

# A new form of collaboration in cultural anthropology:

## Matsutake worlds

### ABSTRACT

Experiments in collaboration open new investigative possibilities for cultural anthropologists. In this report, we use our research on matsutake mushrooms to show the promise of collaborative experiments for ethnographers of scale making, global connection, and human–nonhuman relations. Anna Tsing introduces. Mogu Mogu (Timothy Choy and Shiho Satsuka) argue that the mushroomic figure of mycorrhizal life illuminates workings of capital and power, nature and culture. Lieba Faier examines contingency—through the effect of weather and bugs on matsutake production—as a form of self-positioning that emerges from local understandings of connection. Michael Hathaway uses postcolonial science studies to examine the transnational production, flow, and transformation of scientific knowledge about matsutake. Miyako Inoue discusses the anthropological subject that emerges through the kind of collaboration envisioned and practiced by the Matsutake Worlds Research Group. [collaboration, postcolonial science studies, multisited ethnography, naturecultures, contingency, knowledge production]

Cultural anthropologists' interests in global and multisited phenomena require new kinds of ethnographic methods. In this report, we describe how collaboration can tackle a multifaceted research topic without employing a preset division of specialized labor—a move that would automatically foreclose the singular gift of cultural anthropology: the sensitivity of the research question to the insights of fieldwork.<sup>1</sup>

Collaboration is made difficult by institutional requirements for junior scholars in social and cultural anthropology; universities have not been willing to recognize collaboration as, in itself, a contribution to knowledge. Collaborative research is often regarded as a poor substitute for the originality and rigor of single-author scholarship. Sometimes, of course, research collaborators do only play minor roles. In contrast, our project begins with the premise that every contributor should be able to draw the project into new and original directions; the project should continually shift because of its collaborative innovations. We offer this preliminary report not only to inspire other experimental collaborations but also to provoke institutional reform that might make collaboration more possible. At the very least, scholars at every rank deserve the right to explain the model of collaboration that inspires their research. The prevalent model, which splits the research contribution into fractions such that every collaborator dilutes the pool, is not a good representation of any research practice we know. In our project, every contributor reformulates the research, adding exponentially to its contribution. In this report, each participant offers a view of what working together makes possible. In offering this “research in progress,” we hope to show the promise of collaborative experiments in cultural anthropology—and the concomitant need for institutional reform.

### On collaboration, by Anna Tsing

Anthropologists are talking about collaboration. For many years, or so the story goes, cultural anthropology was the work of lone ethnographers.

Lone ethnographers could be adventurers, philosophers, and creative geniuses all wrapped into one. There was—and is—something thrilling about this model, raising cultural anthropology above the imagined collective drudgery of other disciplines. The excitement of working alone is palpable, and calls to reform anthropology by making it more like normal science have had little resonance. But might there be creative and charismatic forms of collaboration capable of pushing forward the distinctive adventure of anthropology? Anthropologists are talking.

Various kinds of collaboration are being discussed. On the one hand, cultural anthropologists are newly interested in the often-unspoken collaborations of our work, such as the learning relationships we have in the field with our research subjects or the analytic circles at home through which we gain our categories and questions. Formal collaborations, particularly with scientists and activists, have pushed forward disciplinary agendas, training anthropologists in new habits of speaking and listening (see, e.g., Fortun 2001; Rabinow and Dan-Cohen 2006). On the other hand, new kinds of professional working relations among anthropologists are being discussed in which taken-for-granted material routines as well as philosophies of investigating, interpreting, and writing come under new scrutiny.

Even within the restricted universe of collaborations among anthropologists, arrangements are extraordinarily diverse. One way to plot such diversity might be to contrast big-science and intimate-authorship arrangements. In big science, collaboration is a guide as well as a method. This is because good research in big science should offer an object on which many researchers can agree. New methods and perspectives should not change the research object. Thus, collaboration is both a means and a goal. Common questions, goals, and methods facilitate coordination among researchers and demonstrate the factual stability of the research object. Through collaboration, differences among researchers can be absorbed into the whole; ideally, the research object that emerges should have the multidimensionality of the collaborators' separate forms of expertise without taking up the jarring gaps across them that might interrupt its object status.

This model, which sets shared standards to ease collaboration, has a clear appeal. But it has worked poorly for cultural anthropologists because it gets in the way of ethnographic immersion. Ethnographic immersion requires the fieldworker to allow research objects to emerge from the events and contingencies of interactive field experience. Good fieldwork is supposed to change the fieldworker's research questions. Standardized questions, goals, and methods block this kind of ethnographic learning, in which goals and methods change in the research process. Jarring gaps are the stuff of ethnographic learning. Big science may be elegant, but it loses the point of ethnographic analysis.

At the other end of the range of collaborative anthropologies are those that look for a place in the tradition of creative individual authorship. Some—but not many—collaboratively written novels, artworks, and musical compositions exist. They are rare because creative authorship in collaboration is hard work. How might more than one person inhabit the space that Enlightenment legacies have given to the interior genius of the singular individual? Methods of collaboration are up for grabs. In some cases, the work requires a merging of creative personalities; in social science, one example is J. K. Gibson-Graham, the intellectual merging of Kathryn Gibson and Julie Graham (see Gibson-Graham 1996, 2006). In anthropology, the editorial collaborations that created and directed the subfield called "feminist anthropology" are examples.<sup>2</sup> Perhaps creative collaboration is associated with feminist scholarship in part because it requires a labor of emotional intimacy, entailing close hours and long years of negotiation and great care over procedural matters. Who takes the lead? Whose insights take precedence? Whose style works? These questions are never settled. When things go well, the experience is delightful; when disagreements arise, everyone feels crushed. This is because there is no easy complementarity among roles. No a priori standards set the frame. Questions, methods, and goals are worked out in the process. This open-endedness makes collaboration in creative authorship an intriguing—but also terrifying—possibility for ethnographic research and writing.

In practice, a good deal of heterogeneous territory lies between big science and creative authorship. The Matsutake Worlds Research Group is an experiment in making one piece of this territory livable. On the one hand, group members have separate and well-defined areas of expertise. In particular, we know different languages and have been trained in the literature on different world areas. Our project requires this combined expertise. Some of the time too we conduct fieldwork on our own or with collaborators from outside the project. Some of the time, we write alone or with just one selected coauthor. But we have tried, and are continuing to try, a variety of collaborative experiments that exceed both individual and big-science models. First, we have conducted overlapping and joint fieldwork. Not all our fieldwork has taken this form—but enough to consider what intersubjective immersion might mean. Second, we have worked to consider how to analyze data in tandem. And, third, we are involved in varied experiments in collaborative writing. These experiments push us beyond our training, requiring bravery—and opening new possibilities for the discipline of cultural anthropology. We call our process "strong collaboration," that is, a form of collaboration in which explicit attention to the process is part of the project.<sup>3</sup>

Our subject is an aromatic gourmet mushroom, a species cluster of the genus *Tricholoma*, commonly known

as matsutake. Matsutake are much appreciated in Japan as well as in Korea, and they may be the world's most expensive mushrooms. Poetry has been written about this mushroom; in Japan it is a featured subject in anime cartoons, cooking shows, and traditional ceremonies for the autumn season. Until the 1970s, Japanese forests produced sufficient matsutake for domestic use, but ecological changes since WWII have caused a sharp decline in the Japanese matsutake population. The decline corresponded with Japanese prosperity. Beginning in the 1980s, Japan began to import matsutake from forests around the northern hemisphere: North and South Korea, China, the United States, Canada, Morocco, Mexico, Bhutan, and, most recently, Sweden and Finland.

Despite strenuous efforts, matsutake has never been cultivated. To find matsutake, one must forage in forests, where the mushrooms emerge in association with particular host trees, mainly conifers. Once they are picked, they must be sent posthaste to Japan; there is little market for dried or preserved matsutake, because the mushroom loses its aroma if not consumed fresh. The matsutake trade requires efficient global connections, the space-time compression that scholars and pundits call "globalization." The trade also dips into the extraordinary diversity of foraging ecologies. Foraging and globalization are worlds apart in most social theory. Our team became fascinated by their combination in the matsutake commodity chain.

In central Japan, festive village auctions arrange picking rights. In the U.S. Pacific Northwest, war-scarred Southeast Asian refugees camp out in national forests to forage. In British Columbia, Canada, First Nations claim the mushrooms. In southwest China, "matsutake mansions" are built as villages consolidate their forest boundaries.<sup>4</sup> Foraging and forest-management arrangements contrast; so too do both vernacular and scientific understandings of matsutake forest ecology. Our collaborative research investigates how knowledge and value are created both within and across these sites. For this task, we follow both commerce and science.

From the first, we have been intrigued by how both connections among and differences across national and regional formations of matsutake science and forest management emerge. Why, for example, do U.S. forest managers urge less human impact on matsutake forests whereas Japanese forest managers arrange for more human impact (Tsing and Satsuka 2008)? To pursue questions about regional and national difference follows easily from the heritage of anthropology. Yet equally important is taking the knowledge claims of scientists—which focus on connection, not difference—at face value. To become interlocutors for scientists and forest managers, we work hard to train ourselves in mycology and forest ecology, as these disciplines teach us new ways to appreciate the mushrooms. The challenge is to follow cosmopolitan connections at the

same time that we attend to gaps and awkward encounters. Our previous research hones our theoretical tools for this task (Choy 2005; Faier 2009; Hathaway 2006; Inoue 2006; Satsuka 2004; Tsing 2005).

Taking our responsibilities as fieldworkers seriously, we have tried to avoid building an analysis based only on superficial encounters. This is the nightmare possibility of multisited ethnography and one that collaboration can potentially address. Members of our team have language fluency in Japanese and Chinese and area-studies experience from earlier research in Japan, China, Canada, the United States, and Southeast Asia. But how were we to share these talents without dividing up the labor—and thus losing the gift of immersion fieldwork, the shifting research object? Our experiments began with overlapping fieldwork. We challenged each other's sensual experience of the field, soliciting continual reinterpretation and cascades of translation. None of us had done joint fieldwork before, and its pleasures were a revelation. We aimed not to cancel each other's peculiar appreciations, as in big-science collaborative syntheses but, rather, to heighten our differences as a source of questions. Faier named this strategy "echolocation," a term that stresses the importance of intersubjective perception in our collaborative process (Matsutake Worlds Research Group *in press*). After all, the aromatic matsutake teaches us to pay attention to the senses.

Matsutake remind us to smell out connections: Pickers sometimes locate the mushrooms, which may not break the ground's surface, through smell. Smell is our human reaction to chemicals released by the mushroom to attract its own harvesters, who spread its spores. Thinking through the notion of smell provided our team with another ground for experiment, one of analysis. We collectively imagined the mushroom itself as a collaborator. The shared sensitivity to chemicals of both humans and mushrooms, which might broadly be called "smell," bridges human–nonhuman differences. Smell signals multispecies connection from the mushroom's point of view as well as from the human's. What could be gained if we considered the problem of collaboration from the vantage point of mushrooms—or even wider collaborative commitments? This question enlivened one of our first writing experiments, a chapter for a book on multisited ethnography (Matsutake Worlds Research Group *in press*). The chapter was not intended to address the problem of smell but, rather, the problem of collaboration. But smell was the issue that sparked debate about collaboration in our group: Can humans and mushrooms really be collaborators? Might all knowledge, then, require collaboration? If so, what might we gain by making these necessary collaborations apparent? These questions continue to inform our discussions.

