9

How to Interview a Plant

Ethnography of Life Forms

Soon into my fieldwork in the botanical gardens, I began to worry I was not paying enough attention to the plants, that my account would not focus on them sufficiently and I would only end up analyzing representations. This chapter relates my efforts to regard several plants as ethnographic subjects, a project that proceeded rather awkwardly at first, then developed some momentum. I settled on the "how to" format because I hope my approach proves useful to others and also conveys the experimental aspect of this undertaking. My ethnographic project involved the usual steps: read the literature, find a site, proceed to analyze, and so on. The shift comes in trying to account for life forms directly, rather than their representations in human knowledge systems. It seems to me that multispecies ethnography fundamentally must narrate life—that is, describe and analyze life forms in their social relations. I attempt that here, partly by accessing the expertise of botanists, but also by turning toward "thin description," an approach that shifts away from ethnography's traditional investment in "thick description." In the end, my efforts are limited, and I do not achieve my initial goals. But as Kamala Visweswaran argued in her essay "Feminist Ethnography as Failure," there is a lot to learn from what did not work well in the field.[1] The following recounts my process distilled into a rough semblance of a method, or at least suggested guidelines for how to proceed. This is not meant to be comprehensive and is certainly not definitive; it is a gesture toward contributing to some developing lines of inquiry in the field.

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First Step: Read the Literature

My first move in addressing plants directly was to contact Natasha Myers at York University because she is a leading figure in critical plant studies. Her ethnographic research also focuses on plant scientists, but ones whose work is more keyed to issues of sentience or intelligence.[2] When I asked how I might go about interviewing a plant in my field site, her initial suggestions were circumspect and practical: I should visit the plants at different times of the day, in different patterns of light, and observe how they varied. She also recommended I read Craig Holdrege's work, since his method of engaging plants through "exact sensorial imagination" offers a model that most closely approximates ethnography's interview format. For the bigger questions—on whether or how plants are intelligent—she said I should turn to Anthony Trewavas and Daniel Chamovitz. Myers also suggested the philosopher Michael Marder, who insists on plants' radical alterity and otherness: "plants have populated the margin of the margin, the zone of absolute obscurity undetectable on the radar of our conceptualities." Marder works to counter the exclusion of vegetative life "from the purview of respectable philosophical discourse in late modernity," but by emphasizing an antiscience stance: "we must give prominence to plants, taking care to avoid their objective description, and thereby preserve their alterity." Given the immense amount I have learned from botanists, I found this approach unsatisfying; yet I could appreciate his agnostic stance: "All we can hope for is to brush against the edges of their being, which is altogether outer and exposed, and in so doing to grow past the fictitious shells of *our* identity and *our* existential ontology."[3]

Myers was spot-on in suggesting Holdrege. In terms of engaging subjects and learning from them, his approach aligns in key ways with ethnography; also, he meticulously details an observational method that can be applied to plants in any setting. Resonating with Marder's antiscience stance, Holdrege promotes "living thinking" (versus object thinking) as a more participatory, concrete mode, oriented "around the living organism and living processes instead of around the idea of interacting object-like entities." This is a mode that "would be as dynamic, coherent, and responsive as a living organism"; "thinking that is relational, that recognizes how living 'things' interpenetrate and, in reality, are not things at all." Reading *Thinking like a Plant,* I was ambivalent about how this approach sharply contrasted with that of "my" botanists because, with the notion of living thinking and active attention, he

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aims to "transcend the boundaries we construct when we look at an organism from a taxonomic standpoint." But I also heard a resonance with the anthropological axiom that "things" are not independent objects as much as sets of relationships, as in "We can begin to see organisms as intersecting relationships that are part of the greater web of life."[4]

Where Marder insists on the radical alterity of plants, Holdrege—like plant scientists Trewavas and Chamovitz—emphasizes points of fundamental commonality between plants and people. Holdrege's approach is to align certain sensorial parallels: "So the plant's openness to the environment entails initial receptivity, the activity of expanding out and ramifying into the environment, and the ability to remain receptive as it continues to interact with the environment. These are also the fundamental gestures of human perception." The process he depicts, which draws from Goethe's method of "exact sensorial imagination," is contrasted with "carrying out a question-and-answer session with the plant." So I began to consider that perhaps my notion of "interview" was misguided. "Instead, we are taking the time to perceive, to dwell with the plant and its features." This notion of dwelling, though, does fit well with ethnography. Rather than "listening," as in language-based analytics, the aim here shifts sensorially: "So by looking carefully we take the plant seriously—we turn our unencumbered attention toward it. We see the plant as something in its own right and learn to value it for its own sake." The particular process he promotes involves "two complementary types of sensory observation exercise": first concentrating attention by sketching the plant—"drawing can help facilitate looking"—and then, conversely, letting "our attention spread out and wait to find what comes towards us."[5]

Trewavas and Chamovitz move in a rather different direction, toward the task of analyzing plant intelligence in lab-based settings. This a burgeoning field, one that I hoped could readily transpose into an ethnographic setting. The key is constituting "behavior" as a unit of analysis that applies to vegetation as well as to animals. In plants, Trewavas sees behavior in "phenotypic plasticity," a form of action in which movement manifests through morphological change. This version of behavior is strikingly attuned to ethnographic concerns with place and its constitutions. This plasticity, Trewavas writes, is "a phenotypically local response to local signaling." Such "plasticity enables the phenotype to accurately occupy local space, change its phenotype as it grows, forage accurately for resources, competitively exclude neighbours and construct, within genetic/environmental limitations, its own niche."[6]

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Analyzing local dynamics in relation to species being—this is part of what ethnography is designed to do. For that matter, plants are far more attuned to place than humans, in that their "behaviour is inextricably linked to environmental signaling. Because plants are sessile organisms, they may perceive more environmental signals and with greater sensitivity and discrimination than the roaming animal." Plants may be far more exquisite ciphers of "place" than the mammals examined by ethologists and ethnographers. Further, plants can actively constitute place, as is conveyed with the concept of niche construction, which "involves . . . competitive and cooperative two-way signaling between individual and environment that is important in *community structure*."[7] The biggest challenge is that with plants much of this goes on hidden from view underground: "root exudates that contribute to niche construction."[8]

They may behave, but what kind of subjects are they? Ones with rich, sensual lives, as Chamovitz demonstrates by highlighting underlying commonalities with animals at the genetic level. His interest "in the parallels between plant and human senses" arose from researching how plants use light to regulate their development, a capacity linked to a particular group of genes. "Much to my surprise and against all of my plans, I later discovered that this same group of genes is also part of the human DNA. This led to the obvious question as to what these seemingly 'plant-specific' genes do in people."[9] The answer is that they code for blue-light receptors called cryptochromes, which reset our internal circadian clocks. "At this basic level of blue-light control of circadian rhythms, plants and humans 'see' in essentially the same way"[10] With smell and sound and feeling, Chamovitz proceeds in this fashion, detailing how "the science behind the inner lives of plants" reveals consistent and surprising commonalities with humans. For instance, with memory: "many of the mechanisms involved in plant memory are also involved in human memory, including epigenetics and electrochemical gradients. These gradients are the bread and butter of neural connections in our brains, the seat of memory as most of us understand it."[11] Given such commonalities—and because, as Myers writes, "plants sense and make sense of their worlds"—why should they not be ethnographic subjects?[12]

