Observations Upon Experimental Philosophy Redux: 1668 – 2018[1]

Secretly, we all think we are doomed.

—The Dark Mountain Manifesto

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That Old Notion of the Symbiont, and other Relics of Philosophy's Past

It's possible that one of these giant Douglas-firs here at the Andrews, towering just outside my window, recruited its first cohorts of needles at the same moment in which Margaret Cavendish drew ink from a jar and quilled the following claim:

> [N]o creature or part of nature can subsist singly and divided from all the rest, but […] all parts must live together. And since no part can subsist or live without the other, no part can also be called prime or principal. (OEP: 15, 11)

For historians of early modern philosophy, the idea of the symbiont is old news. Cavendish was not alone in her anticipation of the current trends in advocating for blurred boundaries, onto-stories,[2] the holobiont and sympoeitic[3] becoming-with. Baruch Spinoza (1632 – 1677) is

[1] My epiphyte title is intentionally growing on another title, Cavendish's own title for her magnus opus, a 17th Century work of natural science / natural philosophy. In this work, she argues against mechanism, critiques the attitudes attendant upon technological advances such as microscopy, and presents an argument for an infinite, vital, and material cosmos. I use both the Cambridge edition (Eileen O'Neill, 2001), and the Hackett abridged edition (Eugene Marshall, 2016). My references in this essay refer to the Hackett pagination.

[2] Jane Bennett. Vibrant Matter: A Political Ecology of Things (2009). I borrow her sense of the "onto-story" here. Her work has been influential to my thinking about philosophies that deny the strong sense of "discrete, separate, individuals."

[3] In her recent book, Staying with the Trouble: Making Kin in the Chthulucene (Experimental Futures) (2016), Donna Haraway has given a sense of the origins of the trending term "sympoiesis." She writes, "In 1998, a

probably best known for his denial of the idea that anything could arise from out of nothing, needing nothing, having no cause, having no dependencies or avenues of affectation with other creatures, (but for the sake of simplicity I will bracket a discussion of Spinoza for now). For Cavendish, "nature is a perpetually self-moving body, dividing, composing, changing, forming and transforming her parts by self-corporeal figurative motions." (OEP: 20, 20.) For this reason, we can say that she holds a materialist-vitalist view, "vital," not because nature is a personified being with teleological goals, but because it behaves like an organism with motion and change at its core.

There is no singular thing in this cosmos that caused itself or can keep itself alive by itself. Nor, in Cavendish's 17th Century philosophy, are the boundaries of an "individual" clear and stable. In 2012, The Quarterly Review of Biology concurred:

> [I]t is significant that for animals, as well as plants, there have never been individuals. This new paradigm for biology asks new questions and seeks new relationships among the different living entities on Earth. We are all lichens. (*The Quarterly Review of Biology*, Vol 87, No 4. Dec. 2012)

This new paradigm for biology is not a new paradigm for philosophy. I will dig deeper into this in the Log Decomp section below, but for now, it suffices to note that when Cavendish writes that "no creature can subsist singly," she is denying the notion of an individual, making an argument for the radical interdependence and interbeing of things, and doing so in the mode of speculative philosophy. She observes non-individuality and asserts it because it's true in the

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Canadian environmental studies graduate student named M. Beth Dempster suggested the term sympoiesis for 'collectively-producing systems that do not have self-defined spatial or temporal boundaries. Information and control are distributed among components. The systems are evolutionary and have the potential for surprising change'." (Haraway 2016)

simplest sense. It was true for her because she got hungry. It is true for me because I was born. Not even a rock can say with a straight face that it appeared from out of nowhere, will never affect anything, or will never be affected by anything, and this is not because it doesn't have a face. Cavendish's utterance— which requires no *specific,* empirical, repeatable proof, but is rather a general observation of what is most obvious— is a basic premise of much (but not all) early modern materialism: it is the idea that there is nothing that is not in some way embedded in the material cosmos; there is nothing ontologically distinct from that (this) cosmos. The story of me requires acknowledging my lunch, the water I gulped from my water bottle on a sunny rock by Lookout Creek, the human labor that went into making the pipes that got the water to the cabin, the nutrients that went into the bread, the humans that made it, the fossil fuels that fueled the truck that brought the bread to the store, the human who drove it, the lunch she ate… how long could I tell this story? Infinitely.[4] That's the gist of it. This kind of thinking also explores edge. It embraces the edge of today by acknowledging the interdependent and aleatory nature of what I'm going to need tomorrow. I am not myself, by myself. I am a thing that has metabolized and transformed other things. Necessarily, I have an affectively rich future.

