous 2021, Pine 2019), for myriad scholars alchemy affords attention to the dynamic nature (in fullest meaning of the term) of lives and livelihoods coming together and falling apart—eventually refashioned once more across institutional and infrastructural intermediations. Along the way new value and values emerge and with them emergent forms of life (Fischer 2003).

The alchemy of biodynamics *is* metaphorical, but not only so (on the ontological openings of *not only,* see de la Cadena 2014). An emic way of conceptualizing change, internal to biodynamic worldview itself, consider the titles of prominent recent books exploring the topic: *Muck and Mind: Encountering Biodynamic Agriculture an Alchemical Journey* (Code 2014)*;* or *Sacred Agriculture: The Alchemy of Biodynamics* (Klocek 2013)*;* or *Eco-Alchemy* (McKanan 2017). More than mere vernacular affinity, however, the legacy of alchemical science continues to quite directly inform biodynamic ways of working with and knowing nature.

Biodynamic thinking arises from an interesting intersection of Germanic mysticism, 19th century romanticism, Christian theology, and a brand of neo-paganism. These are coupled with spagyrics—a science of plant alchemy—and other pre-enlightenment epistemologies (though both I and biodynamic practitioners would be uncomfortable with the teleological implications embedded in the prefix *pre*). In the biodynamic worldview, alchemy abounds. At the foundation of alchemical efforts is "*solve et coagula, et habebis magisterium!,*" translating to the practice of separation, purification, and recombination. Too comprehensive to detail in depth here, the

process is oriented to separating the 'essentials' from a plant through distillation— the *tria principia* of oils, alcohol, and salt—referred to by alchemists as the 'soul' (sulf), 'spirit' (mercur), and 'body' (sal). For alchemists, *sal, sulf,* and *mercur* are thought to capture the "dynamics" of substance, not as isolated entities or objects, but as activities or processes of constant change. As a leading biodynamic thinker somewhat cryptically frames it:

> because substances are the manifestation of a condition of beingness…they are not in themselves beings, but substances are the corpses of beings. There is a polarity there, between what is manifest as a substance and what is potential (*in potentia*) in the cosmos…It is the silica process that is not silicic acid, silicon, any of those. It is an archetypal, supersensible, cosmic potential for silica, silicon, silicates, to actually manifest… we begin to see differences between something as a substance and something as a process. (Klocek 2013, cited in Code 2014, 156).

Separation is always coupled with synthesis—or 'alchemical marriage'—which is not a mere recombination of parts, but as a biodynamic guide describes it "the flowing together into a common being…the arising of a new organism." This not-so-subtle religious coupling, where science meets the social, is of course fertile grounds for thought, and not incidentally so. For alchemists it's not just that science isn't (yet) separate from culture (or indeed humans from nature or subjects from objects), it's that it shouldn't be. Consider again the substance of separation above. As the same guide elsewhere elaborates "the chemical elements which have received so much attention for the last century [in Modern analytical chemistry] are not primary building blocks out of whose combinations life *arises* but—quite the opposite—are endpoints in the disassociation of life, of living processes" (130). Separation, in and of itself, is akin to death. "The science of analysis and quantification contributes greatly to the *right separation* and identification of the physical nature of substances. As an end in itself, however, it provides only corpses" (Code 2014, 161). In this way of thinking, it is 'right synthesis' that reanimates and meaningful relation that serves as the basis of life. Subjects and substances breakdown,

transform, and come together again engendered by entanglement. It's a messy muddle all the way down, for as Barad tells us "beings don't preexist their relatings" (Haraway 2016, Barad 2007), or Puig de la Bellacasa "nothing comes without its world" (Puig de la Bellacasa 2012). As the author of *Muck and Mind* Jonathan Code reflects, the *epistemology of separation* that governs modern ways of knowing, has profound implications on "the way we experience the world, the way we engage with the world, the way we do science, the way we educate, the way we develop our agriculture, in short—the way we live" (59). Synthesis and the science of interconnection, as we saw in the previous chapter, are lessons in seeing the world holistically, composed of wholes that are indivisible into parts.