The additional consideration is whether plants are social. They may have deeply sensual inner lives, but unless these are socially constituted, the relevance of ethnography would be moot. Here the matter is fairly clear, starting with the fact that plants can practice kinship. Since Susan Dudley's

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breakthrough research in 2007 on kin recognition in a beach weed called sea rocket—finding that the plant restrained its colonizing tendency when encountering siblings, while accelerating its nutrient-consuming root growth when confronting unrelated conspecifics—studies increasingly show that this sensibility is active in other plant species. Much of the understanding of sociality in plants stems from the growing recognition of their capacity *to communicate* with conspecifics and even other species. Plants communicate through volatile organic compounds that can circulate as airborne chemicals or soluble compounds exchanged through root networks and mycorrhizal fungi—the kind Joyce is studying at LANGEBIO. The rhizosphere is where most of these communications and exchanges take place, though—a terrain not accessible to the kind of sensorial encounters Holdrege imagines. For that matter, as Ferris Jabr reports, "Many of the social interactions of plants seem to involve forms of sharing or cooperation mediated by chemical signals."[13] Even if I could access their rhizospheres, I lack techniques for analyzing this communicative medium. So I set out ambivalently, recognizing that much of what most interests me as an ethnographer may remain inaccessible even if I develop the capacity to dwell with certain plants long enough to render them as ethnographic subjects.

Second Step: Find a Location

Monday, June 10, 10:30 a.m.

On my return to Spain in 2013, I start out at the botanical garden in Valencia. Where would be the best place to try this out? I have two requisites: sufficient shade and a spot to sit, ideally with little human traffic so I can concentrate on the plants without distraction. Based on my previous visit, I vaguely sense that these criteria can be met in Muntanyeta, the Valencian rockery, so I head there.

Around 10 a.m. on a Monday, the garden is quiet, or so it seems. From the main path, facing the terraced berm of red-rock floral beds where I discussed the site's argument with Jaime Güemes (chapter 6), I follow a short side trail, maybe sixteen meters, to the center of the rockery. It is quite shady, so I'm off to a good start. The first thing I notice, once I stop moving, is the throbbing pulse of the mourning doves cooing; the air reverberates in the stillness of this glade. Then I hear the frogs croaking along the little stream. This soundscape, though now quite palpable, had eluded me previously. Before long, several cats from the sizable feral population inhabiting

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the garden stroll past cautiously; the males spray, marking and remarking territory. They don't seem to notice me; I feel like an innocuous presence. All of this is quite interesting, but I remind myself that I'm here for the plants. Now, which ones? Thinking of Holdrege's sensory exercises, I know I'll have to start with drawings, and there I lack confidence. So I want something simple. Looking around, there it is, along the watercourse: a horsetail! *Equisetum hyemale,* like all Pteridophyta, is quite primitive—basically, a ribbed stem with occasional whorled branches and sheathing leaves. It looks like a simple green stalk by the creek. What could be easier to draw than this pencil-shaped life form? But of course, there's not just one; there are hundreds, forming a tight mass up against the path.

I don't worry about that for the moment. I'm looking for a place to sit, and there is none. As Jaime noted, this is intentional; the only benches in the different sites are in the medicinal garden. But, in luck, I find a large rectangular stone, rising maybe a meter from the ground, crosscut by the rope that marks the boundary ringing the collections. I can sit on it comfortably enough, but I'm very anxious that in doing so I'm transgressing the boundary around these displays. I assure myself that I can leap up quickly if anyone should confront me over this breach, but that turned out to be unnecessary. That sense of caution evaporates over the next four days that I work this site: I realize that no one much notices me.

After twenty minutes with the horsetails, observing their clumping patterns as much as the species' morphology, I start feeling bolder. Maybe I can do more than one kind of plant; maybe there's another one that wouldn't be too hard to draw. Looking around, I find it: a dwarf palm or *palmito, Chamaerops humilis,* a monocot. The distinct blades of its spreading fanlike leaves strike me as rather easy to draw. And it's across the path from the horsetail, in a sunnier spot at the base of the "little mountain," so I get a broader scope on the site. I start the next series of observations by walking slowly around its bulging, prickly frame, at least as far as I can while keeping on the path. That's when I notice another plant, this one in bloom—bright clusters of red composite flowers. Several of its conspecifics are spilling out of the scene and under the rope border. I trace this colonizing trajectory back to an etiquette: *Hieracium pilosella.* I'm not certain that's the proper identity since there are several other plants near the sign, but it's lovely, so despite my misgivings over trying to draw something so complex, I decide to include it as well. So, then I'm at three, the magic number.[14]

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Plants to interview.

The second step Holdrege recommends is to shift attention from focused to unfixed and open, so I try that. After regarding each plant in turn, I let my attention gently wane and shift. Just by sitting still, I perceive the host of other species: the pollinators lacing through the warming air; the frogs in the nearby water feature; the cats prowling. Now I spot clouds of insects that seem to concentrate in the sun, whose movements across the site and the plants I start to track. I realize how little I know about insects: I can't identify them within the spectrum of sights and sounds swirling around me, from the pool and on up the hillside. I don't know who any of the insects are that land on my arm or in my hair. Nor can I identify the various birds that swoop in singly to get a drink—only the occasional seagulls circling overhead. I grow frustrated and confront the sad fact that I'm lacking a broad naturalist knowledge base. The consolation is that I grow intrigued at how oblivious I am to species all around until I sequester myself in a seat and just sit. I wouldn't even realize my ignorance or obliviousness until such a moment, just as I only acknowledge the wafting pollen when I sneeze. Bugs appear on my notebooks, but their densities are greater by the horsetail, in the marshy ground.

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Then, an unanticipated realization: in this space and moment when I am trying to attend to plants, I get a clear sense of how social this setting is. I'm all alone, just me and the pollinators and these plants, but the social comes through in waves. Not just as a representation designed as an argument about the flora of Valencia, but as a spot in a corner of a densely packed city. First, I recognize voices: the sounds of a day care in one of the buildings bordering the garden, along with snippets of conversation and even song from an adjacent stack of apartments. Then there are people sporadically passing on the path, and, more frequently, the cats. The noise of traffic laces an edge to the soundscape. Within a couple of minutes I'm overwhelmed by the social—not of the plants but of my conspecifics! In the stillness of that moment, I imagine John Cage playing the audience.[15] But another little victory: this is the first time I consider "the social" as a distraction rather than as that which I painstakingly work to see and explain.

What do I glean from all this? I realize that the concentrated attention insects devote to the plants highlights how little attention humans pay to them, even in a place dedicated to their display. In the two hours I sit there on this first day, only a few people filter through. But their movements and attention are familiar to me from spending many days in the garden. They flit past, seemingly unable to focus. They've not had the experience of a botanist showing them how to identify plants, how to recognize the genus, how to locate a species in a habitat range. Short of such training—informal or otherwise—it is very hard for many people to pay close attention to plants. I can see meaning, too, as part of the problem here. Unless plants fit into a frame of meaning—as aesthetic, symbolic, or useful (Jack Goody's "culture of flowers")—then we urban dwellers generally have little interest or capacity to focus attention on them.

