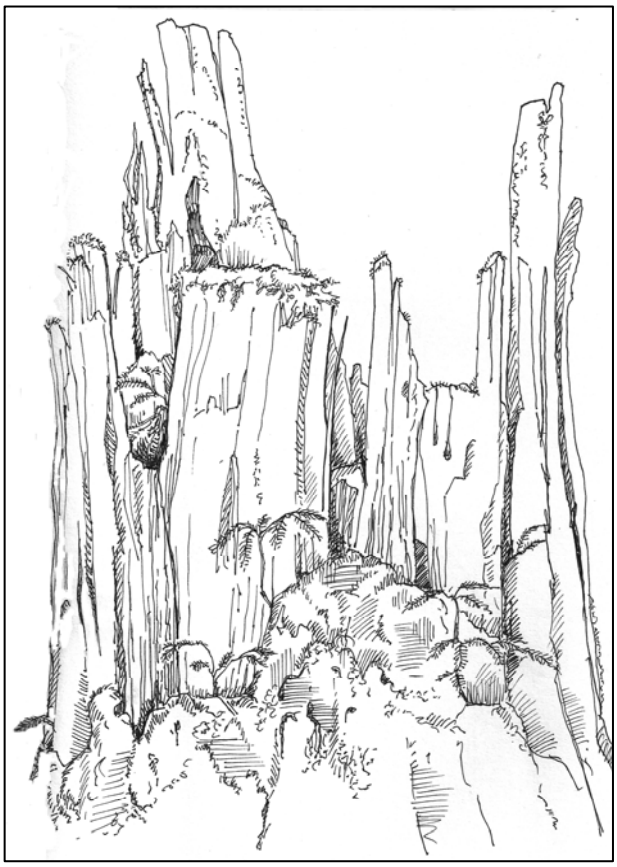
In the very large, the very small

To a New Englander who is used to modest, glacier-rounded "mountains" and to whom a 100-foot-tall hemlock is "towering," everything in the Pacific Northwest is out-sized. Rounding a bend of highway, I get a sudden, gasp-inducing revelation of a snow-capped peak, dwarfing hills the size of the east's highest peaks. I can't photograph even an adolescent Douglas fir with fewer than three stitched-together frames. "Birdwatching" entails craning my neck to glimpse a moving silhouette in the distant canopy (the bird giving me a raspberry from its safe perch). The honey-crisp apples are melon-sized. Even the splattering raindrops, plopping on my sketchbook, are big. This Oregonian forest is majestic, yes, but a little overwhelming in the sensory department. I am a Lilliputian in a dizzyingly gargantuan world, and I'm feeling ever so slightly seasick.

Time, too, is a rather relative concept here. Some of these big Doug firs are 800 years old, three times older than the oldest of those towering New England hemlocks. Plant a seedling today, and my grandchildren's grandchildren won't even call it a sapling.

How can a scientist-artist hybrid like me, accustomed to studying and illustrating organisms the size of my hand and smaller, possibly take all this in? Slowly, quietly, gradually, meditatively, I suppose. But I only have one privileged week, mooching on the hospitality of the Andrews LTER, and I don't have a lot of time to sit and listen to my brain cells divide. I start by focusing on the living things – or parts of living things – that I perceive within my immediate field of vision. I tell myself to appreciate the wonders I can hold in my hand, and *then* to place them in the impossibly large context of an immense old-growth forest (or, maybe, the history of the known Universe...okay, my noisy brain cells are still on over-drive).



City on a Hill. Pen-and-ink. Elizabeth Farnsworth

One slow and quiet afternoon, I take the luxury to sit and sketch near the banks of Lookout Creek on the upper Old-Growth Trail. I sit humbly at the base of a centuries-old cedar, and it's some minutes before I can stop gaping dumbly at the silent stand of trees, their upper boughs swathed in mist. Feeling somewhat damp and *completely* inadequate to the task, I rummage through my pack for my sketchbook and pen. "Plop!" goes an errant raindrop. A bird sneers at me unseen from somewhere up there. For my first subject, I choose the butt-snapped fir stump in front of me, rather than attempting a more traditional "landscape" of the tree-clad hillside in the middle distance.