Writing together introduced its own challenges. We have been loath to merge our identities completely without the careful work of developing a common voice. Our first

full-group experiment (Matsutake Worlds Research Group *in press*) offered a compromise: We each wrote a short signed essay and then sandwiched them all between an introduction and conclusion. When we read the resulting chapter as a whole, we were intrigued and surprised by the effect of multiple voices. Individual styles amplified the collective endeavor. Meanwhile, various subsets of the group have developed their own experiments, exemplified by Mogu Mogu's section in this report. The current report thus offers a second experiment, in which both individual and merged authorships are represented. As we develop voices for different texts and audiences, we plan more writing experiments.

The process is both difficult and fun. At its very best, collaboration can be exhilarating and a needed antidote to the lonely competition of the academy. However, the academy itself enforces that loneliness in its standards, and this has been our biggest challenge. Collaboration is difficult in cultural anthropology for material and symbolic reasons that have nothing to do with research, analysis, or writing *per se*. Institutional requirements get in the way. Although collaboration in big science is a recognized quantity, creative forms of collaboration are not valued in the academy. The accounting system of big science gives individual researchers only partial credit for collaborative work, yet creative collaboration takes much more effort than is required in single authorship. Junior scholars, in particular, feel constrained from trying collaborative experiments because of anxieties about promotion and tenure. Beyond the institution, the culture of academe molds all scholars through its standards. We learn to throw our ambition at individual advancement rather than imagining wider circles and more playful interconnections through which contributions might be made. We feel driven to market our ideas for their quick-sale appeal, not for their contribution to a slow collective project; we forget to ask how our work opens curiosity rather than admiration.

Might we devise a practice that has it both ways—that meets the demands of the academy at the same time that it builds a world worth living in? Might we use the heady rush of creativity and charisma, but plow it back into the scholarly process rather than toward the fetish of individual brilliance? Collaborative experiments, at their best, make the process more important than the race. Chewing into the filing systems of both auditing and one-upmanship, they open worm-sized breathing spaces within the corporate culture of the neoliberal academy.

Each section in this report addresses the possibilities of collaboration: between group members; between humans and nonhumans; and in making knowledge and social practice, more generally, both within and beyond the academy. Our group argues that formal experiments in collaboration allow scholars to consider already existing collaborative dynamics that we ignore to our peril. Tracking collaborations

between scientists and mushrooms, or between mushroom pickers, buyers, and scientists from different parts of the world, or between anthropologists themselves also urges consideration of the ways knowledge emerges from social process. In each case, the findings of research reports are just the fruiting body of a larger underground life process. It may be impossible to acknowledge all the mycelial threads that weave together below this tip, but it is important to follow at least a few. Thus, for example, the reader can follow our group discussions about multinational scientists and mushrooms in and out of the sections that follow. Some pieces of the story are not present here: Tsing's "Unruly Edges: Mushrooms as Companion Species" (*in press b*), written in dialogue with the work of Donna Haraway before the research collaboration began, opens the door to building social theory from mushrooms but is carried to startling new horizons by Mogu Mogu. Hathaway enlarges, through work on China, a more prosaic comparison of matsutake science in Japan and the United States begun in Tsing and Satsuka's "Diverging Understandings of Forest Management in Matsutake Science," written for *Economic Botany* (2008). Neither is the discussion limited to the ideas of members of the research group. We were pleased to find Timothy Ingold's (2006) references to mycelia as models for social theory. We are encouraged by Paul Stamets's (2005) confidence that mushrooms will save the world. Indeed, every scientist and mushroom picker we have spoken to exudes a sense of having found a hidden cache of wonderful knowledge: This enthusiasm breathes life into our analyses.

Mogu Mogu's "Mycorrhizal Translations, a Mushroom Manifesto" addresses the heart of our collective project by exploring translations of value. How might the nature of the mushroom itself shape human understandings of its value? Mycorrhiza are structures formed between fungi and tree roots; the authors argue that they form a useful image for social theory. In this realm of mycorrhizal relations, this section offers an intertwined authorial identity: It is jointly written by Choy and Satsuka, using the name Mogu Mogu. Even as a name, Mogu Mogu expresses the playful possibilities of collaboration. In Japanese, the term might be translated as "yum, yum," and in Chinese, *mogu* is a mushroom. Satsuka described the pleasures of collaboration here: "It was like jazz," she said, with insights flying back and forth in emergent, improvised rhythms. Mogu Mogu challenge us to open up our understandings of social theory, collaboration, and even love, to the rhythms and textures of interspecies life.

Our second section, "Weather and Bugs as Contingencies of Matsutake Connections," continues the theme of human–nonhuman relations with a meditation on the importance of contingency in vernacular evaluations of mushroom science. Faier interviewed matsutake pickers in rural Nagano, Japan, and was struck by their discussions of both unpredictable patterns of weather and insect infestations.

Matsutake science in Japan has evolved in a layered historical conversation between cosmopolitan modern science, on the one hand, and practical village knowledge, on the other hand. Scientists have been attentive to village practices, and villagers have listened to scientists. Matsutake connoisseurs in Central Kiso offered their version of matsutake science to Faier: At the heart of the matter was indeterminacy. What might this interpretation mean for global scientific connections around matsutake? This question again refigures our group's collaborative research topic: the interplay of situated and traveling forms of knowledge and value.

The spread of matsutake commerce around the northern hemisphere has opened new centers of matsutake science and forest and business management. Hathaway takes readers to southwest China, where matsutake has become an important commodity—and an object of both research and policy. China's matsutake research, Hathaway shows, is ideally situated to address questions of postcolonial science, that is, science recognized as simultaneously universal and culturally located. Because matsutake is a relatively recent export commodity in southwest China, the emergence of both interconnection and specificity is still clear. Hathaway shows how the history of international conservation projects in southwest China shapes the possibilities of local expertise and policy. His discussion also illuminates how collaboration can lead to continually revitalized research trajectories. At the heart of his discussion is an implicit international dialogue involving Japanese, U.S., and Chinese researchers and forest managers. Chinese science and forest management, Hathaway shows, emerges in the context of strikingly contrasting models developed in Japan, on the one hand, and the U.S. Pacific Northwest, on the other hand. Our collaborative project—like that of the forest managers we study—engages multiple layers of this transnational dialogue.

Finally, Inoue returns the report to the question of collaboration. How does collaboration change the conditions of knowledge production? What tenets of modern knowledge will scholars be forced to reconsider?

### **Mycorrhizal translations, a mushroom manifesto, by Mogu Mogu**

*Mogu mogu*

mogu mogu  
spores fly shiro abides  
lines of love and value mushroom  
yum yum<sup>5</sup>

The matsutake mushroom has been fetishized in Japan for its symbolic and material value as a rare delicacy. Its high price and the recent decline of the Japanese domes-

tic harvest have stimulated a new transnational commodity chain in Korea, China, and the west coast of the United States and Canada. The Matsutake Worlds Research Group investigates the layers of transnational networks of commercial dealers and harvesters, scientists, forest administrators, amateur mushroom pickers, and food consumers through which matsutake is commoditized, transformed, studied, and consumed. This section represents an initial stage of concept work: a reflection on potential theoretical and methodological implications and the development of some working tools and concepts to instigate lines of ongoing research.

#### ***Rhizomes, fungi***

Gilles Deleuze and Félix Guattari provoke readers in *A Thousand Plateaus* (1987) to approach the world from the point of view of a rhizome. Why do they care about rhizomes? For them, the rhizome serves less as a concept than as a poetics—a poetics of the ontology of multiplicity. It offers an ontology that refuses tree being, arborescent being, being as if there were a general, unifying force—a one—under which all phenomena are organized. The rhizome offers a way to talk about fields and lines of connecting, relating, interpenetrating, becoming, and transforming. One point is crucial: The rhizome not only refuses arborescent being but it also requires a nonarborescent analysis. Its organization—and the proper organization of thought—is emergent through the actualization of connections. The rhizome acts at times in Deleuze and Guattari's text as rhizomic plants such as strawberry, ginger, and bamboo do. At other times, it assumes other living forms—appearing as trees, wolves, ticks, and fungi.

We pursue the rhizome-as-fungus here at more length. Why? Because through the eyes of a fungus, we may attune our sense of the world's relations differently.<sup>6</sup> Modern human eyes are accustomed to apprehending a landscape through its trees, grasses, and flowers. Yet this habit reproduces an overlooked violence; one needs no other reminder than Tsing's (in press b) account of the scandalous victory of cereals that have domesticated human and nonhuman lives. Fungi slip from view, marginalized in the celebratory dioramas of sedentary agriculture.

Another look, however, reveals that the grassy victory is more superficial than it would at first appear. As we keep our eye on a fungus, and look through the fungus, we learn to see not only multiplicity but also diversities and incipient relations in the landscape more clearly and concretely. Fungi continue to act vitally in the connections that make up landscapes. Human beings' lots are cast with theirs.

#### ***The diversity of fungi***

Mycologists categorize mushrooms according to the ways in which they take nutrition or how they relate to a host.

They typically divide them into three types: saprobic, parasitic, and mycorrhizal. Saprobic mushrooms take nutrition from a dead body of plants, such as trees, logs, straw, or compost, or from other fungi and animals. Both parasitic and mycorrhizal mushrooms take nutrition from living organisms. Parasitic mushrooms harm the host plants, at times eventually killing them. In contrast, mycorrhizal mushrooms form a symbiotic relationship with the roots of trees. In fact, plants need symbiotic relationships with fungi to take nutrition from the soil. Most plants have fungi on the tips of their roots. The fungi break down soil components, effectively predigesting nutrients for the plants. In exchange, the plants supply nutrition produced by photosynthesis to the fungus. Mushrooms are the fruit bodies of some of these symbiotic fungi.

Most cultivated mushrooms, such as button, portobello, and shiitake are saprobes. Because they live with—or on—dead plants, humans can easily replicate their living conditions and produce them on a commercial scale. Most highly prized wild mushrooms, such as the truffle, porcini, chanterelle, and matsutake, are mycorrhizal. They dwell in and create the landscape in different ways.

Shiitakes are easy to understand because they act like timber. They are born into the commodity chain from dead trees through an inoculation technology that has been used for hundreds of years in China and Japan. Shiitake cultivators drill a series of holes into oak logs and place plugs with shiitake spawn in them. The logs are then stacked outdoors under canopies. After several months, shiitake mushrooms grow out of the inoculated logs. Increasingly, since the development of indoor sawdust cultivation in 1980s, outdoor log cultivation has declined in favor of indoor production. Humans can believe that shiitakes are domesticated. Little mystery surrounds their propagation.

The mycorrhizal relationship between a matsutake and its host, by contrast, is more complex. The matsutake produces a dense mycelial mass in its subterranean habitat. This mass is called “shiro,” which in Japanese literally means the color white (白), a castle (城), or a place (代). If one scrapes the topsoil, one will see shiro as a white or pale gray soil between or around host trees. Shiro works like a fort around a castle: Matsutake is a weak competitor with other fungi and microorganisms. Matsutake avoid rich organic soil where others thrive. The shiro excludes mold and bacteria. Plant roots that try to penetrate the shiro from the outside turn rotten at the tips or make a U-turn away from the shiro. Within its colonized domain, the shiro can be compared to a seedbed for the matsutake mushrooms.

Matsutake mycelia mesh with the young growing roots of pine trees and create mycorrhiza. They cover the tips of fine pine roots, penetrate between cells in the roots, and form a structure known as a Hartig net, through which they exchange substances with pines. When a pine root grows thick, the growth of fine, lateral roots stops. The thick main

roots do not create a mycorrhizal relationship with matsutake anymore. Matsutake–pine mycorrhiza are produced only temporarily, when the growing cycles of pine roots and matsutake mycelia match. The cooperation of entangled pine roots, matsutake mycelia, and other microbes secures food for the mushroom. Mycorrhiza in a shiro is a structure of symbiosis. It assembles life with other organisms and lets their fruit, the mushrooms, bloom.