Mostly, the only people who devote more than a few seconds to considering a plant are taking a photograph. More troubling, I confront the significant challenge this project entails: my initial experience of focusing on plants directly results in an overload of the human social in its manifold dimensions. For a panicky moment, that's all I hear or see. I cannot tune it out initially because it is pervasive. But I also realize how narrowly I have construed the social, only looking for it or expecting it in the presence of humans. Here, I sense it in their absence. Somewhat contrarily to my intentions, though, I realize I would not have recognized how it percolates up in quite soft and subtle ways if I had not tried to interview these plants.

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Third Step: Reflexivity

Paradoxically, my confidence that this is indeed ethnography increases as my anxieties multiply. They are all ones I recognize as common to fieldwork. At first, I worry, "What if my site is uninteresting?" What if nothing happens here? What if no one will talk to me? I get that last question out of the way pretty quickly. The plants and I will not be "speaking," as I'm foregoing linguistic models of data and analysis as much as possible. Or at least, I certainly will not talk to them directly, though there are suggestions that this would have a favorable effect on the plants. Then the worry arises that haunts me until I leave the field: what if I don't spend enough time with these plant subjects to learn something significant? Since the advent of ethnography, few practitioners are immune to the anxiety that we have not stayed long enough to comprehend fully a way of life or a worldview. For me this anxiety is all the greater with these plants because I am haunted by the daunting image of McClintock's "intimate knowledge" of maize and the great dexterity possessed by the botanists in understanding plant life.

Disappointingly, looking back on it now, I assuaged these worries by consoling myself that if I fail with the plants, I have representation to fall back on—that which I was hoping to avoid. I find comfort in the signage around me: two round green markers, each with numbers referencing recordings on self-guided tour devices; then a large, elevated legend for Cavanilles and the interpretive placard explaining the display. I can at least resort to analyzing meaning if the "interviews" don't go well. But before succumbing to that temptation, something interesting dawns on me. I realize I can discern urban dwellers' inattention to plants like a finely honed cultural artifact. Their plant blindness is clearest here in this spot but it is evident throughout all of the gardens. These humans are very unfocused in approaching plants. None, in the time I'm in this spot, stop to look at the etiquettes, and few spend more than a handful of seconds in front of any one plant. These humans are doing what we generally do—walking around. Against that activity, the sessile state of plants is accentuated.

Certainly, contrasting timescales are evident. Few humans, myself included, can slow down enough to appreciate the movement of plants. But the rootedness of plants—in contrast with the ingrained mobility of animals—may amplify the apparent disinterest in them. The other factor here is light. Humans hug the shade as they stroll, when it is available. Conversely, the

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plants on the slope before me are vying actively to soak up as much sun as they can. They've writhed and contorted to expose themselves to that which would kill me if I were bared to it for a length of time. We need sunlight too, but not in the quantities that plants do. I can only stand being close to them for so long and then I'm back to my rock.

What do these reflections leave me with? A recognition of a requirement for multispecies fieldwork. When self-reflexivity became an expectation of ethnography in the 1990s, the focus was on social diacritics, principally race, gender, and class—the positions that inform and bias perspectives, which need to be accounted for in devising a cultural analysis. Today, perhaps a *second wave of the reflexive turn* is upon us, when the diacritics are components of species being. What is it in my species being that makes it so difficult for me to interact with these plants before me? My skin and proclivity for motion, for starters. Can I calibrate these in such a way that I can learn from a plant before my attention wanes or my body aches to move? The answer, I feel, lies in whether I can use the methods for observing plants in a way that provides some detachment from the determinate power of species being. I turn back to Holdrege, resorting again to drawings, cheered by his counsel that, "In this exercise we become keenly aware of all that we bring into every experience," which resonates strongly with the charge to be self-reflexive. As well, I have my own channeling-the-ancestors moment as I think back on Laura Bohannan drawing leaves as she struggled to imitate the Tiv's facility with identifying plants.[16]

As I prepared for this phase of the project, I came to appreciate how Holdrege's rendering of "exact sensorial imagination" fit well with the basics of ethnographic observation. He promotes a nontechnical stance of looking and describing, an open-mindedness directed toward "overcoming the tendency to think abstractly."[17] Similarly, ethnographers try to shed preconceived categories in favor of an openness to an unfamiliar, located worldview. Both aim "to get closer to the concrete sensory qualities" of a field site, which requires untraining routinized sensibilities: "And for this we need our various capacities of sensing, analyzing, imagining, associating, excluding, remembering, searching mindfully, and so on." Through this "process of coming to know . . . we become keenly aware of all that we bring into every experience," which resonates with an ethnographer's effort to achieve some degree of reflexivity about what predispositions and assumptions to bring to the tasks of observation.[18] Yet, anticipating the moment when observation necessarily

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passes over to depiction, I was anxious about the translation of loose, open-ended sketches and notes into formal description.

Fourth Step: Description

What am I looking at?

This question, posed time and again, grew more difficult to answer with each passing hour. I was surprised I did not become bored and that there was so much to see and think about in this site where humans were fleeting. Yet I struggled time and again to return and tighten my focus on each plant. My sketches piled up, growing a bit more sure of hand and sharp of image. Yet was I getting closer to knowing these plants? My thoughts flowed in ways I would not have imagined or could not have otherwise, which my field notes document. But in reading over four days' worth, in writing this chapter, I realize that little I scribbled down will help me convey much about the vegetative forms I was observing. But field notes are only the beginning of ethnographic description, the expectations of which are starting to shift. More than conveying my thought process as it morphed through these encounters with plants, I realize that I want others to see these plants so that they can think through them, too.

As I gradually made the passage from observation to description, I found myself turning more to the botanists. Despite Holdrege's admonition to "transcend" the "taxonomic standpoint," through the course of my fieldwork I came to appreciate and learn from botanical accounts of plants. Starting with my reading of Sesse and Mociño and Née, then expanding through my transect walks with botanists, I recognized that theorizing species is a descriptive matter, not just a classificatory project that Holdrege rejects. I also consulted works such as Adrian Bell's *Plant Form: An Illustrated Guide to Flowering Plant Morphology,* looking for a catalog of the technical descriptive terms I would need to relate to the reader what I was seeing. But I encountered intellectual resources as well.

The book's opening sentence makes apparent the contrast with Holdrege's concern with the inner being of plants: "Plant morphology is concerned with the study of external features of plants"—nothing here about their interiority as subjects. But before finishing that page, I found more commonalities than differences with Holdrege. I turned to *Plant Form* to deal with this matter of description and encountered instead a tutorial on seeing and drawing that resonated strongly with Holdrege. "Today," Bell writes, "description is

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still the first step in any taxonomic study."[19] In elaborating this point, Bell, like Holdrege, surprisingly turns directly to Goethe, whom he credits with the realization that "a transition could be seen in the form of a leaf on a plant, perhaps from foliage leaf to scale leaf to a sepal and to petal."[20] Holdrege develops this perception through a training exercise in his workshops at the Nature Institute. In describing this method of taking foliage leaves from the bottom to the top of a plant, laying them out horizontally to reveal their sequential transformation, Holdrege observes that "participants are usually amazed that they had never noticed the variety of leaf types on a single plant, although they may have looked at many weeds and wildflowers"—exactly my experience in the herbarium! So, if they share a genealogy with Goethe on seeing homology in plant form, wherein lies their divergence?