Donna Haraway has suggested recently that, "If it is true that neither biology nor philosophy any longer supports the notion of independent organisms in environments, that is, interacting units plus contexts / rules, then sympoiesis is the name of the game in spades. Bounded (or neoliberal) individualism amended by autopoiesis is not good enough figurally or

[4] See Bennett (2009) for an excellent elaboration of this idea of the "onto-story" and material agency.

scientifically; it misleads us down deadly paths." (Haraway, 2016). To these rejections of the individual, Cavendish adds a critique of the universality of reductive laws. "[…] the globular figure [the atom] is not the prime or fundamental of all other figures[…]" (OEP: 5,10). Not even an appeal to autopoiesis, that is, to self-sufficiency or independence at the most elemental level of 'what-things-are-made-up-of,' can redeem the notion of the individual. The *sym*— of sympoeisis invokes a radical interdependency not just in coming to be but in sustaining oneself. Thus, even the idea of the atom seems too singular, too independent for Cavendish, as she elaborates, "no part can be called prime or principal" (OEP: 5,10).

In short, what she wanted to convey was the idea that *transformative processes are king,* and the urgent search for universal laws as the single, solitary, highest goal of science was misdirected. There does not need to be any universalizing account of everything's ultimate nature. Cavendish asserts that material transformation is the key to understanding nature, but also notes that even knowing this, we have to accept that our perspective and our ability to describe or explain the entirety of the infinite natural cosmos, will always be partial. Here too, she had a prescient way of anticipating current trends. Sandra D. Mitchell, a philosopher of science, writes about this in a current context. It is worth examining a long passage, wherein Mitchell explains that,

> The philosophical problem […] is the conflation of compositional materialism (there is one kind of substance from which all things are created) with descriptive fundamentalism (there is a privileged, complete description of the world in terms of fundamental components). Why is this a problem? All descriptions are abstractions or idealizations. They do not stand in a one-to-one mapping relationship with the entirety of the undescribed world. To think that our language (or any human artifact intended for representation, including mathematics and simulation) captures the material world exactly is something that most post-Kantian philosophers have rejected as simply misconceived. Descriptions are always partial. (Mitchell: 2005, p. 30)

Cavendish is neither a compositional materialist, nor a proponent of descriptive fundamentalism. She is not a compositional materialist because she rejects the view things are made of basically universal parts, and she is not a descriptive fundamentalist because she, too, critiques the notion that we can "capture[s] the material world exactly" (Mitchell, 2005). While certain forces certainly obtain, the reduction of all scientific and experimental inquiry into the search for confirmations of a universalizing theory, is, for Cavendish, not just problematic in its ambition but illogical. What is infinitely transforming cannot be exhausted by description. This does not mean she leaves us with a kind of unknowable, mystical, Heraclitean river of a world. In fact, we should attend to objects of natural science diligently, but always with a view toward considering their place in the wider web of a moving cosmos as well. Here too, Mitchell concurs, noting that

> [i]f all of today's scientists restricted themselves to the search for and use of generalizations that meet the stringent standards of universality and exceptionlessness, much of great value that has been discovered about complex, contingent, and evolved structures would not qualify as scientific knowledge (Mitchell: 2005, pp. 2-3).

But, tucked up here in the forest for the evening, what I want to think about in particular is how Margaret Cavendish conceived of the "experiment" as such. There is an interesting way in which her critique of the scientific experiment resonates with the long-term experimental mode at the Andrews, where partial and transformational findings flourish in projects that exceed the bounds of a single scientist's career, or even lifetime. Getting some perspective on this resonance might prompt a larger reflection. What is going on here? If it's so

good, will it, when will it, how has it already, translate/d into larger ethical and political action? Or rather more simply, how do we achieve ecological stewardship?