Many aspects of this symbiotic relationship are still mysterious to humans and pose an exciting challenge for scientists and commercial engineers (Suzuki 2005; Yamada and Omasa 2003). Yet another challenge lies in assessing how porous the trophic categories themselves might be. Lu-Min Vaario and colleagues (2002) have broached the question, for instance, of whether a mycorrhizal mushroom might harbor saprobic potential.

#### *A diagram as a map*

The diagram in Figure 1 maps some of matsutake’s mycorrhizal relations. Put your finger on it to trace them. Matsutake, trees, foresters, buyers, gatherers, industries, scientists, and eating—all nourish each other.

This diagram is a machine of abstraction. It flattens the multidimensionality of the landscape. It simplifies relationships so that one can clearly trace the generative interconnections of each actor. The diagram codifies action, helps the user to copy and repeat the action, and creates the desire to reproduce the effects. It is a tool for tracing actions in a closed terrain. It produces an expected effect.

Yet, if one sees this diagram through the eyes of fungus, it appears as a map. A map can also be a tool for abstraction, but it has two faces. One face of the map reifies objects in the landscape, strata, and territories. It flattens. But the other face of the map shows the line of flight, stimulates movement toward deterritorialization and destratification. It creates the desire to connect different dimensions. The landscape pops up. It sparks imagination outside the closed terrain. It connects to the outside.

A spore flies and lands on the soil where microbes dwell. A mycelium reaches out and entangles itself with plant roots. It collaborates with microbes and diversifies itself into different strands. Fungus and microbes dissolve the soil and create new strata and a new landscape. A mushroom as a fruit body blooms as a product of these intra-species actions.<sup>7</sup>

#### *Analytic advantages of mycorrhiza*

Thinking mycorrhizally points us to landscapes and practices that thrive in the “gap” between what is taken as wild and what is taken as domesticated—the “seam” between supposed nature and culture. In doing so, it not only orients us to the subterranean processes that draw those gaps and

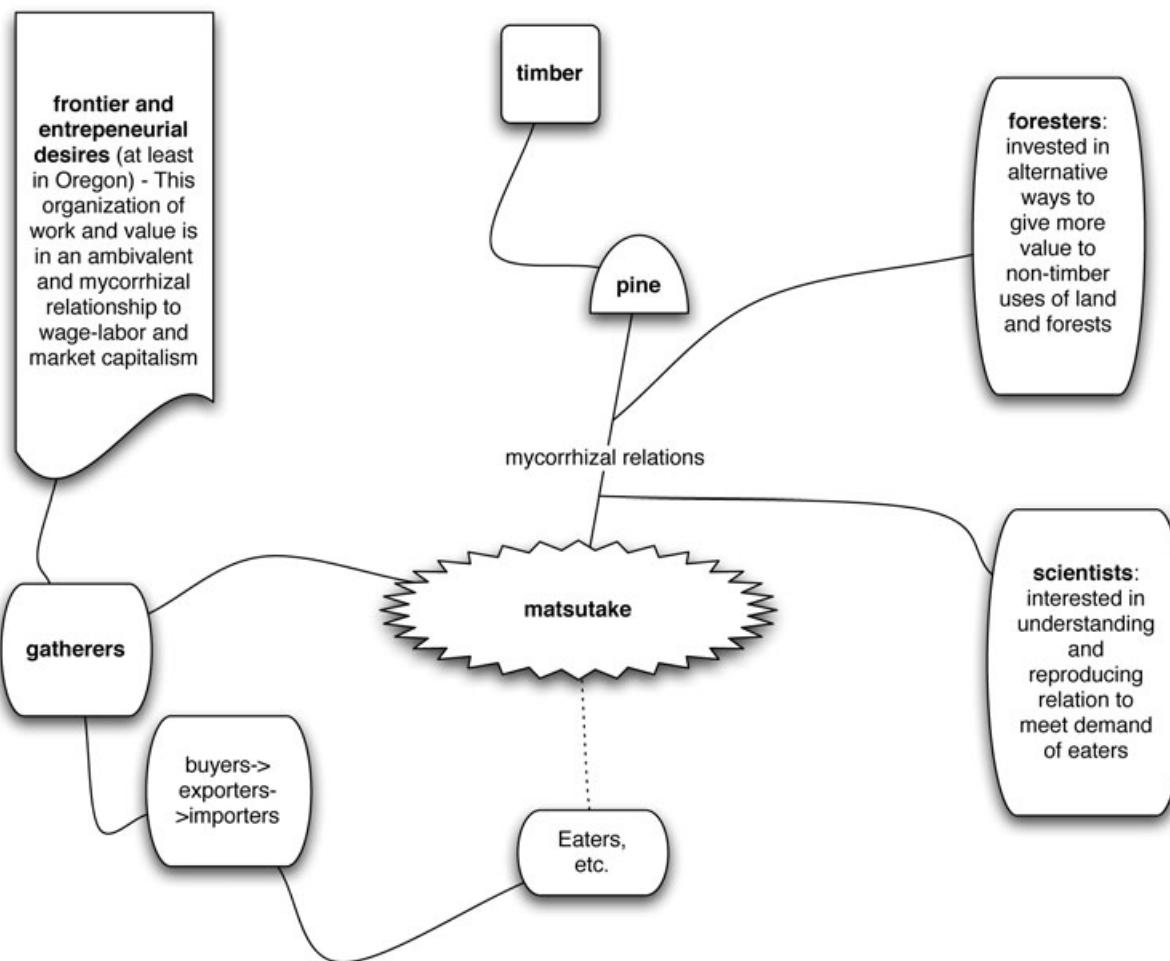


Figure 1. Map.

seams into being but it also alerts us to others that might draw those edges differently.

Matsutake is commonly considered a wild mushroom, one that cannot be artificially cultivated. Yet Dr. Makoto Ogawa (1991), a pioneering Japanese matsutake scientist, has cautioned that matsutake might be better described as an “unintentionally cultivated” mushroom.

In the main islands of the Japanese archipelago, matsutake mostly grow in red pine (*Pinus densiflora*) forests. Red pine is a pioneer species in plant succession. As a pioneer species, the red pine thrives in shallow soils where other plants cannot survive, such as mountain ridges with exposed rock. Matsutake particularly like thin red-pine forests; the mushrooms are usually observed in mountains that have either been cleared by foresters and farmers for wood use and shifting cultivation or that are in recovery.

The matsutake’s favorite habitat in Japan is *satoyama*, an ecological network of low-altitude mountains, forest, and human dwellings. Throughout history, people have used satoyama for cutting firewood, collecting fallen leaves

for fertilizer, making charcoal, and carving terraced paddies. Satoyama is a secondary natural environment, an ecology that includes human activities. A landscape of human intervention is necessary for the growth of the “wild” matsutake mushroom.

#### ***Matsutake mycorrhizal relationships: Three examples***

Looking at the landscape through the matsutake’s mycorrhizal relations tunes our senses to complex chemistries linking and forming different actors. Something unforeseen may pop up in the multinatural landscapes matsutake leads us to. Let us share with you three fruits of matsutake’s relations with love, knowledge, and money.

**Example 1: Mr. Y.** Mr. Y is a quality-vegetable merchant in Kyoto. His store has been dealing quality matsutake since the 1880s. His idea of “commerce” tells of a gift exchange system in the heart of an urban capitalist center.<sup>8</sup> The joy of matsutake, Mr. Y says, is not in the eating. It is about giving a gift. People do not buy top-end, expensive matsutake

to eat by themselves. The matsutake is not like an ordinary commodity that a buyer consumes by her or himself. The matsutake functions as money. Mr. Y explains that, actually, matsutake is often used as a bribe. When people give matsutake as a gift, they rest the mushrooms on a bed of *ura-jiro* (*Gleichenia japonica*) ferns in a basket, often placing some 10,000-yen bills beneath the leaves. In the environment of the gift basket, the matsutake and the bills under the ferns form a mycorrhizal relationship, a symbiosis between mushroom and money. The money under the leaves is like the roots of a pine tree in the satoyama, nourishing the practice of matsutake gift exchange. Without the gift-giving practices, the high value of matsutake is not realized in the market.

But there is a slight gap between this economy of matsutake and money circulation and the usual imagination of capitalism as cold calculation and abstraction.

Mr. Y says that he is fascinated by matsutake because it is the only vegetable he sells that human beings cannot reproduce. It is a gift from the natural world, a blessing from deities. His love of matsutake evokes the ancient notion of money as a medium coming from the sacred world, circulating the blessings of deities, and connecting people through its mobility. Commerce can be greedy profit making, but it can be also an act of dispersing blessings. The matsutake-money relationship in commerce dwells both in the world of political corruption and in that of connections filled with a joy of sharing.

**Example 2: Mushroom modernity.** In 1868, the Meiji government was established, following the model of the modern nation-state. The Meiji government actively incorporated Western industrial technologies in hopes of strengthening the nation. During the modernization process, resource extraction was accelerated, massively transforming Japan's landscapes. Many mountains went bald. Matsutake flourished.

The 1960s saw the Japanese "fuel revolution." People turned from wood and charcoal fuels to propane and petroleum gas, even in rural areas. Satoyamas were abandoned. Red-pine forests were succeeded by broadleaf trees. The soil became too rich for matsutake mycelia to grow. With an urban economic boom, young people migrated from rural areas to the cities. The rural communities were left with old people and abandoned mountains. Around the same time, pine wilt disease caused by nematodes became a serious problem throughout Japan. Many red pines were killed. Dr. Ogawa believes that the decline of mycorrhiza weakened the red pines and made them vulnerable to the disease (Ogawa 2007).

Dr. Ogawa, as a young ecological scientist in the National Forestry Agency, saw hope in matsutake for a revitalization of the rural economy in Japan. Today, he is retired from matsutake research. He grew disappointed in the

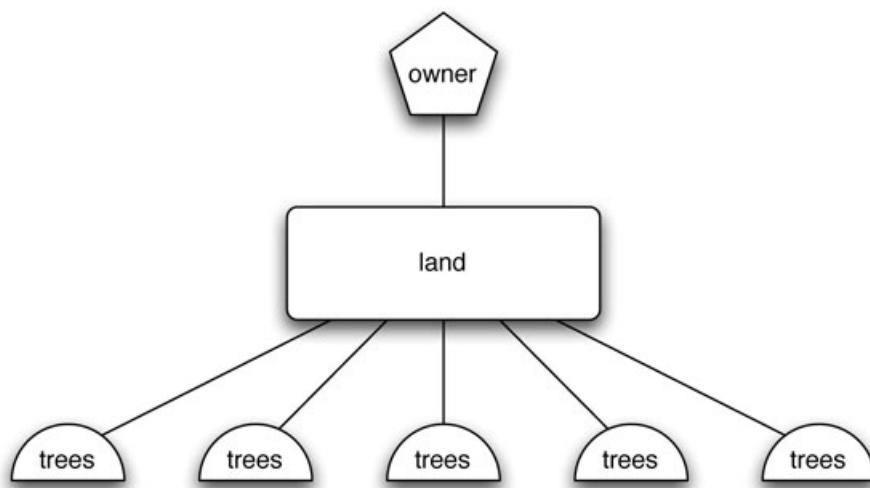
ways matsutake became an object of market speculation instead of a medium of rural revitalization. Yet the spores he unleashed began to grow and extend at the turn of the 21st century. Matsutake has been turned into an emblem of satoyama revitalization movements among many NGOs and grassroots actors. One group even calls itself the "Matsutake Crusaders."