Bell worries that this interest in homologous relations has "submerged" plant morphology into phylogenetic studies (of the type Isabel pursues), a concern that would probably resonate with Holdrege. But they differ in that Bell distances his descriptive method and science from the likes of Trewavas, warning, "Plant morphology has always had a tendency to drift toward becoming a philosophical subject, encouraging a contemplation and debate of the inner meaning of the plant [such as plant 'intelligence'; Trewavas 2003, 2004]. In contrast, the approach in this book is hopefully more practical." Succinctly, Bell's "intention is to provide an account of plant morphology as a working means of describing plant form."[21] This is not "object thinking" as caricatured by Holdrege, because this attention to form also arrives at "plant developmental dynamics."[22] The matter of seeing form—of discerning multifaceted similarities and contrasts—is where botanical vision, developed through drawing and description, mobilizes a similar kind of attention to that which Holdrege advocates.

Reading further, struck by the wealth of drawings of foliage and flowers in *Plant Form,* I recognize that botanical guides, despite their objectifying terminology, offer similar advice as Holdrege and even give my thinking about these plants a greater intensity. Botanists, too, place great value on drawings; many of their journals feature them over photos. Why? Because they focus attention in exactly the way Holdrege champions. Under "Methods of Description," Bell warns against relying on photos because they are "likely to contain a great deal of distracting noise. It is better to augment or replace a photograph with line drawings."[23] Wendy Zomlefer's *Guide to*

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Flowering Plant Families—a volume I sought out after first seeing it on Charo's desk in the RJB herbarium—similarly warns against believing that a photo will be sufficient illustration or description of a plant. In a chapter titled "Observing, Dissecting, and Drawing Flowering Plants," Zomlefer sounds quite a bit like Holdrege: "The most important tool for learning plant morphology is careful observation . . . The most effective scrutiny utilizes all the senses."[24]

With Zomlefer's guidance in mind, I moved to heighten both my observations of and capacity to describe what I was seeing when I approached closely the red flowering plant at the foot of the Muntanyeta. Starting with the nose, she writes "the scent of a crushed leaf can demonstrate the presence of aromatic oils, and the prevalence of certain acrid, bitter, or pungent compounds can be verified by a brief taste of the sap of a broken stem or branch."[25] I forgo the taste test and simply sum it up as "musky," a bit frustrated that I could not be more discerning. Zomlefer continues: "touching the leaves and stems can confirm the degree of pubescence or scabrousness"; indeed, it is hairless, and I had not recognized how distinctive a condition that is for plants—consider the positively shaggy maize *razas* in Mexico. But I leave her approach when it comes to scalpels, razor blades, and dissection. "The careful observation of floral morphology requires a dissecting microscope (or, in the field, a 10x hand lens)."[26] Just by eyeing it, I can report that its inflorescence is a compound cyme—branches of flowers, basically—and the blossoms are zygomorphic (showing bilateral symmetry). In dense, mounding clusters, the tubular flowers—long spurs with lobed corollas of five fused petals (labiate, with one above and four below) in hues from magenta to fuchsia, sprouting an intensely pink, arching stamen—perch on stem leaves, expanding from lobbed stigmas rising out of narrow, dark-green styles that widen into plumb, light-green ovaries, making up the gynoecium.

On drawing, Holdrege and Zomlefer eventually diverge over precision. He favors figure/ground sketches that highlight form broadly, and she allows that her "outlined principles for drawing plants and flowers can aid in quick, rough, sketching as well." But if one is considering publication, as I am, she counsels that "illustrations should be precise and drawn to scale, with correct perspective and properly executed dissections," all of which "require technical knowledge and patience in addition to artistic skills."[27] On that basis, I decide that no one needs to see my efforts. Still, I find her guidance

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both comforting and encouraging. "Simplification is important when beginning to sketch," she suggests.[28] Find the best angle from which its essential features are clearly visible. Here is where she proves most helpful.

When I consider the leaf structure of this blooming plant, I am completely daunted—it is so thick, tangled, and varied that I struggle even to draw it. Goethe's attention to the transformation of form seems unhelpful, better suited to a model organism that demonstrates the regularities he is emphasizing.[29] And it is the strangeness of these forms and their thorough entanglement that I want to grasp. Zomlefer advises, "At first glance, a stem (or branch) may appear to be covered in an incomprehensible array of foliage"—my impression exactly when regarding this vegetative life form. "The complexity of plants can be confusing (and overwhelming), but even an entire plant can be subdivided into manageable components." Such subdivisions might smack of "objectification," but here I encounter forms of thought as well: "actually the underlying arrangement is quite logical, with the stem composing a basic framework upon which the leaves and flowers are attached at specific points."[30] With these basic descriptive terms, I can see its leaf structure. Two types of opposite leaves protrude from the axis of its stem: large cauline blades (borne on the stem), dark-hued and ranging from lanceolate to rhombic-elliptic (intermediate between diamond- and oval-shaped); from their nodes spring petioles sporting lighter-hued, ovate-lanceolate leaves, leaning toward acuminate. The same patterns repeat on each stem and then, at the plant's apex, these stems sport the tight flowering clusters.

Zomlefer cautions: "To capture the true appearance of 'habit' [life-form] of the plant, the angle at which the leaves (or inflorescences, flowers, or fruits) are held in relation to the axis also must be carefully noted." Adopting this perspectival awareness, my drawings improve and my thinking about the plant also sharpens. I see form at multiple scales within the plant. Much as any ethnographer would say, perspective matters, and not surprisingly, Zomlefer warns: "Inattention to perspective, especially of leaves, is a common error in botanical drawings." She suggests that this involves stages of seeing: "Once the fundamental construction is established, the leaves (and other major parts) can be roughly blocked in. Attention to detail then becomes more important."[31]

I learn a valuable lesson in all of this. Describing plants involves sex and geometry. The features that are most central and that draw the most attention are the sexual organs, but along with the rest of the plant—engaged in

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the crucial work of photosynthesis (leaves), deriving nutrients and water from the ground (roots), and assuring its stability and structural coherence (stalks)—these require an attention to form more than function: geometry. Flowers take the shape of circles or ellipses, cones or cylinders, as do fruits, which also tend to be spherical. Leaves run the gamut: elliptical, oblong, orbicular, ovate, deltoid, and rhomboid, with bases and apices that might be acute, obtuse, or truncate, as well as rounded. Holdrege did not prepare me for seeing this, nor for recognizing the wider capacity of thought that opens up here. Sex is the basis for thinking of commonalities across the vast taxonomic divide of plants and animals; geometry, too, but drawing these parallels suggests that there is something far more abstract about plants.