Returning to the alchemical transformations of biodynamic preparations, Steiner too explicitly uses the language of alchemy as more than a mere metaphor when referring to the processes at work in their production and ultimate engagement with soil and plants. As Steiner emphasizes in the *Agriculture Course*, "there is a hidden alchemy in the organic process. This hidden alchemy really transmutes the potash, for example, into nitrogen, provided only that the potash is working properly in the organic process" (102). The goal of the preparations then, is to stimulate naturally-occurring organic processes, to enable earthly elements to better interact and thereby flourish. As Code reflects on the synthetical thinking of alchemical perspective, "it is based on a gesture of opening out rather than the narrowing down characteristic of analysis and distinction striven for in the process of *solve*" (160). Such an "opening out" manifests in nature as well as human cultural perspectives on nature's constant transformations. Steiner puts it thus: "Nature's life and flow are so fine and subtle that in the end they slip right through the coarse mesh of our rational concepts. That's the mistake science has made in recent times—it tries to use coarse conceptual nets to catch things that are actually much too fine for them" (56). Code

concludes, that from the perspective of the alchemist and the work of biodynamic prep making "culture and agriculture…are both expressions of a particular mode of consciousness or way of seeing" (195). He continues, summarizing: "Biodynamics…begins to reveal itself as a new synthesis of artistic consciousness and scientific consciousness, the beginning of a healing of that rift between heart and mind which was set in motion in the period following the demise of the alchemical worldview." Biodynamic practitioners strive to bring the alchemical worldview—attentive to processes, metamorphosis, dynamism, and recombination—back to life.

5.4 Dandelion Dynamics

For a better understanding of the complexities at work in the alchemical transformations of biodynamics, let us return to the field. I invite you to consider one preparation and its plant, the lowly dandelion. For biodynamic practitioners, dandelion is far from an unwelcome yard pest, as we have learned it's a revered part of a carefully crafted compost preparation. Known as preparation 506, the ritualized make process is straightforward. In the spring, at the peak of flowering, dandelion blossoms are gathered and dried; in the fall they're moistened, stuffed, and stitched into the mesentery of a cow. The package is then buried and left to over-winter. The following spring its unearthed and, at long last, inoculated into a ready to ripen compost pile. Separation and synthesis.

It's an admittedly strange yet seemingly simple process, but ask an insider, and there is a complex and quite literal alchemy at work here—entangling more-than-human, indeed more-than-terran allies. Dandelion is under the astrological influence of Jupiter, with its golden flower and deeply penetrating taproot. Its archetypal proclivities strengthen during its time below

ground, its “force” concentrating with the in-breath of the earth, commonly called winter. In folk medicine, dandelion is well-known to activate digestion and detoxification. In the compost heap, it works analogously, introducing the radiance of the sun, functioning as a liver, and stimulating metabolism of a multispecies kind. In concert with the other preps, the compost is thus said to come alive, indeed to itself become an organism, carrying out respiration, circulation, digestion, and secretion. We end up with a homeopathy for healthy humus.

Clearly this is no mere compost starter. Like compost itself, it’s a hot congeries all the way down, the layers of matter and meaning difficult to disentangle. To truly know the dandelion prep, as I’ve come to learn from biodynamic practitioners, is to develop a cosmic planetary consciousness, to engage an alternative epistemology, to respect processes of transubstantiation, to observe the reciprocal impulses of order and chaos, composition and decay. In short, it’s to stay with a good deal of trouble for we so-called Moderns. Indeed, I’ve heard plants described by biodynamic practitioners as “becoming beings,” always-already in a state of transformation. Deleuzian Dandelions?

An image of a dandelion, affectionately tapped to an apprentice’s wall, captures something of the sentiment and sensibility. From seed, to flower, and back again, a life cycle perceived all at once - it’s a panopticon for, what Natasha Myers terms, the planthropocene (Myers 2017). Tim Ingold (2000) might call these perceptions of the environment tuned to attention, Marisol de la Cadena (2015) an ecology of practice across heterogeneously entangled worlds. Following Tsing and collaborators, I’d call it a curious cosmo-ecology for living and dying otherwise on a damaged planet (Tsing et al 2017).