But the boundary between market speculation and rural community empowerment is murky. Dr. Takashi Ito and Dr. Koji Iwase, successors of Dr. Ogawa in matsutake research, today promote the idea of matsutake growing like an "orchard." They have written a book titled *Matsutake: Kajuen kankaku de fuyasu sodateru* (1997), which means "Matsutake: Nurture and propagate like an orchard." The authors argue that, although matsutake cannot currently be produced like other humanly cultivated plants, it is possible to transform a whole mountain environment to make it suitable for matsutake production. As successors of Dr. Ogawa, the authors express strong concern about the well-being of rural communities, but they beg the question of the different dynamics an "orchard" brings to the way satoyamas have been used (Tsing and Satsuka 2008).

**Example 3: SEV.** Our third example takes us from Japan to Oregon, to the relations matsutake's mycorrhizal relations themselves forge with efforts to imagine alternative forms of value. It takes us to an incubated thought, an article-spore. Five foresters set out in 2002 to compare the production and value of timber and of wild edible mushrooms in the Pacific Northwest. To do so, they used an economic instrument known as the Soil Expectation Value, or SEV. SEV estimates the net worth of a forest on a per-hectare basis. To be more accurate, it assesses the potential value of land in terms of the income that will accrue if the land is used for particular purposes. SEV is explicitly an instrument of comparison, a technique for projecting two or more futures—two or more landscapes—in a common currency.

Now, translating land into SEV is relatively straightforward if one thinks about—and like—a tree.<sup>9</sup> In the world of timber trees, all expenses and returns are organized under the one—the one who owns the land—making the costs and returns straightforward to track. Costs—of planting, thinning, and harvesting—are relatively predictable as are yields. The SEV of trees is calculated as the delivered log price minus the harvest cost, wages and transportation costs, and other costs associated with harvesting and transporting the trees. The landowner captures all the return to the resource because property rights and markets are well defined (see Figure 2).

But things get tricky with matsutake and other wild edible mushrooms. Just as matsutake lead us to an appreciation of mycorrhizal relations and intra-active exchanges between (what become) trees and mushrooms, so too they lead us to a mycorrhizal system of value. For economic



**Figure 2.** Arborescent ownership.

returns on the mushrooms do not flow to the one. They are distributed—between landowner and harvesters. The structure of distribution is not free or equal, but neither is it arborescent. With matsutake, the landowner captures a small fraction of the value—only the income, if any, from permit sales. How, then, will the foresters estimate the value of mushroom “production” (if one can even call it “production” when speaking of “wild” mushrooms)? They must find the net return to the harvesters.

This presents a challenge for three reasons: (1) Property rights are not clearly defined, and public documentation of markets and prices for matsutake is poorer than it is for timber markets; (2) given a short growing season and unpredictable yields, the matsutake market is imperfect and volatile; and (3) information about harvesters’ expenses and revenues is scarce.<sup>10</sup> Harvesters do not talk readily about how much they earn selling mushrooms or about how much they spend on food and gas. Harvesters compete with each other to gather the most and the best mushrooms. Secrecy and privacy rule the day, as harvesters guard knowledge of potential mother lodes.

Still, the foresters find a handful of harvesters willing to talk; and what they cannot gather in the wild, they fill in with the help of a former harvester’s memoir, *Matsutake Mushroom: “White” Goldrush of the 1990s* (Guin 1997).

With this information, they reach a remarkable conclusion. Comparing SEVs for potential timber use and matsutake harvesting in the same forest, the tasty mushrooms’ SEV eclipses that of trees. This is striking, because matsutake’s brethren, chanterelle and morel, are not so lucky; they cannot generate comparable values—largely because they are not dear enough. They fetch less per pound, most likely because they lack the extraculinary relations with the monetarized circuits of Japanese gift and graft that nour-

ish matsutake’s cash value. It is this anticipated high value that makes buyers early in the commodity chain willing to pay more for matsutake. It is this high value that, in turn, nourishes the frontier spirit of the “white gold rush” and the imagination of a self-made fortune among the harvesters in Oregon, the willingness to assume the financial risks and hard labor involved in dedicating days to looking for mushrooms that barely break the surface of the pine-needle forest floor.

In this instance, within the controlled environment of the foresters’ argument, trees lose the value game. Land utilized to nurture and harvest matsutake has the same SEV as, or a better one than, land planted with trees meant to be felled. Matsutake and their mycorrhizal relations with Oregon’s pine trees thus cast a spore of thought for the foresters. With matsutake’s aid, they can argue that land is worth more as a landscape than as land. Trees can be mycorrhizal partners—they can be something other than timber.

Thinking through matsutake’s translation of forest values offers a possibility of a less clear-cut future. It does not mean thinking utopically, however, or generally, about fungi or value. Specificities matter. Chanterelles and morels, although equally mycorrhizal and equally delicious, cannot muster such value. This calculus, furthermore, works only within a specific regime of property ownership in Oregon.<sup>11</sup>

#### ***Instruments, love***

Timber value exists in disavowal of trees’ mycorrhizal needs, unless mycorrhizal mushrooms are instrumentalized as nutritional amendments for tree production (see Wang and Hall 2004). Matsutake and those who love them, however, turn the tables, instrumentalizing trees for

mushrooms. By *love*, we mean something akin to what Dr. Minoru Hamada means when he writes in his *Matsutake nikki* (Matsutake diary; 1974) of the possibility of a chemical love.

"When we analyze love as a scientific phenomenon," Hamada writes, "there emerge the following questions":

1. Is it an exclusive phenomenon among living organisms?
2. Is it an exclusive phenomenon among human beings?
3. Is it a phenomenon towards different sex?
4. Does it presuppose sexual maturity or sexual activity? Can you observe it among infants or elders?

The above questions all involves ambiguous categories...all living forms are bipotential or bisexual...often the actors of "love" are not perfectly male or female, they may be sterile, or there may be a better sexual partner. Even after a lover passes away, the feeling of love may remain or even become stronger. The object of love does not need to be a living organism. It is also hard to draw a boundary between "true love" and the love between a parent and a child, between friends, desire for a thing or work. [1974:185]

He defines love as follows: "positive and negative approach towards a variety of stimulation caused by a non-living being, a living being or a group of living beings. In other words, love is the whole process of movement stimulated to move toward a certain direction. Love is positive or negative action, that is, approach or estrangement. Once the movement is over, love is over" (Hamada 1974:185–186).

We leave unpacking the ethical possibilities of such a queer love for a later time. What lies immediately ahead is the practical task of tracing more of (and in more detail) the still-active pathways of movement that articulate matsutake with trees, forests, mountainsides, gifts, entrepreneurial dreams, rural development schemes, conservationists' hopes for viable timber alternatives, and more. Doing so requires us to think with, but also beyond, commodity chains and chains of translation, those chains whose successive links lend an object its material facticity in the world and that give it value. The lines cast by matsutake do not work only serially—they work in parallel or radially, refusing a single direction, cause, or logic. The practical conditions of matsutake's mycorrhizal life—in all the specific sites where matsutake thrive—call for a different calculus of nature, love, and value.

### **Weather and bugs as contingencies of matsutake connections, by Lieba Faier**

What follows is a preliminary reflection on how two non-human forms—weather and bugs—figure in the ways that

some matsutake pickers and traders in rural Japan talk about local and global science. My research centers on a region of mountain towns and villages in southwestern Nagano Prefecture that I call "Central Kiso." Central Kiso is not among those regions in Japan famous for matsutake; only a small quantity of these mushrooms are found there every year. Because the area is not at the center of matsutake culture in Japan, it is a good place to consider the relations between official and vernacular knowledges. My interest here is in how Central Kiso residents make sense of matsutake-related weather and bugs by mobilizing and embellishing scientific and local knowledges to accommodate local commitments and concerns.

Science studies challenge scholars to think of science as itself a kind of vernacular knowledge—a form of knowledge produced through social alliances and contingencies of practical method (e.g., Haraway 1989; Latour 1987; Trawek 1988). However, less attention has been paid to how scientific and technological knowledge is taken up outside official institutional sites, such as in conventionally "vernacular" spaces. This article joins science studies and scholars in other disciplines who have tried to pick up this dropped thread to understand the interplay of forms of knowledge through which nonscientists understand the natural world (see, e.g., Braun 2002; Cruikshank 2005; Haraway 1997; Mol 2002; Verran 2001; Whatmore 2002).

Matsutake are useful for thinking about such questions because understandings of them in Japan, including ecological understandings, have historically been forged in a dialogue between scientific and village knowledges. Scientists have long drawn on village knowledge and practices to learn about matsutake. In turn, rural residents consult the research of experts and listen to their advice to understand conditions of local matsutake growth.

Here I focus on the ways that Central Kiso residents' understandings of weather and bugs develop in dialogues across these vernacular and scientific traditions of knowledge making. I draw on the work of my collaborators in the Matsutake Worlds Research Group who are studying scientific forms of knowledge surrounding matsutake. Their studies have been exploring the cross-cultural dimensions of scientific knowledge about matsutake and the ways scientists account for relationships among fungi, trees, insects, people, and other forms of matter and life (see, e.g., Tsing and Satsuka 2008).

In conversation with this work, I have found that, when Central Kiso residents engaged with scientific discourse to make sense of weather and bugs, they articulated official understandings with vernacular ones to highlight their pride in the local landscape and their concerns regarding its future. One way they did this was by characterizing weather and bugs as contingencies of connections: dependent but not entirely predictable conditions that shape possibilities

for, and forms of, matsutake-based connections on local, national, and global scales.

Let me first share two ethnographic sound bites that illustrate how weather and bugs figure as contingencies of connection for Central Kiso residents. I then discuss some of the ways these residents mobilized and embellished scientific knowledge about weather and bugs to make room for local concerns. I end by reflecting on some future considerations for our collaborative research.

First, then, let me tell you about Morikawa-san, the vice mayor of a small town in Central Kiso. Morikawa-san is known not only as a local *matsutake no meijin* (a matsutake expert or master) but also as a good marksman who once killed a bear. Referred to by other Central Kiso residents as a true "outdoorsman," Morikawa-san wears bolero neckties and hunts deer and wild boar. And he gathers all kinds of mountain vegetables and mushrooms from the mountains he owns, although matsutake is likely the most valuable of these species.

Morikawa-san agreed to take me up to one of his matsutake-gathering spots when I was visiting Central Kiso in October of 2005. I was surprised when he picked me up for our appointment in a pale green, two-cylinder minicar (*minikā*), the kind of car usually driven by young housewives in the area. Morikawa's choice of transportation made sense to me once we started up the extremely narrow and at times (what felt like) nearly vertical dirt road that led to the top of the mountain where he gathers matsutake. Morikawa-san spoke to me in a local dialect that he moderated for my benefit. He explained that he had dug the road, which was just about a minicar's width across, three or four years earlier. The job had taken an entire year's worth of Saturdays and Sundays. He confirmed that he had bought the car specifically to use on the road.

As soon as I got into his car, Morikawa-san began to explain that there were not many matsutake this year, at least not in Central Kiso: "It didn't rain in May this year," he stressed.

You need rain in May and September.... If there isn't enough rain, the mushrooms won't grow. This May there was hardly any rain. And in September too, it didn't fall the 100 millimeters we get in the average year. It only rained one or two days this September. The mushrooms, they start to grow around the beginning of April. That's why you also need rain in April and May... or the mushrooms won't grow well.... Last year [2004] there were lots of typhoons. They all came to Japan. And not just typhoons, there was lots of rain too in May, and even in June.... But this year none came through here.... We had lots of strong high pressure air in the skies [and he used words one often hears on weather reports to explain this]. Even if the typhoons came this way, it drove them all away. They slid right by. They all went to Taiwan and China.