Fifth Step: Theorize

My efforts at describing plants by tapping botanical expertise open onto questions about the status of description in ethnography today. For a generation, at least, "thick" forms have dominated.[32] But more recently, John L. Jackson Jr. has promoted a shift to "thin" modes instead.[33] The contrast involves the locus of analysis—the sole provenance and authority of the ethnographer in the former, while in the latter our interpretive work lies alongside, and increasingly draws from, that of fellow worldly, networked subjects: in this case, the botanists I have been studying. But Jackson also channels the "flat ontology" of Ian Bogost—similar to Bruno Latour's analytic of flatness—to invoke "a kind of flat ethnography, where you slice into a world from different perspectives, scales, registers, and angles—all distinctively useful, valid, and worthy of consideration."[34] But none are centrally directed at explicating a meaningful interior of a culture-bound subject. In thin description, analysis is displaced along a plane of equivalence, where one's interpretations might align with that of other subjects. In flattening, other subjects' interpretative frames are loosened enough to be accessible for adoption, both by ethnographers and by their readers.

This task is hardly easy or unproblematic. But I glimpse it in the way I turned to botanical descriptors to better see and depict these few plants, and how I began to envision this mode of analysis as necessary for ethnographic theorizing of species—where place-specific dynamics have to be regarded against a backdrop of a species' general characteristics and the far wider distribution of species across space and time—and in the dawning idea that you, the reader, encountering the elements of botanical analysis and modes

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of description here, might find them intelligible and accessible enough to learn more about them, to take them with you to the field.

All ethnographic description is theorizing. Even if it is only "setting the scene" for an encounter or a story, or convincing you that "I was there," there is an implicit theoretical gesture of insisting on "this is how one should see things." Botanical description theorizes, too—it theorizes a species from a welter of forms and particular observations about vegetative life that one may encounter, rooted in place. "Thick" sets up an analytic where our descriptions open up realms of representation and classification, the work of ideology; the various "turns" of the current moment (ontological, species, affective, speculative materialism) lead away from individual subjectivity with its meaningful contents. Botanical description is comparatively thin, resting on the surface of morphology; it neither posits nor enters into subjective spaces of meaning, though, as we have seen, plant genetics opens up interior spaces of species that reveal them as distended through time and across space. Botanical description is crucial for theorizing a plant species, but what does it offer ethnographically?

In taking nonhuman life forms as ethnographic subjects, this thin mode of botany is appealing for more than its techniques of delineation. Botanical description aims to enable the reader to identify a species wherever one might encounter it; ethnography, in contrast, aims to report on a select portion of the human species at a particular place and moment. Both are interpretive, as the debates over species concepts should make clear; and both are analytic in that, for all that cultural anthropologists might fret over self-reflexive obligations, we still manage to render accounts of the world that are (or should be, at least) recognizable to someone else who goes there. Ethnographers' use of details, though excessive compared with the highly economical prose of botanists, is animated by a sense of relevance: you need to know this about that place so you will see these connections. My question is this: between my spew of field notes and this effort to convey something of this place and these plants, can I improve my ability to theorize about the species before me by tapping the methods and means of botanists? This question of theorizing species leads me to regard ethnography differently.

I am not doing botany, though I am mobilizing its descriptive techniques and observational practices. The plants before me are fully theorized, in botanical terms, though not yet ethnographically, that is, as flattened subjects vying for light and water and soil in a densely layered living argument about

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a regional flora and its englobing biome. Botany as delineation of plant forms, and ethnography as rendering the place/time of encounters, are both involved with *specifying.* The botanical gardens, as living ethnographies, allow me to imagine "interviewing" plant subjects; botany led me to think in terms of form and to recognize how that works as a crosscutting means of thinking about species and ethnography, that exacting social-science technique of being specific. But together, most generatively, they allow me to loosen my descriptive efforts from the task of rendering a meaning-bound subject.

In describing this setting and these plants, then, what am I theorizing? The species splayed before me on this knoll in Valencia? The argument and representations that have compositionally placed them here? The larger question of how to feature nonhuman life forms in ethnographic accounts? What epistemologies, what assumptions and biases of species being are affirmed, unconsciously or not, in the process? I'm torn between the naïveté promoted in Holdrege's approach and a recognition that I'm able to see so much more of the plant through the botanical lenses I have begun to use. But keep in mind, botanists describe a species, not a particular plant. There is always one type (specimen) on which this description is developed and to which it is forever bound in an herbarium, as with the type for *Cassia fructicosa* in which I could glimpse the leaf-sequence technique. So it is not just a tension between "object thinking" and "living thought" but being able to see species versus a series of individual plants. Conversely, what I add as an ethnographer is the perspective of place as a means of framing the scale problem that species presents: a means to understand species formation not as an event in evolutionary time but as modes of entanglement with various settings, which might not change the species but that helps us to understand its position in social spaces.

Sixth Step: Transect Walk

Wednesday, June 12, 11 a.m.

Midway through my transect walk with Jaime, when we paused along the edge of the Muntanyeta—just after the "botanical school" and before he introduces me to the *Medicago*—I steer him into the depths of the rockery to ask him about the spot I have taken up for my observations. At that point of the tour, Jaime was ready to move on to the more accomplished and recent rockery displaying the "dehumanization" of the Mediterranean. But I ask him into the center of the Muntanyeta with a somewhat vague idea that he

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can help me in analyzing the scene; yet, practically, I wanted to be sure I linked the etiquette with the correct plant. It's a good thing I did because it turns out to be mislabeled. The *Hieracium pilosella,* which the etiquette originally identified, had been outcompeted and entirely displaced by a *Centranthus ruber.* I had the wrong name for this species! Disgustedly, Jaime yanks the etiquette from the ground and tosses it behind the rope on the opposite side of the site. I break the silence and ask if they had intended for the *C. ruber* to be there; he replies only that "It seems that it's dispersed a lot." After writing the correct name of the plant in my notebook, he says, "We've got to get in here, take everything out, and then replant." I knew he was already dissatisfied with the representational scope of the rockery, but there is an additional problem.

"We have a leak in the water feature," he explains. Locating and repairing it would be costly and require much digging, which would actually facilitate his idea for the full-scale representational reordering he sketched out for me earlier. In the meantime, "this area is getting little attention." The results are visible. "The invasive *[invasor]* plants, the more they extend, they just keep colonizing." Assaying the scene, he continues, "If the plant isn't bothering others, if it's not displacing others that we want, then we let it go." The absent *H. pilosella* testifies to the perils of this lack of vigilance.

"So you didn't plant it here?" I ask, wondering about his use of "*invasor*": invader or merely prolifically growing invasive?

"No, this plant thrives along waterways. It was planted above"—he gestures to the top of the rockery—"but it's spread down here, and there, and there," he says, pointing out numerous spots I had not even noticed along the hillside. Reaching down to the plant I had chosen for my focus, Jaime plucked a handful of the blossoms that had morphed into seedpods, the delicate white, feathery pappus—tuft of hairs on seed (in thistles, dandelions, milkweed) that aids airborne dispersal—etched in the sharp light. As he tumbles these onto my palm, several caught the light breeze and drift away, illustrating their capacity for travel. "These things, they are very easy to control," he said as he sized up the *C. ruber.* "You pull them up and they die. They don't have rhizomes," which is exactly the problem with the horsetail. "That, we can't control," he said, pointing to one of my other ethnographic subjects, as he ruefully traced its extension along the artificial stream.