Consider a telling quote from a leading biodynamic guide: “preparations [such a dandelion preparation 506] create conditions under which plant and soil become sufficiently

sensitive to react to and absorb the incoming stream of life from the cosmos" (Storl 1979, 272). This process of rendering receptive is known as potentiating. In biodynamic philosophy and practice, potentiation is an insiders ideology, and potentiation abounds—indeed much of the labor is aimed at making matter open to impulses and influences, new kinds of intimacies. But if plants are potentiated in this process, so too are people. And here is the real power of the dandelion as well as the whirled and whisked water introduced at the outset. Its lessons in learning to be affected (Despret 2004), cultivating response-abilities for more-than-human worlds. Entangling meaning and vital matter (Barad 2007, Bennett 2010) such alter scientific practices as thinking alchemically render response-able (Haraway 2008), open to co-constitutive relations as well as fertile forces for change.

5.5 Conclusion

Returning to the Steiner School workshop, towards the end of a full day of learning and laboring to produce biodynamic preparations, the instructor Paul brings up the importance of using biodynamic seeds in biodynamic production. I was immediately struck, what could be the meaning of a biodynamic seed? What might make it different from a landrace, from an open-pollinated variety, even from a GMO? How do biodynamic followers reckon such a difference? Until this point, my central takeaway from biodynamic paradigms and practices was that it is, in addition to whatever else, a system for ensuring fertility on organic farms through compost production and care-full attention to soil and landscape. Before departing I invited the instructor Mary to elaborate, explicitly asking, when it comes to seeds, what could possibly be the difference. She replied that a biodynamic seed is seed that has been reproduced through a biodynamic system, grown with preps and intentionality, and planted via the celestial calendar.

Still at a loss to comprehend, I pressed further, “but how might that matter to the seed?” The answer was illuminating. She said that seeds that are grown, saved, and replicated through biodynamic processes are opened, made receptive. They are, as noted above, potentiated; made ever-increasingly amenable to cosmic forces, planetary impulses, and elemental engagements. They become dynamic, acquiring generative vulnerability to vital transformations.

The more time spent with biodynamic practitioners and the knowledge communities they foster, it becomes increasingly clear that a rendering receptive applies not only to seeds and soil, but to neophyte farmers themselves. The labor of biodynamic skilling institutions—at once imparting agricultural and cultural knowledge—introduces farmers to new ways of seeing, interacting with, and interpreting nature. It brings with it a great deal that is difficult to reckon in the modernist mindset. It does not make all skeptics believers. Indeed, following up with one of the apprentices that joined me at the Steiner School workshop on what she made of everything we learned there, and on biodynamics in general, she replied, “I don’t really know if biodynamics works. I don’t know if everything they say about the cosmos and planets has an effect, or if the preparations grow better vegetables. But it doesn’t really matter. I does seem clear that the time we all spend thinking about these unseen influences and mindfully interacting with our farms, produces high-quality food and farms. Perhaps that’s enough.” Whether learning laborers become fully indoctrinated, evangelizing biodynamic believers or not, they do quite often experience an opening out, a new-found attention to subtle interactions and more-than-human metamorphoses going on all around us, that we may not be able to directly observe. But seeing isn’t believing. Biodynamic practitioners come to take an expansive and holistic view of human/environmental interactions, come to learn that more than NPK influences soil and plant

health, more than sellable produce is important to landscape ecology, and that more than productivity is important for farming and farming well.

In conclusion, there are two particularly key points to take away from these lessons in biodynamic praxis. The first pertains to emancipatory infrastructures. As elaborated in the introduction, I argue that a key role of skilling institutions is their influence in expanding capabilities but also concepts. The "room to manuever" critical to sustainable small scale farming is economic but also ideological, relating not to just a flexible autonomy from often pernicious market forces, but also a freedom to farm in ways less governed by the modernist mindset and rationalist thought, less influenced by chemical companies and technoscience. The infrastructure of biodynamic education does precisely this kind of work. It produces farmers who farm differently but also think differently. It is worth reiterating here the key anthropological insight on the role played by ritualized and ceremonial activities in social life: they reproduce cultural communities of thought and embodied practice. Similar to religious prayer, or even a Balinese cockfight, the intentional labor of biodynamic prep making cultivates values, perspectives, and a shared ethos amongst practitioners. Burying cow horns and suturing herbal sausages, while at the same time consulting culturally-significant texts, and undergoing these more-than-human transformations together, biodynamic prep making offers an alchemy for emancipation beyond agri-business-as-usual. It exposes individuals to other ways to do, see, and be, and provides a scaffolding for such alternative forms of thinking and doing to not only take root, but to grow, and even flourish.