As I draw, I become enchanted with the fairy-tale world that this six-foot-diameter stump encompasses. Hemlock seedlings have rooted along its "cliffs," resembling mature palms lining the road to a palace; the central hollow contains its own emergent forest.

The vertical shards of trunk take on the form of towers and turrets, and the fragmenting bark – with its characteristic hieroglyphic, curving furrows – seems to be riddled with windows and doors. Gradually I conjure a fantastical kingdom full of ramparts and roads, like a Canyon de Chelly mini-civilization, ensconced in this decaying tree. So, of course, can any six-year-old...but it has been a while since I was six.

Later, I'm convinced that I've really stumbled into the realm of Tolkein's "Ents" when I encounter the "Forest Crone" in an otherwise ordinary tree stump, with a pate of moss and her arms folded in a way as to say, "So? where have *you* been?" "Okay," say my brain cells, "we're going off the deep end."

Forest Crone. Pen-and-ink. Elizabeth Farnsworth

I cover three feet in three hours. Just down the trail from the palazzo of Doctor No, I notice that a prone log serves as a horizontal nursery for hundreds of hemlock seedlings, each about 8 inches tall. It's as though they'd all rooted there at the same instant in some fantastic mini-mast event. Peering into this nascent forest, I'm captivated by the understory of mosses, tiny mushrooms (each, I am sure, with its own gnome taking shelter under it), and still smaller inch-tall tree seedlings from the last mast-flush, patiently awaiting their turn to reach the "canopy."

Mini-Jungle. Pen-and-ink. Elizabeth Farnsworth

Okay, enough of faeries already. Better yet, I tell myself, I'll plunge into the world of the very, very small – the plants, animals, and in-betweens that are only visible under a hand lens or a microscope. To really immerse myself in this world of giants, I'll start by getting to know its tiniest inhabitants. Is this a tunnel-vision cop-out, or a mind-growing foray into the far corners of my vast ignorance? Yeah, probably both. But it's Friday, and I only have five days left in Wonderland.

I decide to explore the miniature universe in the context of the famous decomposition plots at the Andrews. It's late October, just before the first ominous Pacific storm of the season is predicted to roll in, so most insects and other invertebrate decomposers have packed it in for the winter: they are smarter than I am. Even the common carpenter ants (yes, there's a LOT of wood in these here forests) have retired underground. So, perhaps fortunately, I can focus on things that sit still, namely the assemblages of lichens and bryophytes that inhabit the logs strewn around the forest floor. I wonder, do these green colonizers play a role in decomposition? With limited time to spend at the Station, I know I can't explore this question experimentally, especially since I have absolutely *no* idea what any of these creatures are (my botanical expertise doesn't extend much beyond the vascular plants,

chauvinist that I am). Instead, I set about performing a decidedly qualitative, correlative, art-ecology study.

Field sketch of decomposition plots. Pencil on waterproof paper.
Elizabeth Farnsworth

I run a conceptual transect, documenting and comparing some of the non-vascular species living on: 1) the logs at the decomp plots in old-growth forest; 2) logs in a 40-year-old stand; and 3) logs in a recent clear-cut. I clamber over the downed giants in these contrasting habitats, gaily collecting finger-sized bouquets of strange, minute green matter and stuffing them into sandwich baggies (where *would* science be without Zip-loc?). I exhale moisture and carbon dioxide into the bags full of my hapless captives, assuaging my vague guilt at kidnapping them from their tiny, precarious homes (who knows, there might be some gnomes in there??). I keep them moist and oblivious until subjecting them to searing light (a 60-watt bulb) under the relentless eye of my borrowed microscope – ha-ha!