Relying on another overwhelmed etiquette, I ask too about the *Vinca major,* a low-growing vine that is energetically competing with the horsetail, but that also was a case of mistaken identity. "No, that's not this," he responds as I mistakenly point to a cluster of *Gynandriris sisyrinchium.* "I don't know

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where its etiquette is. We have to revise all the etiquettes," he sighs. "See, here, this is the *Vinca,*" he explains, identifying the spreading subshrub covering much of the ground, while I thought back to Silvia Villegas's concerns over missing etiquettes at the RJB in Madrid. The problem of etiquettes not matching their proper plants is clearly intractable and further complicated by the tree whose shade attracted me. "What species is this?" I ask, not realizing I had already read its etiquette but, in this case too, had misassociated it with a nearby plant. "This is a *Koelreuteria [sp. bipinnata]*. This tree is very *Koelreuteria,*" a genus with only three species in the family *Sapindaceae*. "It's an Asian tree. It has nothing to do with this"—he sweeps his right arm over the scene as he shifts to explaining the history of this place.

Jaime then tells me the story. "This plant, and there were others, and are others still, grew here from seed, almost fifty years ago." A nearby palm had arrived under similar circumstances. When the river Turia inundated Valencia in 1957, the garden was underwater for weeks. After the water finally drained away, gardeners worked at clearing debris from the grounds, which had turned the garden into a trash heap, as was the first garden. "That's why we have the 'little mountain' here. On top of that debris, we gradually piled on more and more, and the remains accumulated here." These plants before me, then, are ruderal entities, emerging from rubble piles within the city that became a living infrastructure for new landscape designs.[35] The garden closed the area off for some forty years, during which the *Koelreuteria* and the palm grew unfettered. Once they started executing the rockery design idea, "we didn't want to cut down this tree or the palm. But in the future, I understand that this rockery has to be free of trees." The mattorral, which they want to represent, features plants that thrive in full sun and do poorly in a tree's understory.

"It's an invader, then?" I ask.

"Yes, it's very much an invader, as is the palm. Well, do you mean here in the garden or in Valencia?"

By way of reply I ask if these were invasive species in Valencia generally. Jaime says, "No, no. Because both of them need a cool, wet place, so they can prosper. You won't find these outside of the garden." So they could be an invader in the garden without being invasive in the city or the region. I wonder how a tree, native to China, ended up being carried along the Turian floodwaters until it came to rest in a pile of refuse on this temporarily disused mound. The history of this species is interesting, but risks distracting me from focusing on the plants before me. I feel the weight of allegory pressing

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in. I imagine the story this tree might tell of the movements and circuits of humans and the plants they carried with them.[36] I also have Walter Benjamin whispering in my ear to think about the aspect of ruins in this former trash heap that came to accommodate the drifting reproductive tendencies of unseen plants. What might this scene stage as a means of connecting back to the origins of gardens in our most distant ancestors' refuse piles?[37] But let's not forget the plants.

Settling into this spot the next day, thinking back on Jaime's comments, I realize that the etiquettes serve an unintended role of marking the movement of the plants, a gauge for their efforts at colonization. I also notice now that they've grown up on the thresholds of displays, along their borders. It's not just that these margins escape some practices of surveillance and care pursued by gardeners; it's that the large stones used to articulate portions of the boundaries—like the rock I chose to sit on—shelter the roots of Mediterranean plants, allowing them to thrive in sharp sunlight. Such observations, I realize, would hardly warrant inclusion in a botanical account of these species. But they are relevant to describing the species formation unfolding before me in urban space. Through my disciplinary attunement to boundaries, I see how this species formation emerged—plants use them to thrive and colonize. Already I am seeing the species as much as the particular plants.

Following Jaime's narrative, along with the drifting pappus of the *C. ruber,* I began to recognize that species dispersals were occurring all around. This opens onto the register of behavior in an ecological setting; of plants observing, responding to, and remaking their environments. Later, alone again in this setting, I look to find the original *C. ruber* planting. I think I locate it on a high portion of the display, but I also see it down among the horsetail along the creek—because it is near the path, I can't tell if it has adventitiously encroached into the equistem or, rather, if the rhizomatic species is taking over a display of the valerian. Regardless, I realize these species are in competition for land and light. This is not something I learned to see from Holdrege but is what I've learned to see along the way, since I started this project at LANGEBIO.

Seventh Step: Make Connections

The situation with the *Centranthus ruber* and the *Koelreuteria* reminded me of a story Samuel told me that helps convey what happens when a plant shows up unintroduced in the garden. During our second walk we came

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upon a Chilean grass. "It just appeared here," he explained, both pleased and befuddled. "I shouldn't tell you too much. But this grass is invasive." He laughed, confidingly. "The problem is, we don't have that many grasses. We've got hardly any from Chile. I think we've only got two—this one and one other. And so, because it is a native species [of Chile] and it's very sizable, I wanted to include it in the garden." The problem, though, is some people get very upset about invasive species. A few minutes earlier, Samuel had told me about a man who indignantly confronted him over a nonnative plant growing in the garden. "Now, this is where some people, like that guy I was telling you about, could get really angry."

Samuel grew animated in response to his irritated accuser. "My defense is that this plant just appeared in the garden because it's *already* in different places in Catalonia. It's already invaded the country." The botanical garden is not guilty of transporting this plant. "And so, in fact, the plant is already *outside* the garden. I think we would be doing a disservice if the plant was not outside, and that it might escape from the garden. But because in fact it is outside and escaped *into* the garden"—he laughs, appreciating the apparent absurdity—"because we found one in the garden!" Resuming his placid air, he concluded, "Now, you start explaining that to a person like that, and they just won't listen to you."

I ask Samuel how he recognized it. He was the first person to detect this species' entry into Spain, when he was cataloging plants around Zaragoza, and "One of the plants we came across was growing *inside* the military area. I noticed it, because it was just on the other side of the fence. And then we came across several other plants outside the military area and realized that they'd probably originated in the military area and had escaped. *And it was this plant.* And I started to work on it. And it was very difficult, because it wasn't known then. And it wasn't long before I realized it wasn't a native species. In fact, *it took me years to identify it. I think it was about four to five years* after I discovered it that I was able to give it its correct name, which, at the time was *Stipa caudata,* which is now changed, it's called *Amelichloa caudata.*" I ponder his capacity to do this and the time involved before I ask, "Did it change because of genetics?"

"Yes, they're working on the genetics of all these plants and they decided *Amelichloa* is the genus. I'm not particularly happy about that, but that's the way it is. So we changed the name, and put the new name on it. In fact, its name is very little known at the moment, so that helps deflect attention from

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it a bit." He laughs wryly and then does not take much prompting to continue his story.