As a result, Morikawa-san explained, whereas the previous year he had found more than 100 matsutake on his mountain, a relatively large number for him, this year he had found fewer than 30.

Morikawa-san also told me that in Japan matsutake first appeared each year in Nagano because it is so high above sea level. (This turns out not to be necessarily true, but Morikawa-san's identification of the region in such terms offers a glimpse into how weather and matsutake figure in some of the ways locals imagine regional identity, a point to which I return below.) Morikawa-san mentioned that the matsutake season in Kiso ends early too, because the weather gets cold. He also said that the cold weather keeps away the *matsukumushi* (pine weevils, lit. pine-eating bugs) that eat the trees under which matsutake grow and that are destroying the matsutake harvest in Tanba, a region near Kyoto famous for matsutake where Satsuka, Tsing, and Hathaway have conducted fieldwork. Morikawa-san explained, "The bugs that eat the trees can't survive in places that drop below five degrees Celsius. In Kiso, it drops below ten. They can't survive in a cold place like Kiso."

Morikawa-san had been gathering matsutake since he was a child. His grandparents taught him to find the mushrooms in the mountains surrounding their home. His grandparents had gone up into the mountains to collect leaves to use for fertilizer. The resultant thinning of the mountain soil had encouraged the growth of matsutake, just as it exposed the mushroom caps to interested pickers. Morikawa-san told me that his grandparents had been poor in those days, so they had sold all the matsutake they had gathered. He told me that he never sells them now. Collecting them is primarily a hobby. He usually eats them with family and visiting friends and offers them as gifts to maintain social networks with people both within and outside the region. But, he qualified, he only gives them to friends if the mushrooms are not infested with *mushi* (bugs; in this case, fungus flies). According to Morikawa-san, whether they are infested depends on weather conditions that allow for many wild mushrooms to grow. He explained, "If there are a lot of mushrooms around, the bugs that eat mushrooms [*kinoko o taberu mushi*] won't get to the matsutake. But if there aren't many mushrooms, they likely will." He pointed out that few other mushrooms were growing in the vicinity that year, suggesting that the matsutake on his mountain would likely be full of bugs. He showed me how he gently presses on a mushroom to see if it is soft and, thus, whether there are mushi in it. He was pleased that the one he tested was still firm.

Morikawa-san was not the only Central Kiso resident involved in matsutake picking and trading who spoke to me about a lack of rain in the region that year and about problems caused by mushroom bugs. Watanabeya-san, the energetic wife and manager of a produce market in town, also

stressed the importance of the weather for her matsutake business and the ways that bugs affected local matsutake. I had asked her where she had purchased the matsutake sitting in decorative boxes near the front of her shop. She responded in rapid, percussive tones: "Oh no, I didn't buy them from anywhere, they're all from the mountains around here. Well," she backpedaled,

and I also sometimes buy some cheaper ones from China. I buy ones from places like China and Korea at the regional wholesale market, but really most of them are picked from the surrounding mountains. You see, when it comes to picking them, there are conditions. It depends on whether there is a lot of rain and the weather is good. There are times when it isn't. It's never the case that we don't find any matsutake. You see, we have *doyō* matsutake during the "dog days" of summer. There were a lot of *doyō* matsutake during that time this year. But those matsutake don't have much of a fragrance and have a lot of bugs. But if it's cool during that time of the summer, if we don't get such intense heat, you know, if it's like you're thinking, "Is it hot?" Well then the matsutake really come out. Years like that you can find matsutake all the way from June through October. In short, even if it rains in September, if it doesn't before then, forget it. If you get some rain in July and August, then the mushrooms will come out throughout the mountains. However, if it's just a little rain, then it won't be enough to get under the leaves below the trees and the mushrooms won't develop. But if there's a lot of rain, like really a downpour, then it gets under the leaves and the mushrooms will develop. But then if it's hot the mushrooms will rot. Then in the climate of early autumn, and through October, they'll grow.

Watanabeya-san never goes to pick matsutake herself, not even on the mountains her family owns. She told me she is too busy with her produce business. She buys matsutake from neighborhood people who pick them from the surrounding mountains. She explained that in the past, during years when the weather in Central Kiso was unfavorable for matsutake and there were not enough local mushrooms, she imported most of those she sold from China and Korea, and a few from another part of Japan. She also regularly buys cheaper matsutake from places like China and Korea at regional wholesale markets to sell to local inns that serve matsutake cuisine to visiting urban tourists, who have come to expect such delicacies in mountain resort regions. Weather patterns, both local ones and those in other parts of the world, such as China and Korea, affect where Watanabeya-san's matsutake come from, how much she pays for them, and how many she imports; they are part of what determines links between Central Kiso and other parts of Japan and the world in any given year. Watanabeya-san said that there had been many local mush-

rooms in 2004 (the year before we had our conversation and the year Morikawa-san mentioned as having seen many typhoons and much rain). That year, she claimed, she hardly imported any matsutake at all.

Neither Morikawa-san nor Watanabeya-san depends on matsutake for his or her livelihood. As I mentioned, although some matsutake can be found in Central Kiso, the harvest is not really large enough to make the region significant or famous as a matsutake region. And yet, both Morikawa-san and Watanabeya-san recounted with insistent detail the weather conditions necessary for matsutake to grow in the surrounding mountains and the problems with bugs that could threaten them. They could tell me what the weather and bug conditions were like this year and in past years, and the relationships between weather conditions and bugs to matsutake harvests and markets both locally and in other parts of the world.

As local residents such as Morikawa-san and Watanabeya-san discussed matsutake-related weather and bugs, they embellished scientific knowledge to accommodate local commitments. Consider Morikawa-san's discussion of the problems with matsukuimushi in Tanba. Scientists have argued that a nematode carried by the pine weevil is killing the pine trees under which matsutake grow in this and other parts of Japan (Suzuki 2004). As I mention above, when I asked Morikawa-san about Tanba, he responded immediately that the pine trees under which matsutake grow there are dying because they were blighted by matsukuimushi. Yet Morikawa-san and other local residents did not mention the nematodes when discussing matsukuimushi and their effects on matsutake harvests. Rather, they stressed that cold weather had thus far kept the matsukuimushi away from Central Kiso. Scientists have also found that pine weevils prefer warm, dry climates (Suzuki 2004). However, when local residents pointed this out, they were not aiming to contribute to generalizable scientific knowledge about these weevils. Rather, they were engaging discourses of local identity tied to the notion that Kiso is a "samui tokoro" [cold place], as local residents regularly described the mountainous region to me. When speaking of the region in this way, they often recited with pride a line from the *Kisobushi* (The Kiso Melody), a folk song about the Kiso region that is familiar throughout Japan: "Natsu demo samui" [Even summer is cold]. In this way, discussions about matsutake-related weather and bugs became opportunities for distinguishing the region and asserting local forms of identity and expertise.

Central Kiso residents also related scientific knowledge about matsutake to their concerns about the depressed local economy. These concerns often centered on the neglect of local forests and the aging of the local community caused by the increasing number of young people who have been moving to urban areas. Another longtime matsutake picker, Kawanishi-san, told me that matsutake harvests have been

decreasing over the past several decades. "It's quite different than it was in the past," she told me. She explained that before gas usage was widespread, people went into the forests to get firewood for cooking and heating their homes. "Before, the forests were always neat and clean [*kirei*] and the matsutake grew. Now people use gas so... you can't find many matsutake anymore." She and another longtime resident lamented that local forests were no longer being maintained. Gesturing to the effects of urban migration and the corresponding graying of the local population, they explained that those who knew how to care for forests were elderly and thus could no longer manage such work.

To counter the decline in the regional forestry economy, local residents had turned to domestic tourism. But these efforts have met with limited success and come with liabilities. Watanabeya-san and Kawanishi-san also explained that local people had started roping off their mountains so tourists and golfers could not selfishly enter and incorrectly pick mushrooms, damaging the fungi and, thus, future fruiting prospects. At his home, Morikawa-san showed me the "no trespassing" signs he had recently painted and planned to put up on his mountain. A couple of years later, as I walked through the region with local residents, I noticed such signs and barriers across the landscape.

Central Kiso residents thus rearticulated science through an appreciation of locality. In doing so, they highlighted what they experienced as the unpredictability of nature, which they understood as always already global. They knew that matsukuimushi were not indigenous to the region but that these weevils traveled and could always make a sudden local appearance. The larvae of local fungus flies too were unpredictable, their sporadic appearance in mushrooms dependent on the weather. And the weather also taunted local prediction. It seemed to be increasingly shaped by the traveling abstraction of global climate.

In fact, some local residents cited "global warming" (*chikyū ondanka*) as a factor affecting local matsutake harvests. They spoke about how rain and other weather patterns had become unpredictable in recent years, explaining, "Matsutake need rain, but because of global warming, the rain patterns have changed." Watanabeya-san also told me that global warming could be affecting the quality of mushrooms in the region. "It used to be cooler in the summers and we had matsutake from June through October. Now that it's warmer, if they come, they rot." The effects of global warming in the region meant fewer and poorer-quality matsutake. It also meant, as Morikawa-san suggested, that if the temperatures got warm enough, matsukuimushi might eventually come to the area.

For Central Kiso residents, then, discussions about how weather and bugs affected matsutake harvests provided opportunities for relating scientific knowledge to local forms of expertise in ways that centered on life in the region. When

local residents discussed global warming, pine weevils in Tanba, and typhoons in China, they staked a place in a cosmopolitan scientific world. This was an appealing world to participate in; many local residents were self-conscious about seeming parochial because they lived in an economically depressed part of rural Japan that was often identified as remote and traditional. Yet they also recognized that "the global" played out in their lives in unpredictable—and not always beneficial—ways. Central Kiso residents often connected the local economy's problems with the importation of cheaper woods to Japan from other parts of the world and to the appeal of cities like Tokyo, which they viewed as more modern and cosmopolitan.

Homi Bhabha points out that *contingent* has two meanings: "[It] is contiguity, metonymy, the touching of spatial boundaries at a tangent, and, at the same time, the contingent is the temporality of the indeterminate and the undecidable" (1994:186). For Central Kiso residents, weather and bugs were contingencies of connection in two senses, then. First, they were contingencies that shaped the kinds of connections local residents could forge with people in other parts of the region, Japan, and the world. Weather patterns and bugs shaped how many matsutake were found locally, where imported ones came from, how much they sold for, and who consumed them. Second, weather and bugs were uncertain factors that reflected the ways that not only matsutake harvests but also everyday life in Central Kiso were impacted by forces outside the region—and in this sense they were viewed as beyond local residents' control. Although both Morikawa-san and Watanabeya-san could cite in careful detail the weather conditions necessary for a good local matsutake harvest, they could not be sure from year to year whether local weather conditions would be auspicious or whether those in other parts of the world might be more so. They also could not predict whether local matsutake would be infested with bugs or whether matsukuimushi would eventually make their way to the region. In this way, weather and bugs were not unlike other things with links outside the region that residents viewed as potentially taking a toll on life inside it.