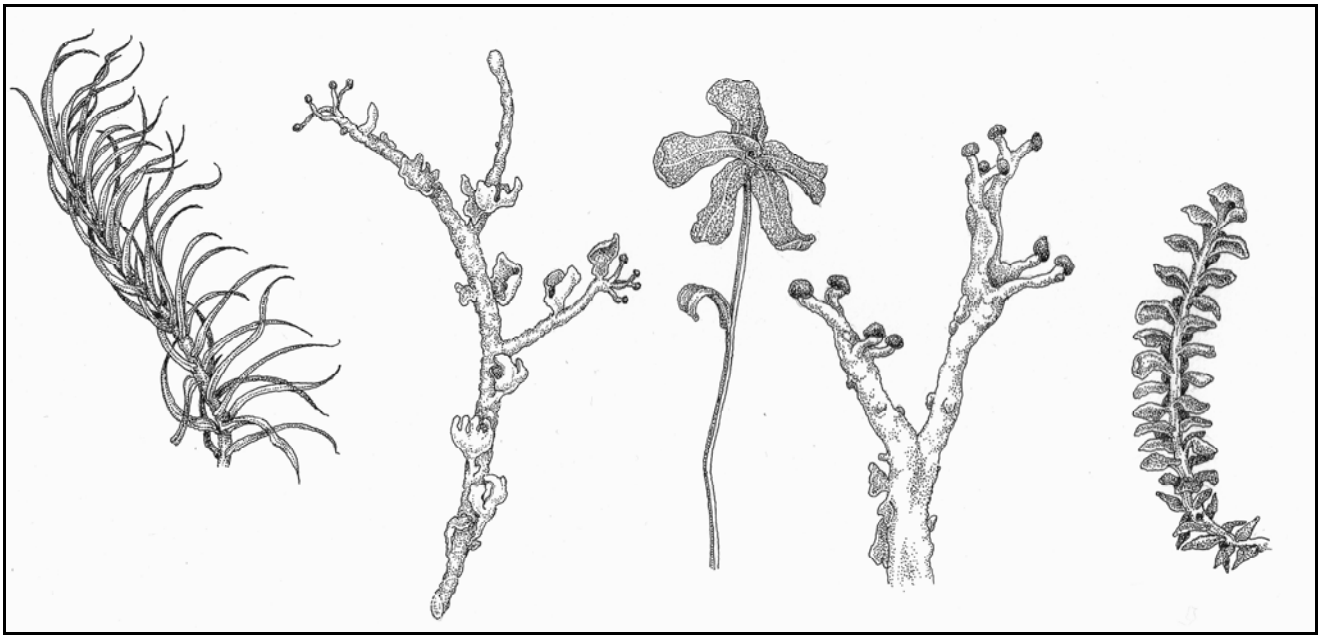
Ah, how freeing it is to be a mad scientist with no hypothesis or pesky knowledge to bog me down! Ignorance is bliss. I simply remove these species one-by-one from their plastic bags and lay them under the scope, not knowing what to expect. Eyeing each new sample, I feel like a newcomer to an unexplored planet; *Star Trek* screenwriters never thought up aliens like these. Mosses at 250x magnification resemble Christmas trees, bearing a fractal likeness to their Douglas fir hosts.

Any six-year-old knows that lichens are symbionts consisting of algae and fungi, but I finally *get* that far-fetched idea when I see a mushroom-like fruiting body on one arm of a rubbery, pale-green and black epiphyte. Peering into Pojar and MacKinnon's *Plants of the Pacific Northwest Coast* ("*Revised!*" the cover assures me), I tentatively dub this interesting blob *Hypogymnia duplicata*, because I don't really feel like a bona fide scientist-type until I assign a clever Latin name to something, even the mold in my fridge. Fragments of *Lobaria* festoon the downed decomp logs, with other ropey lichens grafted onto them; I have read enough to know that these are keystone nitrogen-fixers of the rainforest canopy. One white, highly branched lichen with a stout central trunk resembles a tiny, ancient oak hailing from some old-growth English forest remnant that would have inspired Tolkein himself. Mosses only one cell-layer thick produce electrically chartreuse leaves folded origami-like into the shapes of hearts, arrows, boat hulls and helices. No annoyed gnomes, thankfully; one startled springtail is the only moving creature in this motley collection.