The emancipatory possibilities of biodynamic farming and its skilling institutions reiterate a second important point. So much of the anthropological literature on alternative ways of working and worlding with nature derive from the global south, in particular among

Amerindian communities, but not only so. Whether thinking with lively forests in Ecuador (Kohn 2013), about plant kinship in Brazil (Miller 2019), alongside sacred mountains in the Andes (de la Cadena 2015), or on the multispecies personhood and symbiotic socialities of palm oil in West Papua (Chao 2018), much recent scholarship underlines the existence and plighted persistence of more-than-human relations conceptualized differently than through the dominant knowledge regimes of so-called "western civilization." As key theorist of epistemological justice Boaventura de Sousa Santos (2014) reflects, "the ecology of knowledges confronts the logic of the monoculture of scientific knowledge and rigor by identifying other knowledges and criteria of rigor and validity that operate credibly in social practices pronounced nonexistent by metonymic reason." He goes on to say, "from the standpoint of the ecology of knowledges, ignorance is not necessarily an earlier stage or starting point. It may well be a point of arrival, the outcome of the forgetfulness or unlearning implied in the learning process." (188). I want to emphasize that such alternative ways of reckoning knowledge and nature are not just "epistemologies of the south," as de Sousa Santos suggests, but latent in cultures globally, even the so-called modernized west. Nevertheless the salient lesson is the same, that justice against epistemicide implies a good-faith foray into knowledge systems and ways of knowing that are not our own, and seemingly beyond our capacity to conceptualize. More still, for scholars and biodynamic practitioners alike, key to the learning process is unlearning, developing the capacity to see and be in the world anew. An opening out. Biodynamic preps and their making are, I argue, also preparations for life, rendering a more expansive ecology of knowledges full of vital entanglements and metamorphoses of a more-than-human kind. An alchemy of alternative worldmaking.

Chapter 6

Conclusion: Fertile Fields for the Future

During my time in the Hudson Valley I frequently traversed the Rip Van Winkle bridge that connects the upper Catskill mountain range, west of the Hudson River, with Columbia County's fertile floodplains to the east. Whether heading to workshops, interviews, or apprenticeships with alternative farmers, the sunrise drive across this crossing often brought with it renewed vigor for the work ahead. With its vista of stunning agrarian hinterlands hugged by soft blue-hued mountains in every distance, it also brought opportunities for contemplation: a brief reprieve from the labor pains of both farm work and the sustainable future so many aspiring agrarians struggled to bring into being. At times I wondered if the curious name of that bridge was actually rather apt. Referring to the famed protagonist of the Washington Irving folk tale, the Rip Van Winkle bridge conjures images of a man who fell asleep and awoke dizzy, decades later, to a world turned upside-down. It follows his attempts to make sense of life in the aftermath of a great revolution. As I traversed that bridge each morning, coffee in hand, and entered into a landscape sprouting a bumper crop of organic farmers, struggling to cultivate life differently, I had to ask, was I waking to a yesterday of yore? Or was this, perhaps, a transformed tomorrow?

The temporality of alternative agriculture tends to invoke the imaginary of the past. The apparent predecessors of today's U.S. neoagrarians are of course the counter-cultural hippies who, shedding the trappings of modernity and its attendant ills, went *back* to the land. The technologies of alternative agriculture—from draft power to compost fertilizer—are often described as anachronistic, outdated, out-of-time. The seeds are heritage or heirloom. The

tractors can be found in agricultural museums. As for the people, well, they aren't realists but rather romantics. Like their idol Thoreau, they are said to be looking backwards—idly, heads-down, hoeing beans—even as Progress has already passed them by. What does that so-called progress look like?

To the future-makers at agri-businesses such as Monsanto/Bayer and Syngenta, the future has no space for the alternative agrarian. To the protagonists of agri-business, the one-way teleology of the evolution of agriculture begins with the primitive technologies of the smallholder farmer: the horse and plough, the landrace seed, the simple tractor. From there, farms and farmers are beneficently introduced to agricultural improvement by way of hybrid breeding, synthetic pesticides and fertilizers, and the suite of Green Revolution technologies. Next, in this evolutionary schema, comes the advent of genetic modification and its packaging in patented seed. Fast forward and the 21st century introduces a host of high-technologies—mobile devices, microbial engineering, data science. The end, it seems, is a brave-new beginning, the future of agriculture is a foray into the frontiers of digital and precision agriculture, satellite sensing technologies ostensibly designed to optimize field management and to conserve resources, while meeting yield goals and feeding a growing population. Smart farming is presented, in media and marketing, as the next agricultural revolution. We've come so far from crude beginnings.