As a theory through which local and global natures are connected, this understanding of contingency is not limited in its application to Central Kiso. Indeed, it makes an important point about global connection and the nature of science. To the extent that communities like those in Central Kiso form relations with locally specific forms of nature, recognizing global ties means recognizing the ways that these local forms, and thus one's life and surroundings, are not entirely in one's control. This sense of local indeterminacy is a particular form of self-positioning. It is one that can be identified with the vernacular itself. To be outside official centers of power is to be caught in contingency—to be made to respond to its vagaries rather than being able to force a response from them. Consider, in contrast,

how contingency works for those who view the world as if they were positioned above it. From such a perspective, one tends to see powers of prediction in the possibilities of global connection. Contingency becomes fodder for modeling and remaking the world, not for responding to it. For instance, global climate scientists take the global nature of climate as the key to forming predictive models. Global forest managers take the global nature of deforestation as the beginning of their mandates for sustainable management. Such understandings of contingency are only possible when one sees oneself as positioned in some sense outside of global nature so that its uncertainty becomes entirely available for analysis. However, from the perspective of practical local engagements such as those of Central Kiso residents, the existence of global ties increases the unpredictability of local outcomes in a precarious way that demands one always be prepared to flexibly respond.

Ethnographers need to appreciate these situated perspectives to understand life on earth. Too often, social analysts follow globally oriented science and approach the globe as a patterned and predictable whole. We overlook differences and participate in creating a myth of a homogeneous globe. Attending to contingency helps us see the possibilities of difference in interconnection.

Central Kiso residents' understanding of weather and bugs as contingencies of connection is useful for appreciating matsutake ecology and commerce around the world. It points us to the ways that the roles played by weather, bugs, and matsutake themselves are not fixed across the globe. The participation of these nonhuman forms takes culturally, historically, and geographically specific shapes. Their roles in matsutake exchange shift in different moments and create different configurations of social–natural relationships in different locales. These relationships themselves take on varying significance to different people and things in different sites where members of the Matsutake Worlds Research Group are conducting research—they are different for Hmong pickers in Oregon, scientists in Yunnan or Tsukuba, and pine trees and residents in Tanba or Central Kiso. A collaborative research project enables us to explore the overlaps and gaps among these relationships and the different roles nonhumans are playing in them in various places around the world. By doing so, we can learn something about the connections and disjunctions among human–nonhuman worlds across the globe and how global processes take shape at their interface. Paying attention to ways that people in places like rural Nagano invoke weather and bugs as contingencies of connection helps us build the theoretical vocabulary necessary to do this. It helps us grasp both the patterned and the unsystematic ways that nonhumans figure in global processes as they take shape through locally situated dialogues between scientific and vernacular knowledges.

### **Postcolonial science studies and the making of matsutake science in China, by Michael Hathaway**

Over the last few decades, scientists' claims that their knowledge is universal and culture free have come under scrutiny. Scholars have shown how scientists' assumptions and epistemologies not only impinge on the interpretation of their results but also shape their research interests, experimental design, and conceptions of knowledge and authority (Anderson and Adams 2007; Barnes and Edge 1982; Latour 1987; Pickering 1995; Shapin 1994). Science studies, a wide umbrella combining scholarship from historical, sociological, philosophical, and anthropological traditions, has tried to reveal the "cultural fingerprints" (Harding 1994) left behind on scientific data, theories, and methods. Recent work in postcolonial science studies contributes to a legacy of science studies that focused on Western contexts, with some notable exceptions (i.e., Needham 1954 and subsequent volumes in the *Science and Civilization in China* series). Studies of science in non-Western contexts have tended to treat colonialism as having hegemonic powers and as a "machine" that used Western science to dominate (McClellan and Regourd 2000; Osborne 2005). Recent scholarship challenges this proposition, however, by examining how "Western" and "non-Western" sciences were made through a "complex process of translation, appropriation and accommodation" (Bray 2007:440). This recent work explores how science circulates through multiple centers and localities and how it is transformed and taken up in social and political practices by diverse constituencies (Abraham 2000; Anderson 2002; Biermann 2001; Harding 1993; Hayden 2003; Hecht 2002; Helmreich 2005; Lowe 2006).

The Matsutake Worlds Research Group builds on postcolonial science studies to examine the transnational production, flow, and transformation of scientific knowledge in the contemporary world. Our research examines the role of a high-value gourmet mushroom, the matsutake, in motivating a diverse realm of scientific practices in different countries. We examine how mycologists (mushroom scientists) and forest ecologists in the United States and Japan conduct experiments in the lab and forest and how their data, findings, and assumptions have influenced the production of matsutake science in China. We are particularly interested in how matsutake research in China is shaping and being shaped by the regional mushroom economy. Matsutake has become important as an object of financial value and as a symbol of ecological health. We ask, How are these knowledges informed by and informing networks of trade, taxation, and the emerging economy of nature conservation efforts? How do debates about matsutake science and policy foster connections between

disparate groups, such as forest ecologists, conservationists, and social-justice advocates?

In this section, I outline some of our initial research findings from the United States and Japan. Then, to provide ethnographic context for our future research in China, I draw from my previous fieldwork there on the politics of transnational nature conservation efforts, activities that were always motivated and justified by reference to science. Such conservation activities have gained increasing importance in debates over matsutake management.

Fieldwork in the United States and Japan provides a baseline for our research in China. In the United States, Tsing has begun to uncover the social and institutional networks that create, disseminate, and use scientific studies of matsutake. She has shown that the bulk of this scientific research emanates from a nexus between state agencies (such as the U.S. Forest Service), private logging interests, environmental NGOs, and the public. U.S.-based ecologists usually regard matsutake as a “wild resource” and consider human presence in the forest intrinsically harmful. In turn, their studies about the effects of human harvests are always compared to a baseline study of “non-intervention” (i.e., Luoma et al. 2006). Much research is focused on sustainable yield and is haunted by an intense concern with overharvesting. One of the few U.S. researchers who worked with Japanese matsutake scientists declared that Japanese “forest management goals differ greatly” from those in the United States (Hosford et al. 1997:46; see Tsing and Satsuka 2008).

Our work in Japan, guided by Satsuka, follows a differing genealogy. We trace the research trajectories of several matsutake scientists, who navigate a complex realm of support from the academy, government, and private industry. Unlike the situation in the United States, private interests in Japan play a major role in funding scientific research on cultivating matsutake in the lab (a project that has yet to be successful) and increasing “wild” populations in the forest. Scientists operate from the notion that, without proper human stewardship, matsutake yields will decrease. Human presence in the forest does not threaten “wild” populations; rather, humans can help revitalize the “matsutake mountains” that were previously found throughout rural Japan. Thus, our comparative study reveals that Japanese and U.S. matsutake research, despite frequent exchange at conferences and in scientific journals, emerges from fundamentally different notions of nature and the role of human action.

Our future work in southwest China’s Yunnan Province will examine how Japanese and U.S. mycological perspectives vie for authority. We anticipate we will find that neither perspective totally dominates but that Chinese scientists create their own novel formations in conversation with others. Debates about the management of matsutake now include many actors, including conservation biologists, social

justice advocates, foresters, and others who produce, consume, disseminate, and transform scientific studies. Thus, matsutake provides an excellent opportunity to examine the changing politics of science. The emergence of matsutake science in China is deeply inflected by Yunnan’s particular sociohistorical context, in particular, the history of debate and interaction between foreign conservation NGOs and Chinese scientists, officials, and villagers. Such relationships are shaping the social landscapes of livelihoods and policy and the material landscapes of actions such as logging, mining, farming, and conservation.

My previous fieldwork revealed how some of these relationships emerged in China. Before I turn to a discussion of the recent history of matsutake in Yunnan, I describe shifts in official national policy toward conservation during the 1980s and show how some Chinese experts played a major role in transforming the political terrain on which matsutake management is debated. This history is important for understanding the changing dynamics of power and authority among conservation organizations and how these dynamics impinge on contemporary debates about matsutake.

By the 1990s, the politics of nature in China, at least officially, was turning away from earlier models of “nature as natural resource base” and “nature as pollution sink” toward a concern for ecological sustainability. Previously, state reports on wild animal and plant populations often focused on increasing levels of production, in numbers of furs and pounds of dried herbs; there was little regard for ecological issues per se. Likewise, Chinese state representatives argued in global forums for the “right to pollute” as part of the country’s necessary transition toward a more industrialized economy; environmental controls were often regarded as an unfair imposition by the Global North (see Economy 2004). However, China became an increasingly frequent signatory to international environmental treaties by the 1990s and expanded its creation of nature reserves and environmental laws.

At that time, there were also substantial changes in Yunnan, arguably the province with the most environmental activity and the richest matsutake habitat (Litzinger 2004). In the 1980s, when international conservation NGOs first carried out their projects in Yunnan, NGO staff often conceived of villagers as antagonists of the natural world. Villagers were depicted as “peasants,” who, with little capacity to understand science, damaged the surrounding forests with unsustainable practices, such as slash-and-burn agriculture. Two decades later, such depictions were increasingly challenged by a handful of Chinese experts. These experts had already played a critical role as cultural brokers, helping foreign conservation NGOs get established in Yunnan.<sup>12</sup> Over time, these experts were no longer acting as mere technical helpmates for foreign NGOs but were increasingly entrenched in global flows of funding, academic

prestige, and connections. They used archives to show that certain practices (such as villagers clearing large amounts of land by slash-and-burn agriculture) that are now regarded as environmentally damaging were not carried out by villagers on their own terms but were promoted and orchestrated by the state itself. Experts also countered accusations of villager ignorance by carrying out fieldwork documenting "indigenous knowledge," including villagers' knowledge of matsutake ecology.

Because of the influences of these experts, powerful organizations such as the Nature Conservancy (TNC), likely the world's wealthiest conservation NGO, found that their ability to set the terms for conservation and science in Yunnan was diminished. In addition to the experts, other agents now vie to influence agendas previously left to specialized scientific committees (on this development in the United States, see McLain et al. 1998). In turn, questions about managing the matsutake economy are increasingly reflected through this dynamic between state agencies, Chinese experts, research institutes, and villagers.

Unlike the trade of tea and horses, which goes back centuries in Yunnan, the matsutake economy is relatively new, only beginning in earnest in the late 1980s. The sheer newness of matsutake allows us to trace more closely how it became a commodity in transition, an object of scientific inquiry, and a transnational object of desire and concern. Of the multiple stories about matsutake in Yunnan, one heard by a colleague in 1990 speaks to several concerns (Bob Anderson, personal communication, November 2007). In the late 1980s, several Japanese biologists came to northwest Yunnan to collect rare butterflies. They traveled to the most important and imposing mountain in the area, Jade Dragon Snow Mountain (Yulong Xueshan). The butterfly collectors explored the mountain for days and were able to find numerous interesting species. When they descended the slopes, however, local officials discovered that the butterfly collectors lacked the proper permits. When the officials searched the biologists' supplies, they found evidence of the true reason for the expedition: matsutake mushrooms. These entrepreneurs, posing as butterfly collectors, gained access to the mountain at a time when political prohibitions meant that many places in Yunnan were still closed to foreign tourists but potentially open to scientific exchange. In this account, those who appeared to be disinterested scientists were, in disguise, entrepreneurs.

This account of entrepreneurialism, therefore, speaks to a larger question that emerged during ethnographic fieldwork on foreign environmental NGOs in Yunnan: Why are foreigners interested in Chinese nature?<sup>13</sup> During fieldwork, I was asked by villagers as well as officials, What are environmental NGOs doing here in Yunnan? What is in it for them? What do foreigners like the Americans or the Dutch want with Chinese nature? Will groups like TNC try to buy up land and turn it into a tourist destination? In contrast,

the Japanese butterfly collectors-cum-entrepreneurs are more easily and satisfactorily understood by Chinese villagers and officials: They have come to make money. Unlike Western expectations that scientists' efforts are purely motivated by the quest for knowledge, the butterfly-collector story revealed an expectation that scientists, or those who claim to be disinterested scientists, have entrepreneurial aims. When TNC started not just to promote ecotourism writ large as a new part of Yunnan's economy but also to endorse particular ecotourist destinations, the move was seen as evidence by some Chinese that its aims were not just to save nature but to save it to make a profit. Although TNC and other NGOs fought fiercely to present themselves as disinterested parties that use objective science for conservation goals, their actions were often interpreted differently. Foreign NGOs' sudden interest in matsutake only furthered those suspicions.