A first clue is in a quick look back of what I've said thus far and noticing the mix of science and philosophy. An important take-away from this brief, introductory look at Cavendish is this: she was not interdisciplinary, but pre-disciplinary. The degree PhD, *philosophiae Doctor,* or, 'doctor of philosophy,' is one that can be conveyed to biologists, engineers, theologians, psychologists, etc., and of course, philosophers. Even without the conferral of the degree, those who are interested and invested in the complex questions of the natural world, are all lichens, are all philosophers. It reminds us of the era in which Cavendish worked— a time when these silos were not so distinct— and the pressure to doggedly pursue a narrow and pre-defined field was not yet so pronounced.

Philosophy professors who teach early modern philosophy specifically, encounter this intellectual mycorrhiza in our literature regularly. Our typical tangle of queries in a single 50-minute university class might expose all of the following words:

nature, body, infinity, machine, microscope, sun-spot,

cold, heat, God, mind, optics, brain, magnet, soul.

A favorite title of mine, from one of Descartes' writings in *The Principles of Philosophy* (1637) is "On drops of sea water, rotten wood, and the like." Another: "Things which grow hot but do not shine such as stored hay." Descartes of course, is also a thinker renowned for advances in geometry, theological arguments about the nature of God, optics, and other subjects. And yet, whatever we think Descartes is about, he's undoubtedly the bad guy across environmental

philosophy and literature. I tend to find many problems with figuring Descartes in this way, but I will bracket Cartesian complexities for another day. Suffice it to say, pre-disciplinary tangles of queries were typical of two centuries of thought in which intellectual life was characterized by a genuine effort to grasp big pictures about diverse phenomena and embrace the complexity required to do so. Another way to say it is this: a 17th Century philosopher-scientist would rarely, (I think never), get off the hook of a difficult question— especially an ethical question— by saying "that's not something I work on." It is this century that compels me most in finding inspiration for ecological thought.

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Nature's Time: A Deeper Historical Context

One of my first observations with the work going on in the Andrews was that it has essentially "nailed it," that is, the interdisciplinary spirit of the place is in the best way both very 17th Century and currently very progressive. Why *shouldn't* someone thinking seriously about rotten wood also think about how we can live well, and what it means to be free?

In the mid-60's (the 1660's), Margaret Cavendish was setting out to offer her critique of experimental science. The target of her critique was not always aimed at a particular scientist by name, but was generally trained on the activities associated with the new Royal Society and the projects carried out by the likes of Sir Francis Bacon, 1561 – 1626, Robert Hooke, 1635 – 1703, Robert Boyle, 1627 – 1691, and others. In the 20th Century, with her own critique trained on the same era and the same names, Carolyn Merchant wrote the definitive treatise identifying understudied, problematic assumptions and attitudes especially in Bacon's idea of the experiment.[5] Merchant's seminal text makes it clear that the dangerous legacy of the "Father of the Scientific Method's" use of the language of sexual violence as a way to describe nature has persisted through time in various ways, leaving wreckage of every sort in its wake. Since Merchant's careful and extensive research already lays out the specific verbiage that promoted violence toward women and nature at the same time, I'll refrain from rehashing the specifics. Cavendish's own scientific and philosophical views also respond to those attitudes, wherein the male scientist was urged to dominate and subdue out-of-control, or, 'virgin' female nature. The primary force of Cavendish's response was in asserting first of all the vitality and power of the natural world, rather than allowing it, or *her*, to be a passive body; "for nature being in perpetual motion, is always dissolving and composing, changing and ordering her self-moving parts as she pleases" (OEP: 5, 10). And indeed, Cavendish sometimes, but not always, gives nature the gendered pronoun "she." As it stands, this is an opportune area in Cavendish scholarship. For now, I wish to make less out of this use of "her," than her advocacy for

[5] Carolyn Merchant. *The Death of Nature: Women Ecology and the Scientific Revolution*. Harper & Row, 1983.

"perpetual motion" and nature's being "self-moving." Cavendish is, I would argue, presenting a case for the merits of Long Term Ecological Research (LTER).[6]

Because nature moves, and the time of an infinite system like nature exceeds that of the human perspective, a scientist ought not strive to cling to a single, complete, authorial position. Her critique of experiment also expressed a concern about a problem of habit, evident in her use of the word "intoxication," or what she also called an "addiction" among scientists for whom the technology (which she refers to simply as "art," meaning, "artificial means") had become more interesting than that which it studies. She worried that technology would give a scientist the impression that more was happening than not, or, that the technology was more important than the subject of observation, or even the results.