"When I put this plant in my catalog, it was the first reference to this plant on a national scale in Spain. And after I published that, a Belgian guy discovered it here in Catalonia. Since then, we've discovered this plant is present in a lot of places in Aragon and Catalonia, but no one ever identified it because it just blended in. It looks like a native plant, so many people must've just thought it was another species and not given it any attention. So that's the story. I was the first person to recognize the presence of this plant in Spain. And now I'm guilty of . . ."— his voice trails off as he's not sure what to say other than to add that when he found it on a remote corner of the grounds, he decided to move it down here, to "Chile." "I thought, instead of having it up there, let's put it in Chile where it belongs." On the slopes of Montjuïc, after occupying the concentrated attention of a botanist, this grass finds itself in a representational niche.

Eighth Step: Contextualize

Wednesday, June 12, 7 p.m.

The evening of the third day I spent engaging with these three plants—*Equisetum hyemale, Chamaerops humilis,* and *Centranthus ruber*—I reencountered them in a workshop on herbal recipes for cleaning and skin care. The event was held in one of the garden's educational halls; its ten rows of small tables seated sixteen women, ranging across the middle-age spectrum. This was not about cooking or spicing up recipes, nor did it cover herbal remedies; rather, it is focused on cleaning—not the type of cleaning that is crucial to the seed banks, but instead its role in making domestic spaces and bodies habitable.

The class opened by framing the problem of care and cleaning entirely in terms of the toxic threat posed by most commercial products. Olga, the seminar leader, used a PowerPoint slide show to illustrate the copious chemical ingredients in commonly available cleaners. Benzene, 2-butoxyethanol, Isopropyl ether—toxic, caustic agents found in soaps, detergents, and makeup—scrolled by, numbering hundreds in any one commodity. In response to these threats, Olga offered a slew of cleaning tricks for sinks and tubs, tile and carpet, that made use of vinegar, bicarbonate of soda, or sprays made of cornstarch. All of this labor could be augmented with alluring aromas by adding or using essences of pine, lavender, or cedar. From stained clothes

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and dirty windows or shades, Olga moved on to soaps for the skin and toothpastes, all featuring aromatic herbs, which, she added, can also be used in pillows as a soothing sleep aid. Leaves of basil or meadowsweet, branches of elder, and oil of neem filled out the repertoire of care by providing protection from various insects, whether applied on the skin or spread on the windowsill and above doorways.

Tansy, dried pennyroyal, marjoram, along with all the mints, were deployed in linen closets and dressers. But then Olga shifted the discussion to address how to use many of these same materials as insecticides to protect valued plants in the gardens. Infusions, decoctions, and macerations featuring cayenne or garlic or lemon all work to repel insects from the very herbs she was counseling the women in cultivating for cleaning purposes. I was entranced by the layers of multispecies enlistments by which care for the human (our skin, clothing, and home interiors) turned to care for plants in holding a panoply of species (insects) at bay.

After more than an hour of a wide-ranging lecture and some hands-on time with sample leaves and roots, the class headed out to the garden. We leisurely made our way to the medicinal garden, stopping first under the gingko—in the botanical school section—for a short summary of uses for its leaf extracts: aiding memory and concentration, relieving headaches and sinus problems, even improving vision or alleviating tinnitus. Along our meandering way, Olga pointed to palms and explained how they were used in shampoos, while she looked for fallen leaves and seeds as opportunities to school the women in methods of identifying plants—edible ones as well as those handy for various forms of care. Some, she admitted, are "ugly but useful," a consideration for whether certain plants might be grown at home or just purchased for use in dried or capsule form—Olga's examples were comfrey, oregano, and elderberry. I was surprised how often the phrase gets used over the course of that evening and in other workshops I attend, an apologetic for the aesthetic demerits of some plants. Aromas and scents were also a prime consideration in making choices about which plants to grow. Red valerian, she noted, using the common name for "my" *Centranthus ruber,* looks beautiful but its smell is quite pungent. I reminded myself to check that for myself when I returned to my "interview" spot the next day.

When we reached the medicinal garden, I was surprised that the first plant we visited was the species I started with over in the rockery—horsetail. If we hadn't stopped there, I would not have known that its manifold cleaning

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Meeting plants.

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uses stem from its high silica content, which functions as a strong abrasive, excellent for scrubbing or even polishing a variety of surfaces. "It's full of minerals," Olga said—iron, manganese, and calcium, among others. The horsetail grows densely here too, but its growth was constrained by an active regimen of weeding and trimming. Olga cautioned that, when harvesting it, one should take only what one needs so as not to exhaust the plant. Springtime is best, because its leaves are most vibrant and rich. For other uses, such as making healthful teas for people with asthma or kidney conditions, the plant should be bundled and air-dried, then cut up with scissors or crumpled by hand. Olga spoke of its uses by the Romans, mainly for healing wounds, stopping bleeding, or treating skin conditions such as psoriasis or acne. But for internal uses, especially over a long period of time, she advised taking it in capsule form, purchased from the store, so as not to deplete plants growing in home gardens.

As Olga spoke, I gradually realized she was only using common names of plants and did not give a scientific name all evening. This led me to think about the huge disparity between the tersely limited information provided by the etiquettes and the range of lore and knowledge Olga—or any herbalist, for that matter—could offer. But this encounter with plants was ensconced entirely within an anthropocentric perspective: these plants are privileged for their usefulness, culinary or healthful, and hopefully are aesthetically satisfying or at least neutral. From my interview site in the rockery, I could observe plants in the wake of disinterested human passage and see how little impact we have on them. Here, these were plants all at attention, closely groomed and smartly cropped in order to achieve maximal benefits for us.

The valerian here is also growing in a far more circumscribed manner. Again, noting its pungency, Olga advises using it in pills. "It's pretty enough for the garden," she allows, "but smells terrible." When the others pass it by, eschewing the opportunity to smell it, I lean down for a whiff; the tang struck the back of my nostrils but I did not find it repellent. I could even catch a glimmer of how attractive it must be for certain insects, though I admit this was all a bit strange. After picking some mint, Olga led us back to the classroom and let us work at grinding it down for sprucing up a cleaning concoction of vinegar and alcohol.

Returning to my site the next day, looking at both the horsetail and the valerian, I think about how much more massive they seem as species in a location rather than in a display of cultivated plants. They are more vigorous,

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too, as I can see their movements with greater resolution now by drawing on the contrast with the cultivated spaces. Also, I can see the sharp difference between the garden plants, dissected or disassembled for their useful features, and those that grow untrammeled in the rockery. But more important, in terms of my method, is the realization that I should look for these plants in the other botanical gardens as well. From this experience, I start seeing differently in the other gardens. If species didn't "exist," I couldn't have deployed this type of attention and learned from it—it's not the same plants I find in other gardens, it's the same species; I can recognize its morphology and its habits.