After the Japanese showed the potential of matsutake as a commodity, it began to be incorporated into a shifting set of networks. In the early 1990s, much of the literature on matsutake collection was celebratory, exclaiming its potential to assist in "poverty alleviation," and no one seemed concerned about its ecological impact. At the time, conservation organizations also promoted the harvest, as it fit with trends to find "non-timber forest products" (NTFPs). This strategy was based on the notion that if villagers could profit from forest-dependent natural resources such as wild mushrooms, they would have an incentive to protect the forest. Although the initial notion behind NTFPs was that these products (e.g., mushrooms and flowers) were of low value, during years of good harvest and high prices, matsutake has, in fact, brought massive amounts of wealth to Yunnan. In 1997, the crop was worth \$40 million. In 1997, the average per capita income was about \$125 a year, so tales of finding \$50 worth of mushrooms in one day meant that mushrooms represented fantastic opportunities and brought newfound wealth to many families.

The market was given an unintentional boost in 1998, when logging was banned in the headwaters of the Yangtze River. China implemented the ban after a massive and devastating flood of the Yangtze. The ban was based on the widespread assumption that upstream logging resulted in downstream flooding. This was the world's largest ban of its kind, and, in enacting it, China was likely influenced by neighboring Thailand, Vietnam, and Sri Lanka, countries that had earlier declared logging bans. Prior to the ban, logging was a key industry in this part of Yunnan, sometimes bringing in more than 80 percent of local government revenues. After the ban, illegal logging continued to a small degree, but legally sanctioned logging came to a virtual standstill. Local governments, as well as thousands of individuals supported by forestry, began to search for financial alternatives, and matsutake was already there, having been "found" by the Japanese almost ten years earlier. Yet,

as matsutake has risen in economic importance, the politics and practices of matsutake collection have become increasingly connected to emerging networks of actors concerned with Yunnan's ecological landscape. Many of these actors have expressed fears about the mushroom's overall sustainability and made dire predictions about the ecological consequences of the harvest. Whereas initial reports celebrated matsutake wealth as a way to alleviate poverty, recent discourses pay more attention to its role in remaking social and natural landscapes.

As a direct form of landscape making, the matsutake harvest seems fairly insignificant. Unlike more intensive methods of land use, such as converting forested riparian habitat into permanent rice paddy, matsutake harvest per se does not seem to have significant effects on other species. As far as scientists know, matsutake is not a "keystone species," and so, even if it were to go extinct, it is hard to know what other species would be affected,<sup>14</sup> other than *Homo sapiens*, as thousands of people devote themselves, at least seasonally, to its harvest, purchase, resale, trucking, marketing, taxing, and monitoring. Rather, it is the wealth, or potential wealth, of the matsutake that has fostered changes in rural land tenure and affected other livelihood activities such as herding.

The rise of the matsutake market has strongly influenced village land tenure. Until the early 1980s, villages in China were often part of large-scale communes, which had started to form in the late 1950s and had no clearly defined boundaries. Currently there are no national or provincial regulations on the matsutake harvest, and, instead, the village has become the most critical site for organizing the harvest. The matsutake economy has provided a new incentive to create firm boundaries between village lands, especially as some villages with productive habitat try to exclude others (Yeh 2000).<sup>15</sup> In addition, the creation of a valuable resource also conjured new social relations within the village, sometimes promoting *communitas* but also presenting new challenges as residents devised ways to protect the harvest from each other through regulations, guards, rules, seasons, and social sanctions.

Indirectly, the matsutake harvest is affecting landscapes as it displaces other forms of livelihood, such as yak herding, which have been practiced for centuries, if not millennia. Yaks range over a huge swath of land, and their grazing changes the kinds of vegetation that survive. Under the new environmental mandates, herding is coming under increasing scrutiny too, especially in terms of concern about its impact on flora and soil. In particular, some worry that new tree seedlings, subsidized by the logging-ban policy, will be threatened by the grazing animals. Herders, who tend to favor meadows for grazing, often set small fires to encourage the growth of lush plants and burn back tree seedlings. Yet, grazing land is shrinking because laws that prohibit the use of fire are now increasingly enforced. In re-

sponse, some families have sold their yak herds and increasingly devote themselves to the seasonal matsutake harvest.

Concern about the ultimate sustainability of the matsutake harvest has become a major issue in Yunnan, not only among officials and conservationists but also for many harvesters. This concern has mainly focused on matsutake as a species in and of itself. Few studies have examined the possible effects of decreased populations on other plant and animal species or how matsutake harvesting techniques might affect other species. Historically, this turn to incorporate fungus within conservation plans is novel, as such plans rarely give fungus the same status as plants or animals. Matsutake has become a notable exception, as it was declared an endangered species in China in 2008. Just six years earlier, at an international meeting on endangered species, only a few countries had even considered including any mushrooms at all on this list. Two countries, Japan and China, rejected this possibility, saying that mushrooms should not be added, as they are not threatened by trade (Thomas 2005). Now, for reasons not totally clear, China has added matsutake to its list of endangered species. Its pronouncement is challenged by some who suggest that little scientific work backs up claims that matsutake is endangered in China (Arora 2008; Menzies and Li in press; Winkler 2004). The mushroom's new status will certainly increase governmental and scientific interest and actions. Contrary to expectations, this listing does not necessarily remove matsutake from the commodity chain and may, in fact, stimulate its consumption through increasing its value.

In conclusion, it is important to recognize that, although Chinese scientists draw from a rich set of domestic scientific traditions, they have also been informed by Japanese and U.S. studies, among others. In our future work, we will explore how to trace or sort out these scientific genealogies. What might we be cautious of? Scholarly studies of science have moved away from more general observations about science as a universal set of social practices to examine nationally specific pedigrees and cultural frameworks. For example, scholars such as Donna Haraway (1989) and Sharon Traweek (1988) highlight notable differences between Japanese and U.S. scientists in creating scientific knowledge about primatology and physics. Such scientists differ not only in terms of training and method but also, more fundamentally, in terms of epistemological foundations. Yet, in the case of mycology, as well as other sciences, we might become increasingly aware of the ways in which science is formed through transnational exchange. In China, scientists and other participants in debates about matsutake management draw on Japanese and U.S. funds, collaboration, and studies to guide their own research and buttress their arguments.

Scientists might be some of the most respected agents in debates about forest management, but others are now

playing influential roles. Some Chinese social activists are now concerned about trends to restrict and police the matsutake harvest in Yunnan, a policy informed by visions of local people's actions as environmentally damaging. Indeed, there are rumors that officials may decide to ban the use of rakes in forests because of fear that raking the forest duff (the loose layer of pine needles and leaves on the forest floor) will harm the growth of mushrooms. In the United States, there are also controversies about the ecological effects of raking; most scientists believe that it damages the forest ecology, and, because of this belief, raking has been banned on U.S. Forest Service lands (Luoma et al. 2006). In Japan, however, removing the forest duff with rakes is seen as part of the difficult but necessary labor of matsutake stewardship. Such a ban in Yunnan would have serious social consequences for, unlike the situation in the United States or Japan, many rural people in Yunnan raise animals for food and cash, and they need the duff as bedding for these animals.

Although Yunnan seems to be moving toward a raking ban, a Japanese NGO called the "Matsutake Crusaders" will soon visit the province to promote its methods for increasing matsutake yields, including raking. Members of this group will likely arouse interest and provide a more public and visible perspective on human–matsutake relationships than the biological studies undertaken by their compatriots. They will, in turn, likely foster more debate in Yunnan and add new twists to the changing world of matsutake science, as it continues to transform.

Studies of science-in-the-making need to attend to the larger social context in which scientists carry out their work, in this case how social-justice advocates, forest officials, and pastoralists play a role in the larger social terrain in which matsutake studies are conducted in Yunnan. At the same time, however, scholars need ways to focus their analytic vision on those social interactions that are particularly influential in the production and transformation of this knowledge. In other words, when widening the scope to trace the social networks involved in creating, debating, and supporting this knowledge, it is important not to assume rhizomelike equity but to examine how differently situated actors engage with a power-laden world. Scholars must examine how national context inflects scientific knowledge, without assuming that national boundaries are rigid. Such a stance encourages efforts to investigate the ways that methods and perspectives travel, to trace the social life of scientific facts and theories, and to consider how all of these, in the process, are transformed.

### **Collaboration and the subject of anthropology, by Miyako Inoue**

Sociocultural anthropologists grow up professionally and live in a subdiscipline that envisions collaboration as a

marked category, perhaps even a bit eccentric. That is, we are all trained and disciplined to think of scholarship as a normally individual, even isolated, enterprise. We know this is an abstraction, indeed, a distortion. We know that intellectual labor is social, as is all labor, and that "the individual" is a dramatically social production. We know that our work is enabled by means of intellectual production purchased with real capital—what we call "resources" in the university—and that it is rooted in social relations of intellectual production, even if those relations are not precisely capitalist (although they appear increasingly corporate, even neoliberal, to faculty members who are not professional administrators). We know that the concrete situations in which we conduct our research and write and publish are made possible by relations inside and outside the university that are shot through with power; that ideas are never freestanding but are always circulated through inescapably social, political, and material means of reproduction; and that everything we do as scholars and teachers is founded on particular conditions of possibility, in both the discursive and material-social meanings of that phrase (see, e.g., Field and Fox 2007; Fox 1991).

It gives one pause to consider the improbability of such a field as social-cultural anthropology as not only having been invented (Hymes 1999) but also institutionalized (Vincent 1994). My immediate point, however, is that a complex and largely stable—if continuously negotiated—academic division of labor has to exist for social-cultural anthropology to exist. Cultural anthropologists have to agree with sociologists, psychologists, political scientists, historians, and linguists—not to mention biological anthropologists and archaeologists as well as deans and provosts—on how to divide up and organize the world to study, write, and teach about it. This is never a matter of clean mutual exclusivity, because we always refer to other disciplines in what we do, if only by implication. A host of others are involved in our "individual" intellectual enterprises, and although we do not usually call that "collaboration," we need to start with recognition that we never work alone.

It is ironic that in a field that should perhaps know better—social-cultural anthropology, particularly in its critical and humanistic versions—we are less open to "collaboration" or to seeing our work as a social product than are the "harder" intellectual workers down the hall from us or in the building next to ours. Scientists, engineers, biological anthropologists, and archaeologists all regularly work in teams of specialists with affirmatively dovetailing, or better, synergistic, knowledges, and major funding agencies such as the National Science Foundation and National Institutes of Health regularly support anthropological research teams—teams that often include specialists from other disciplines: biology, geology, and so on. Corporate research and development is, of course, never based on a model of individual

pursuit of knowledge but is always organized in teams of complementary specialists.

We should also remember that much of the foundational work of 20th-century social-cultural anthropology emerged in collaborative projects in the immediate post-war period. Recall area studies and community studies, including Julian Steward's Puerto Rico Project (1948–51; see Steward et al. 1956), the Harvard Modjukuto Project (1952–54) and Chiapas Project (1957–92; see Vogt 1978), and Sol Tax's Fox Project (1948–59), which left indelible marks on the discipline by funding and training numerous graduate students who later became prominent figures in the field and by creating protocols of ethnographic collaborative research, many of which involved multiple graduate students funded by the project and a handful of faculty members working together in one area or community. So where are we in terms of collaboration in the present? (I leave aside the question of collaboration with our "informants" or "research consultants" because that is another can of worms.) Are we just trying to catch up with everybody else, from industry employees to our colleagues in the sciences, or is collaboration for us something different? Are we simply recycling postwar large-scale area and community studies, which had their own, historically particular, social relations of intellectual production?