The very small inhabitants of logs in the Decomposition Plots at Andrews Forest. Pen-and-ink. Elizabeth Farnsworth

Interestingly, it seems as though logs that are "naturally" breaking down in the decomp plot host a more diverse flora than the experimental logs that have been shaved of branches and shaped to uniform size prior to the 200-year trial. Are they simply different tree species underneath all that green fuzz? Has human handling somehow altered the process of succession on the test logs? Or perhaps this is merely a figment of my overactive imagination ("Probably," agrees the forest crone).

But back to my overarching question: do the inhabitants of the younger-aged and recently-logged stands differ from those of the old-growth? Some log-dwelling species overlap with common members of the decomp flora, such as the ubiquitous "common witches' hair" (*Alectoria sarmentosa*) and broom moss (*Dicranum scoparium*). The middle-aged stand, though, holds a treasure of a moss with a "blossom" of leaves poised atop a leafy stem: *Rhizomnium glabrescens*, suggests my handy field guide. Sometime in the deep evolutionary past, would-be daisies borrowed design ideas from these lovely flower mimics. The cedar flake liverwort (*Plagiochila* sp.) carpets one damp, waist-high log I trip over. And whitish-green lichens sport brown mushroom caps at the tips of each fingery branch. Are these unique to young recovering forests? I don't know, but they sure are cool.



The very small inhabitants of logs in a recovering 40-year-old cut at Andrews Forest. Pen-and-ink. Elizabeth Farnsworth

Finally, I visit a recent cut just north of the Andrews Forest boundary. The few standing trees and snags bear scars of a medium-hot burn, shiny black charcoal licking half-way up their silvery gray trunks. Exuberant, slightly sunburned *Rhododendron* and *Rubus* shrubs are overtopping the slash, making the most of the abundant light by putting on foot-long growth spurts. Remnants of crisped *Lobaria* cling to the prostrate old trunks, but the more common epiphytes here are tough, leathery mosses like curly thatch (*Dicranoweisia cirrata*) and fingernail-sized scales of *Cladonia* lichens, the latter happily sending out weird horn-like structures like leeches on the make. Though conditions for moisture-loving creatures are challenging, there is still a diverse and hardy bunch of species here.

The very small inhabitants of logs in a recently cut stand at Andrews Forest. Pen-and-ink. Elizabeth Farnsworth

Until a cover of brush or Doug fir takes hold, however, these logs look to me as though they'd as soon fossilize before they'll decay. I am thinking that it will take more than the very little things to process the tissues of the very big, even though the trees that were once so intimidating look somehow diminished on this blackened hillside. But with only this brief snapshot, this neophyte New Englander is at a loss to draw conclusions from only sketches of a pattern. Even two hundred years is just too short to see out this particular experiment.

The predicted storm has taken hold, and the temperatures are dropping. Plopping raindrops are turning, mid-air, into snow – early even for this time of year at elevation. Meanwhile, all these critters (not plant exactly, not quite fungus, what would *you* call them?) have been rapidly curling up under the heat of the lamp at my scope, changing form and color under my very eyes. Feeling bad – and a little like Heisenberg must have felt about his atoms – I quickly immerse my captives in the life-saving water of my teacup, where they miraculously recover their turgor and chlorophyll. Maybe I needn't worry, just revel in their sheer weirdness and adaptability. Their wild cousins outside are hunkering down to overwinter. Life in the canopy in a Mediterranean climate is not all roses (so to speak) for any epiphyte, any more than it is for a log-dwelling denizen, so these guys are bred for resilience. Many of these taxa – or at least their ancestors – harken back millions of years, persisting improbably through ages of tectonic and climatic turmoil. Many are true resurrectionists, equipped with chaperone proteins that protect their cell walls against all sorts of insults, from flood to drought to freezing, and that enable them to reinvigorate after months or years of suspended animation. Chances are, these cartoon creatures will be around long after this Andrews week is a fond memory, the clearcut has recovered, I have become compost, the logs in the decomp plots have disintegrated (and the decomp data finally published), and Mount St. Helens has erupted a thousand times more. They will probably be around when our sun becomes a white dwarf (even warmer than my scope lamp), partying wildly and sending out one last hopeful spray of spores into space before Earth's greatest experiment – life – finally blinks out.

Elizabeth Farnsworth
October 2010

Seedlings. Digital photograph. Elizabeth Farnsworth