Such a reckoning is, but is not only, corporate imagineering. It is also the prevailing prognosis in the popular imagination for our agrarian future. A quick web search of the "future of agriculture" yields a triumph of techno-science. Vertical Farming, Hydroponics and Agrobotics, Artificial Intelligence, Genetic Engineering, Drones and Digitization. The future of farming it seems is more of the same, on steroids—Big Data, Big Farms, Big Technology, Big

Corporations, Big Capital. It's the apparent apotheosis of get big or get out. With the growth of indoor agriculture, in the future, farming may not even take place on farms at all. I would suggest that, in these performative imaginaries and accompanied discourses for an agriculture ahead, the future has been colonized, here by the techno-optimists, there by the doomsday prophets. Tomorrow will either be scientists engineering life and life-support technologies on a hostile planet or it will be scarcity, suffering, and societal collapse. Indeed, its either the Martian (2015) or its Mad Max (1979). The promise and perils of a unilinear Progress. It is an anti-politics *for* the Anthropocene.

But in the valleys and hills and hollers of places like the Hudson Valley and central Appalachia, seeds of an alternative future persist, even resist. Indeed, when I asked a young farmer, as we traversed that Rip Van Winkle bridge on our way to nearby workshop, what she thought of the query I presented above, she paused a moment, looking across the landscape, deep in thought. Eventually, she reflected, there isn't anything past about what she and her compatriots were trying to do, her efforts were about looking ahead, trying to fix a very broken system that promises only annihilation. In short, for her and fellow aspiring agrarians, their farming is about cultivating fertile fields for the future.

Anna Tsing (2015), Donna Haraway (2016), and a host of others have argued that the time is nigh for new stories, tales beyond the damaged dreamscapes of Modernity and Man. Ursula K. Le Guin, the famed storyteller of science fictions in the feminist mode, relates it well, "the utopian imagination is trapped, like capitalism and industrialism and the human population, in a one-way future consisting only of growth. All I'm trying to do is figure out how to put a pig on the tracks" (1989, 85). Following the lead of my interlocuters, through my research, in part, so too am I. What if we take seriously Le Guin's proposal, not as an act of porcine sabotage but

of reclaiming that trapped imagination. What if putting a pig on the tracks was more than mere metaphor, and that pig was pasture-raised, within an agricultural complex of polycultures, interspecies interdependencies, and more-than-human mutualism. Such divergent porcine worlds exist; on the one hand, human designs on nature captured in Porkopolis (Blanchette 2020), on the other, Real Pigs (Weiss 2016). In the anxious atmosphere of the Anthropocene, with its onrushing extinctions, the task ahead is to tell "Gaia stories" beyond human exceptionalism and nature/culture dualism (Haraway 2016), beyond the fantasies of transcendence and Modern Man. If we follow Haraway, the future calls for a kind of mytho-poesis born of speculative fabulation for unlearning and relearning our ways of relating to each other and the earth. I suggest we need not (only) speculative storytelling and science-fiction, but (also) sustained ethnographic attention to nascent worlds otherwise that are already everywhere in existence. Indeed, Tsing's (2015) "Arts of Noticing" approach invites us to look around, rather than always already ahead, and stay with the trouble and indeterminacy we find there.

Across the landscape of alternative agriculture, indeterminacy is everywhere. In this dissertation I have focused on particular aspects of neoagrarianism, and in particular skill, sovereignty, and the nature of knowledge. Skill, as we have seen, is challenging to acquire and difficult to impart but it is essential to the efforts of alternative agrarians striving to cultivate "room to manuever" from the diverse dependencies offered by the ecologies of agri-business. As these smallholder farmers push back at the landscapes of industrial agriculture, they do so, not through public protest but through direct productive action. One farmer quoted Buckminster Fuller to describe their approach to transformation: "You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete." The knowledge infrastructures of alternative agriculture, emerging in places like the

Hudson Valley and central Appalachia (but not only), provide infrastructures of emancipation, *in potentia.* Their outcomes are, indeed, underdetermined. What is clear, however, is that as alternative farmers learn to labor—whether through hands-on experience, conference workshops, or prominent literature—they acquire practical knowledge about productive practice as well as cultural knowledge about the relationship between humans and the environment. Indeed, trainings in permaculture and biodynamics, as we have seen, open up possibilities for rethinking more-than-human entanglements and resituating selves within alternative ecological and ideological landscapes. This is the alchemy of the knowledge regimes of alternative agriculture, the multispecies worlds it strives and struggles to bring into being.