In Madrid, I find all three of my ethnographic subjects in the taxonomic grid of the botanical school. The horsetail is in the fern glade with its fellow *Polypodiophyta*; the *C. ruber* is underneath a spreading trumpet vine *(Campsis* × *tagliabuana),* from a completely different family—*Bignoniaceae* instead of *Valerianaceae.* They are linked here as members of the Asterids class, and also as cultivars from the previous stage of relying on commercially grown greenhouse plants. A dense splurge of *Viburnum* and a blooming *Abelia triflora* alongside the trumpet vine make me recognize a prevalence of plants that are widely used in central Texas landscaping. I find the *C. humilis* located in beds right next to the ferns, where the whole family, *Arecaceae,* is on display as a tightly linked series of forms. Spending a couple of afternoons here, I learn to see these plant subjects differently—the ability to recognize forms across species within a family and genus is gradually more interesting to me than a particular plant and what it can tell me of life in this locality. This is a moment of adopting the perspective of my human subjects, the botanists—seeing though the perspective Sylvia, Jaime, and Samuel tried to convey. But rather than "going native" or achieving an "insider's point of view," this is a manner of seeing that is designed to be learned and adopted by others because it works so well at identifying life forms in the world.

This experience is strongest with the *C. humilis,* which I easily locate among the palms. But rather than being able to concentrate on this plant subject, I'm intrigued to see it flanked by two domesticated varieties, cerifera and vulcano. They scarcely look different at first, mostly just paler in coloring. But before I can concentrate on variations within this species I'm drawn to attention by the plethora of familial forms on display. Perhaps because the vast array of bladelike appendages conjures up images of threat more than accommodation, I don't rush to reacquaint myself with these plant subjects.

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Instead, I wonder about the permutations of form that constitute *Arecaceae.* Unlike most leaves, palms feature a complex folding of the surface, resulting in numerous plications; yet their fronds generally manifest either as pinnate or palmate, those most common leaf patterns.

I circuit the display slowly. Writing down all the species takes me more than an hour, but I'm seeing mostly forms that I can't yet name. Working with Zomlefer, though, I am able to recognize the difference between an acaulescent palm, such as the *Sabal minor*—a passel of stems shooting straight from the ground—and towering palms, such as the *Washingtonia robustus,* that grow in dense clusters, or the bushy *Nannorrhops ritchieana.* Because the *W. robustus* is draped with marcescent leaves, I'm curious about the grooming practices here, since a nearby *Phoenix dactylifera* is kept neatly trimmed from its dead growth. But mostly I am caught up in the variety of leaf forms—the acanthophyll fronds of the *Phoenix* species, spines extending from the leaflets, in contrast to the costapalmate leaves of the *Sabals,* whose fronds dangle loosely from the long arc of the petiole extending the length of the leaf blade. My head swirls with the alterations on the characteristic plicate (pleated) leaf blade, with some leaflets induplicate (V-shaped, with its spine below or abaxial) or reduplicate (A-shaped, spine above, adaxial). With the clear, midafternoon sky above they all are soaking up light, though some are streaked by shadows from upper-tier blades and a few fronds occasionally quiver and shimmy, marking the scant flow of an infrequent breeze. Unlike the rockery in Valencia, these species range from Asia to South America, though Mediterranean species seem prevalent.

Ninth Step: Analysis

After the fourth day of interviewing my plants, I wake in the night, from a dream, I think. But it doesn't dissipate. The *C. ruber* is growing in my mind, its lanky stems expanding, its opposite leaves unfolding as it gains in stature and expands. What to make of this? At least I can report that Holdrege's method, as developed from Goethe, is a success. I experience the oscillation of thought and observation—each heightened and enlivened through continuous interplay—as I am entranced in a profound appreciation for the red valerian. The life form becomes part of my thinking. But have I succeeded in my larger objective of rendering these plants as ethnographic subjects? Largely, I have not, though here I take inspiration from my colleague, Kamala Visweswaran, and consider what is gained in failure.

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I begin by itemizing where I feel my fieldwork came up short, starting with my application of "exact sensorial imagination." Although I have acquired this capacity, I find that this mode of attention is not easily maintained. It helped immensely in allowing me to focus on the plants, but its ephemeral character suggests I did not make enough time for them—a few days are not sufficient, even with follow-up visits. Subsequently, I have a hard time discerning changes in the plants on a day-to-day basis, as light shifts and the pungency of the air waxes and wanes, intensifies or dilutes, registering the impact of heat on leaves and flowers. The "living thought" grows detached from the life forms that prompted its generation. Worse yet, after hours of sitting in that spot, sketching time and again their features, attending to their particulars, I don't feel I've attained a "feeling for the organism" that McClintock described—the aptitude for anticipating what they will become. In terms of questions about plant intelligence or sentience, too, my efforts turn out to be shallow and oblique. I don't learn much about the most lively topics in plant studies, concerning their possible forms of agency and intentionality—the type of things that interest Trewavas, or Myers as she focuses on the storytelling tendencies and sensibilities of plant scientists.

These shortcomings have several origins. The first is my initial decision to focus on multiple species at once, from across the plant kingdom. What I gain in ability to see and think botanically I lose in terms of an "intimate knowledge" of each plant. Second, I'm haunted by what I've seen researchers at LANGEBIO do with roots—I know that their methods and techniques applied here would exactly reveal the social realms of the rhizosphere. As an ethnographer, that is where my subjects would mostly reside.[38] But aside from being impractical, there is the ethical impediment that such knowledge is acquired at the cost of the plant's life. This raises the third issue, of engaging plant science in an ethnographic sense. What I have not accomplished here provokes me to reconsider the interplay between lab and field in knowing plants and their social worlds.

McClintock honed her intimate knowledge and intuitive capacities only by working with a highly trained domestic species, one she was able to watch from its first sprouts and through its entire reproductive cycle as an annual, while also analyzing and experimenting with its genetic dimensions and dynamics. The work that Trewavas and Chamovitz pursue and all that they reveal about plant intelligence or sentience, too, is entirely dependent on laboratory settings. These conditions for knowing plants are not yet reproducible

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in the field. Transplanting such techniques and their apparatuses, in some possible future, would entail an interesting reorientation of the "circulating reference" Bruno Latour documents in his account of "sampling the soil in the Amazon forest."[39] As for the botanists, though I have certainly not mastered their practices, by asking ethnographic questions of plants in these gardens I engaged them in a way that I did not anticipate when I started this project. Initially, I thought this would be an ethnography of the botanical gardens. If it were, it would have been considerably longer and far more focused on the human routines that make these places function. But accounting for plants instead changed my approach to ethnographic description—not just including these life forms in the backdrop as so much decor, or even highlighting them as a basis of human sustenance and contestation; instead, thinking and theorizing with them.

How do plants as subjects alter an ethnographic account? The process here is twofold. First, relying on the age-old apparatus of field notes, I recorded both my thoughts and what I was seeing, thus describing the scene. Then, in conveying all this to you, the reader, I was compelled to describe plants in some detail, which required developing my capacities to see and to think through these life forms. Two points follow: ethnographic detail is theorizing, and in theorizing a species in this setting I resort to botanists, the experts. This results in a different ethnographic perspective than I had initially aimed to produce, because I focused on the plants. As a result, I developed a facility with botanical description, and I can apply that in the future to the task of theorizing species. What I can imagine now is how I might be able to combine my expertise with that of my subjects in honing an analytic that would account for the role of sociality in species formation. I also imagine this as a collaborative undertaking with botanists and lab-based geneticists. Such imaginings start with field notes, expand into outlines that become arguments buttressed by examples, and then, with luck, become the book you are reading now. Each step along the way entangles the next.

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