The Matsutake Worlds Research Project is situated in a twofold intellectual and historical context. First, it is in many ways informed by the new challenges wrought by reflexive and experimental critiques at the core of what has been called "the linguistic turn" in anthropology in the 1980s. Debates that were brought about by the publication of *Writing Culture* (Clifford and Marcus 1986), for example, directed both new and renewed attention reflexively back to our own research methods and practices. The recognition of the historical kinship of anthropology with colonialism and imperialism, the reflection of this link in the unequal distribution of power in the relationship between researcher and informant, and the inherently political nature of ethnographic writing as productive of—rather than transparently representing—our objects of knowledge, all put on the table, and demanded, new modes of ethnographic research and writing.

Second, the consequences of contemporary translocal political-economic processes ("globalization") have made it necessary either to develop new methodologies for spanning "scales" of analysis (but see below) or otherwise finding "phenomena of connection" (see again below) or to critically recover and adapt appropriate methodologies from our disciplinary ancestors. In practical terms, how could critical knowledge up to the job of making sense of our present world be based on the work of individual scholarly entrepreneurs?

The reflexive and experimental turn has also productively pushed us to find anthropological subjects beyond

the "primitive" and "exotic" in geographically and culturally remote areas, to find them close to home in modern institutions and practices, as in medicine, science, and technology, and among national and transnational agents of governance, finance, and social movements (see, e.g., Holland et al. 2007; Rabinow et al. 2008). Working with scientists, activists, NGO workers, government officials, and other experts not only challenges the anthropologist's monopoly of knowledge production but also complicates her or his ethical, political, and intellectual standpoints and thus recasts the subject of ethnographic research. Furthermore, it brings us a sober realization that anthropological knowledge is contingent on, and contiguous with, the production of other forms of knowledge, outside of academic institutions. It would well seem that we have little alternative but to respond to the historically specific conjuncture of our contemporary situation by recourse to collaboration. For those of us in the Matsutake Worlds Research Group, collaboration was one inevitable and logical answer to the question of how anthropological research is possible in the actually existing world of the present.

We are mindful of four characteristics of the process of our collaboration. First, strong collaboration is dialectical, not synthetic. There is more to strong—and critical—collaboration than is highlighted in the hard sciences and corporate research and development. The benefit traditionally imputed to research teams is the integration of complementary specializations, the holistic payoff that comes from dividing up the work into functional categories and assigning it to different team members. If a family physician is not sure how to interpret a particular set of symptoms, both she and the patient are better off relying on an appropriate specialist. This is, of course, a quintessentially Fordist model, or, deeper, the model at the origin of the capitalist industrial division of labor.

What we are trying to do here is different. True, we have all assumed "specialized" roles in this project. But the model is not based on the idea that we are intending to synthesize our separate, freestanding analyses into an organic, complementary whole. On the contrary, our works may show that there are views of our object that are not assimilable to others; we might have to be content with productive tensions among our conclusions. The analogy in politics is the recognition that a will to consensus is often a will to power in that somebody has to yield to others to arrive at "consensus." We are often better off agreeing to disagree. Although all of us are familiar with this model of working together, we should mark its distinction from the traditional understanding of collaboration. James Clifford (1997) has written wonderfully about the multivocality of collaboration between anthropologists and indigenous peoples; they do not arrive at synthesis and perhaps not even agreement other than to work together by representing their distinct standpoints (which, of course, in the dialectics of open

dialogue, are unlikely to remain unchanged). We welcome the method of “looking several ways” (Clifford 2004) and see multivocality as a productive outcome of collaborations with each other.

This particular kind of productivity, and its consequences for the partitioning of knowledge, is the second characteristic of our collaborative process. Specialists on research teams recognize that value comes from interdisciplinary or interspecialty dialogue, but there is generally little sense that disciplines or specialties might change their basic relations with each other or undergo internal reorganization on the basis of dialogue. Our project opens that possibility. Although it is never comfortable—and certainly not “efficient”—to seriously rethink one’s questions or assumptions in the midst of doing the work, we need to continually ask how our frameworks for the project are hierarchically related. My point is that a collaboration among critical scholars can be an opportunity to think deeply about core ideas in our discipline and our specialties within the discipline.

Third, we focus on connections across different geographical sites rather than complementarity across different specialties. Bringing supposedly different “cases” to the table is not new in anthropology, but we are not interested in conventional comparison. Rather, we see these sites as socially and materially connected by a commodity, that is, the matsutake. Marx’s (1990) concepts of the “commodity” and “commodity fetishism” are useful guides. Marx was not interested in “comparing” the site of production of a commodity with the site of its consumption, as if they were two different “cases” in the Human Relations Area Files. His work guides us to trace concrete connections between production and consumption, what Lila Abu-Lughod (1991), after Eric Wolf (1982), has aptly called “phenomena of connection.” We also recognize the continuity of what we are after in our project with the “commodity chain” approach. But it is collaborative ethnography that allows us to appreciate the extent to which such connections are far from predetermined, but, in fact, are unpredictable and contingent. Faier refers to “contingencies of connection” to highlight the provisional nature of the local’s “vernacular” knowledge to manage the unpredictability of the weather and bugs. Hathaway shows how the rise of “postcolonial science” and the production of scientific knowledge, in fact, hinge on the ongoing divergence and convergence of multiple national and transnational stakeholders.

Furthermore, such connections are not best understood in terms of the functional requirements of capitalism or an integrated world system. That is precisely how one should not be trying to understand phenomena of connection. Localities—“places,” as geographers call them—are *sui generis*; some of them are more powerful than others and have the ability to tie the others to them—and sometimes to remake the others—in ways the less powerful have

little choice over. What are those ways that powerful places have at their disposal, and how do less powerful places respond? How do less powerful places get caught up with the more powerful places to begin with? Although it is possible for a single scholar to address these kinds of questions through multisited ethnography or the kind of magisterial historical work done by Sidney Mintz (1986), it is collaborative work that is most promising for most anthropologists.

Finally, we want to let the research subject (the matsutake) inform our research design. In other words, we aspire to mimic the matsutake’s rhizomic sociality for our research strategy to envision the productive multiplicity that underwrites our collaboration, and to defy the impulse of centralizing and totalizing knowledge production.

## Notes

1. The Matsutake Worlds Research Group consists of Timothy Choy, Lieba Faier, Michael Hathaway, Miyako Inoue, Shiho Satsuka, and Anna Tsing. The sections of this report were born at a session of the 2007 Annual Meeting of the American Anthropological Association. Tsing presented a related talk, “Kinship and Science in the Genus *Tricholoma*,” at a separate 2007 AAA session honoring the work of Marilyn Strathern.

2. A chain of coedited anthologies directed and marked the course of feminist anthropology from the 1970s to the turn of the 20th century. A full discussion and listing would require another article. However, for a taste of the enterprise, see Rosaldo and Lamphere 1974, McCormack and Strathern 1980, and Ginsburg and Tsing 1992.

3. Our term echoes Sandra G. Harding’s (1995) “strong objectivity,” in which attention to process is part of objective science. We acknowledge the feminist heritage of our methods. We elaborate on the idea of “strong collaboration” in Matsutake Worlds Research Group in press.

4. See Saito and Mitsumata 2008 for a discussion of Japanese village auctions. See Yeh 2000 and Arora 2008 on matsutake in Yunnan, China. I am grateful to Charles Menzies for sharing information about matsutake and First Nations in British Columbia. Matsutake forests in the U.S. Pacific Northwest have been a site of my own intensive fieldwork, conducted in collaboration with Hjorleifur Jonsson and University of California, Santa Cruz, undergraduates Lue Vang and David Pheng. A preliminary discussion of the matsutake commodity chain can be found in Tsing in press a.

5. Mogu Mogu represents Shiho Satsuka and Timothy Choy writing together. In Japanese, *mogu mogu* is an onomatopoeia for eating. In Cantonese and Mandarin, *mogu* refers to a mushroom.

6. Ingold (2006:13) also mentions that he prefers fungal mycelia over rhizomes to understand the web of relations among organisms.

7. *Intra-species* is meant to connote and connect with a sense of “intra-action,” a term coined by Karen Michelle Barad (2007) to convey a world in which things in relation do not preexist their relation. The ontologies of the things themselves are at stake in their relating. See also Strathern 1988. Also see Isabelle Stengers’s (2003) work using the concept of “intercapture,” which builds on Deleuze and Guattari’s (1987) discussion of the “double capture” of orchid and wasp.

8. Katherine Rupp (2003) observes a similar coexistence of reciprocal relations nourishing gift and market economies in Japan.

9. As Susan J. Alexander and colleagues put it:

The methods by which timber is measured, marketed, and sold make SEV calculations for timber rather straightforward...

For trees, the delivered log price minus the harvest cost, wages and transportation costs, and other costs associated with harvesting and transporting the trees, equals the stumpage price, or the bid price in government timber sales. The landowner captures all the return to the resource because property rights and markets are well defined. The stumpage price minus the landowner's cost of administering the sale is the return to the resource. The return to the resource after each cutting cycle for all time, discounted back to the present, equals the SEV. [2002:131]

10. Alexander and colleagues explain:

For wild edible mushrooms, the return to the resource is the net return to the landowner along with the net return to the harvester. This is different than the return to the resource calculation for timber. As mentioned previously, the owner of trees captures all the return to the resource, because property rights and markets are well defined. Return to the resource for wild edible mushrooms, as with many other nontimber forest products, is harder to calculate in part because the landowner usually captures little to none of the value. Permit prices, if a permit is granted, are usually fixed and low and may or may not cover the cost to the landowner. Property rights are not clearly defined, and markets and prices are not publicly documented for these resources as they are for timber markets. The harvest of wild edible mushrooms is labor intensive, the unit value is often low, the season is short, and the economic risk is high. The harvester captures much of what little return to the resource there might be by doing the labor and taking the risk, and often makes little money. The market is imperfect. Because the landowner captures little or none of the return to the resource through administratively set permit prices, or no permit at all, the return to the resource for wild edible mushrooms is the sum of net return to the landowner through permit sales, along with net return to the harvester.

The net return to the landowner is usually permit fees minus administrative cost; in most cases, the harvester is not the landowner. The net return to the harvester includes subtracting both an estimate of personal costs (gas, food, etc.) and an estimated personal minimum wage from mushroom revenues, realized by selling mushrooms daily at buying sheds. Each of these cost and revenue estimates must be converted to costs and revenue per hectare, as for timber calculations. These calculations depend on information that ranges from good to nonexistent. [2002:132]

11. We have yet to explore, for instance, what instruments of valuation address problems of comparison in certain satoyamas in Japan that are owned communally.

12. Elsewhere, I argue that so many international projects came to Yunnan not just because it has so much biological diversity but because Chinese experts made it into a compelling location for research, conferences, scientific tourism, and international projects interested in "cultural diversity" and "indigenous knowledge."

13. This account parallels insights by Joan Fujimura (2000) that reveal the vast efforts undertaken by certain leading scientists (in this case, genomics scientists) as entrepreneurs, trying to find and sustain support for their research from private and state sources.

14. Even so, recent research on its microbial actions underground is showing complex and still largely unknown interactions with other species.

15. Boundaries for family land allocations are also vague. Books in rural Yunnan that give the boundaries of such property (which families lease from the state for a set period of time) describe the land not precisely in terms of total area or exact distance but loosely in terms of its relative position between neighbors' lands.

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