There is much more of interest to the seeding of sovereignty across alternative agrarian landscapes than I've had sufficient space to attend to here. And these efforts too remain underdetermined. For instance, the DIY and open-source technology movement—such as Farm Hack—is providing the blueprint for scale-appropriate technology development while resisting restrictive right to repair laws. It offers emancipatory opportunity. But both established and start-up companies recognize the burgeoning market for supportive farm technologies and seek to capitalize through new software platforms for business and landscape management or through specialized, high-priced tillers and seeders. These offer convenience but also input costs for the already cash-strapped farmer. Their role on the alternative agrarian landscape remains ambivalent. As another example, there is a movement for racial justice sprouting, promising new forms of agrarian sovereignty. Whole workshop tracks at major conferences focus on social justice principles in production and marketing. Folks like Leah Penniman, of Soul Fire Farm in upstate NY, are increasingly prominent voices, writing books (such as Farming while Black [2018]), training future farmers of color, and hosting workshops on uprooting racism. There is a

push, and platform, for reparations at the level of land and cash donations for Black-Indigenous farmers that is gaining ground. But the fact remains that alternative agriculture continues to be predominantly white. Beginning farmer training programs and policies, as Calo (2020) argues, often reproduce in practice and discourse many of the problematic myths of the yeoman farmer. Moreover, volunteer agricultural labor privileges "willing (white) workers on organic farms," while potentially undermining struggles for structural labor transformation (Guthman 2017). Steps forward, back, and sideways. Sovereignty across alternative agrarian landscapes requires staying with the trouble. Fertile fields for future research—theoretical and applied.

One final example is worth outlining as it offer revealing insight into the (undetermined) state of the alternative farm movement. Many alternative farmers are, as we saw above, legitimately interested in social justice initiatives. They recognize that the food they produce is out of reach for many, whether through access to markets or the high cost of organic foods. They wish it different but, already struggling to make ends meet, find little "room to manuever." Consider two farmer's reflection on the topic:

> Larry: Why is it that we're always punished in the market if we try to do something good? It seems that any efforts to support social or environmental or economic justice ends up just being an added burden, and those that are constantly attempting simply to reduce costs or be more efficient or get up on their neighbor or dupe their customer, those are the ones that have the advantage. They end up forcing your hand, it becomes very difficult to stay in business if you have any other motivation but the bottom line. What are we supposed to do about that?
>
> Beth: That conversation is so slanted towards making food cheaper, which is regrettable, we field that question all the time in ways that feel aggressive…Let's pay attention to the structural factors that make food too cheap and people too poor to afford it…. Is it just because you can come to the farmers market and look me in the face and express your anger? Or is it because your used to farmers being poor? We should all be more focused on reclaiming wealth for common people than on making food cheap. It arrives with a whole host of problems, that those of us getting paid less than 9 dollars an hour to grow food, are working their butts off to remediate. Let's not do this again, I'm not in this business. We're already subsidizing those $3.50 bunch of beets in a hundred different ways. There's no reason we should make them any cheaper… we [are already]

> mortgaging a huge chunk of our lives to end up in fragile physical and financial conditions.

Larry and Beth are both articulating the ways in which their aspiration to realize social justice through their food production is frustrated by the structural barriers of agricultural economics that militate against them. They regret that they can't be more committed to economic justice than they already are and resent the fact that they take the brunt of complaints—gripes about $3.50 for beets—about concerns over resource distribution that are clearly larger than them. Beth's concluding reflections on these issues offer a window into the felt reality of alternative agriculture: "We understand that we're *holding space* for agriculture right now. We're not farming in a sustainable system for us. We can't farm at below-poverty levels forever. We are in this to develop solutions to amplify the conversation, to try to figure out, *to ninja our way around* these problems to the extent that we can." Alternative agriculture is, more often than not, an experiment in cultivating life otherwise. It offers landscapes of occupation, a holding ground, as well as an inhabitation, a rooting into. The solutions to the problems of agriculture are neither simple nor are they entirely intractable, and aspiring agrarians see themselves as struggling to ninja their way out of the problematic present and into more fertile futures. To ninja is an apt analogy, suggesting skill, and creativity, and flexible experimentation. They don't have it figured out, certainly, but their farms and farm communities cultivate what might be considered "temporary autonomous zones." Space, partially-freed from power, for learning to labor collectively towards more livable, more-than-human tomorrows. Indeed, the landscapes of alternative agriculture offer ruderal ecologies (Stoezer 2018), resilient yet fragile life forms sprouting through (metaphorical) concrete.

The landscapes of alternative agriculture offer efforts to ninja into alternative economies as well as alternative ecologies. While the language of environmental conservation has not been extensively foregrounded in this dissertation, per se, efforts at sustainability are of course the background that informs this research, and that motivates so many alternative agrarians. In a seminal essay, environmental historian Bill Cronon (1996) makes a pitch for a different form of conservation. His argument is that conventional conservation practices tend to operate by a model that, while often in good-faith attempting to ensure sustainability, continue to underwrite a problematic nature-culture dualism. By the standard operating procedure, nature is that which is separate from man, threatened by humanity, and as such it must be protected. Such ways of thinking breed "fortress conservation" and its well documented ills (Brockington 2002). Rather than existing *apart* from nature, Cronon intimates that man is *a part* of nature; so-called wilderness—ostensibly untouched nature—is culturally and materially made by man. He notes, "wilderness is not quite what it seems. Far from being the one place on earth that stands apart from humanity, it is quite profoundly a human creation" (7). In setting aside vast swathes of landscape, and establishing erroneous ecological baselines for their composition, Cronon suggests that conservation efforts, in practice and in paradigm, are "getting back to the wrong nature."

I might suggest that the alternative agrarians I labored alongside in my fieldwork are cultivating a different kind of conservation. To turn Cronon's phrase, they are not so much getting back to the wrong nature, as they are getting back to nature wronged. For in the wake of the Anthropocene, and its recognition of the severity of human impacts on the environment, there is increasingly widespread recognition that there is no nature beyond the human. Moreover, we have no choice but to make the best of the mess that's been made. This is especially clear in

agriculture. In the Hudson Valley, would-be organic farmers struggle to reclaim apple orchards laden with lead and arsenic, the pesticide of an earlier era that promised "better living through chemistry." Likewise, dairy farmers replace an older dairy industry, one whose economies of scale went boom and bust, but whose built and ecological infrastructures offer the soiled grounds for new forms of habitation in alternative agrarianism.

In Central Appalachia, things are different, yet similar. Mountain top removal sites, damaged seemingly beyond remediation and post-apocalyptic by appearance, are now being utilized for rotationally grazing goats or growing organic mushrooms and lavender. One beginning farmer training program grows diverse vegetables in raised beds, above ground, because the post-industrial urban landscape is conspicuously contaminated. Indeed, on the far side of a chain link fence, the spray of a hose beyond the garden boxes, offers a word of warning: Caution Contains PCBs (Polychlorinated biphenyls). At another site, likewise serving to train beginning farmers, alternative agriculture now takes place in place of a former conventional plant nursery. The soils are compacted and degraded, but the terms of the development project are to produce food and farmers now, so long-term remediation strategies for improving the soil for organic production are foregone, in their place are purchased "organic" inputs. Across these diverse landscapes, in short, U.S. alternative agriculture is emerging, not from *terra nullius*, a pristine, untouched nature waiting to be carefully tended, but always already in the aftermath of industry and industrial agriculture. We must ask, therefore, what is being cultivated in the ruins of these damaged landscapes—ideological, economic, environmental, and otherwise.

Beyond the latter part of the phrase, it is also important to underline the *getting back* aspect of getting back to nature wronged. Here, getting back is not meant to convey a time before the present, but rather a getting back to work. For the conservation of alternative agriculture is

not setting aside nature but a return to it with different principles in mind. One farmer described her efforts as such:

> …at the end of the day there are a set of activities that support human life, and they tend to be the harder activities, producing food, taking care of kids, healthcare, taking out the garbage, those kinds of things. I feel like I have a really strong inherited fairness and justice principle that makes feel a lot of weird feelings when I'm shirking responsibility. It's important to me to feel like I'm taking on my fair share of the work. The heavy burden.

Cultivating life is indeed, as we have seen, a heavy burden. It's oriented to the production of food but also healthy human and more-than-human landscapes. Engagement oriented towards dwelling and inhabitation (Ingold 2000). Towards becoming native to this place (Jackson 1996). Towards coming home to eat (Nabhan 2009). Fittingly, the etymological origin of ecology is *oikos,* or home. As Cronon (1996) suggests, "Home, after all, is the place where finally we make our living. It is the place for which we take responsibility, the place we try to sustain so we can pass on what is best in it (and in ourselves) to our children. The task of making home in nature is what Wendell Berry has called 'the forever unfinished lifework of our species'" (24). Work in nature is life work indeed. An opportunity to reimagine labor when the more dominant frame may otherwise be, "are you an environmentalist, or do you work for a living" (White 1996). For as Heather Paxson (2013) has shown in respect to post-pastoral ethos of artisan cheesemakers, those farmers forging new kinds of food production are cultivating a "working landscape." Their hands are dirty with the labor of multispecies worldbuilding. If we accept the entanglements of man and the more-than-human, the work ahead for environmental sustainability is, then, work indeed. It is about rethinking life and labor on a damaged planet (see Besky and Blanchette 2019).

Paxson concludes her ethnography of artisan cheesemakers asking if they, and the ecologies of production they cultivate, might be bellwethers for alternative food and farming futures to come. The bellwether is at the fore of flock of sheep, leading them to fertile fields beyond. I am captured by this metaphor but see its value in conjunction with another ovine observation. Despret and Meuret (2016) examine the life worlds of new shepherds in the south of France. They argue that humans are struggling to acquire new skills of keeping and caring for sheep, while the sheep, formerly kept in pens, likewise have to "unlearn" captivity and "relearn" transhumance, passages on pasture. Through their more-than-human labors, the shepherds and their sheep, changed the way they inhabited the landscape together: "to inhabit is at once to be transformed by the environment and to transform it" (32). Despret and Meuret refer to these efforts to learn new ways working and worlding together as a cosmoecology, but a nascent, unfinished, undetermined one. In other words, an "Experimental cosmoecology: learning to hold possibilities open, learning attentiveness to the infinite ways of being affected and of affecting, where no one may know ahead of time the affects one is capable of or the kinds of forces and entities that will constitute landscapes and worlds with us" (35).

Like the new shepherds of southern France, American alternative agrarians are also cultivating experimental cosmoecologies of more-than-human relations. The effort is full of pitfalls as well as promise. Indeed, as we saw in Chapter 2, exhaustion is the everyday experience of a life down on the farm, frustrating farmers as well as efforts to learn agrarian labors. Likewise, the emergence of alternative agriculture takes place in a market context, even as it remains deeply uneasy with the economic arrangement. As chapter 3 underlined, the result is that skilling farmers into alternative cultivation practices is interrupted by the bottom line, displacing certain management practices (such as draft power, but also no-till or "organic"

chemical-free), and replacing them with logics that may well make every alternative farm a Toyota factory. As farmers learn alternative agriculture they acquire practical skills (sometimes) as well as new ways of seeing the world, educations of attention. Chapters 4 and 5 highlight what such more-than-human perspectives look like as well as offer insights into how they are brought into being. Permaculture and biodynamics—a holistic design science and an agricultural approach that understands farms as living organisms—teach new modes of ecological entanglement based on ancient, often indigenous principles. They offer a good deal of trouble for so-called moderns (see Latour 1993). Across these agrarian landscapes we find farms, farmers, and fertile futures being brought into being, ripe with possibility but also riddled with friction and frustration. Like Tsing and the more-than-human world of mushrooms (2016), this dissertation strives to capture, "how the making of worlds and the sense of the end of a certain kind of world coincide: Here are new articulations of subjects, relations and environments that are going on and unfolding, not always with a plan, but still settling into particular lifelines that inform the possibilities of other worlds to come" (Gabrys 2018, on Tsing). Cultivating Life offers a glimpse of what such unfinished subjects, relations, and environments might look like. Indeed, alternative agrarians laboring to learn agriculture and agricultural ecologies differently inform the possibilities of other more-than-human worlds to come.

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