> Wherefore those that invented microscopes, and such like dioptrical glasses, at first, did, in my opinion, the world more injury than benefit; for this art has intoxicated so many men's brains, and wholly employed their thoughts and bodily actions about phenomena, or the exterior figures of objects, as all better arts and studies are laid aside. (OEP: 3, 8)

It is *not* evident that she was against technology to the effect that she thought it should be banned or altogether abandoned. Rather, she emphasizes her concern about the habit of scientists. They "addict themselves" (OEP: 3, 8), rather than cultivate their abilities to know and to learn. The experimental scientists were at risk of making "artificial experiments the ground and foundation of the knowledge of nature, and prefer[ing] art before reason" (FOEP: 6, 71).[7]

[6] As Frederick J. Swanson explained to me, LTER also has come to stand for Long Term Ecological Reflection, in recognition of his desire to see other disciplines flourishing at and with the research taking place at the Andrews.
[7] FOEP stands for "Further Observations Upon Experimental Philosophy," which was added as an addendum to the original "Observations Upon Experimental Philosophy" (OEP).

This intoxicated, addicted approach to microscopy also meant that there was an increased propensity for studying things in isolation, rather than in their context, or even habitat, i.e., studying them as divorced from their relation to other things. She called this a "deluding" process, saying "experimental, or mode-philosophy, build[s] upon deluding art" (OEP: 25, 25). She was critical of the idea that you could sever a part of nature and dissect it and become "intoxicated" with just that phenomena, especially if this meant you might fail to return the isolated data to its role in a wider context, or holistic picture.[8]

The risk of this mode of abstraction for Cavendish was that scientists of nature would lean mechanistic, which presented another competing theory in her time. Mechanism is itself a compelling view, but the problem— very briefly, for Cavendish— is that mechanism requires a top-down power structure, where nature, (the cosmos-machine), requires input from some separate thing (usually god), and the parts within it must always function and work in order to produce a certain output. In this view, change and transformation are devalued in favor of a fixed vertical ontology where beings must stay in their place and be given their power from outside sources, or, the nearest cog in the wheel. Mechanism served the Baconian experimental method because it meant nature had to be understood as requiring an ordering, directing, ruling power in order to produce or serve 'Man.' There was a two-fold approach to this narrative. It required on one hand smuggling in a particular ideology (which extends perhaps as far back as Hesiod's *Theogony*), in which female earth, or, earthly females, were

[8] A current expression of this occurs in Katz (1997) as quoted in Borrie (2000), "As Katz […] describes, 'any organism that is modified through human technology has been subjected to a process of design. It may appear to be natural, it may still be an organism- yet the meaning of its existence, its essence, has changed'," (William T. Borrie: 2000).

hysterical and unpredictable, out of control, or at least, more susceptible to temptation. On the other hand, it requires painting nature as inert and lifeless, such that it requires external operations and coercions and has no perceptions or powers of its own. Cavendish was particularly critical of this latter notion.

> And I cannot enough admire the strange conceits of some men, who perceiving and believing such a curious variety and various curiosity of nature in the parts of her body, […] do yet deny, nay, rail against nature's self-moving power, condemning her as dull, inanimate, senseless and irrational body. (OEP: 15,11)

Another problem for Cavendish, is the characteristic, colonial-entrepreneurial tone of the new sciences, which were striving to observe and name things "first," and eventually catalog everything completely, or as exhaustively as possible.[9] If transformation is true for all of nature, then time is also a ruling force. It means science cannot simply concentrate on the immediate and the isolated. It means that just as there is no final stopping point in the account of a thing's constituent parts, neither is there a perfect and observable end to its future action. This challenged the expectation that one scientist could be the sole author of a complete experiment, or that the mark of a successful experiment was a singular result which would pass the test of being absolutely true without any possible future challenge or other possible perspective.

In short, and as we will explore further below, she was a thinker for whom nature was vital, materialist, and emergent, and she was also a philosopher who rejected the idea of the discrete, independent, truly ontologically distinct "individual." Cavendish's world is a complex

[9] The best book on this that I have encountered to date is Vandana Shiva: Biopiracy, The Plunder of Nature and Knowledge (1997).

and dynamic one, whose time exceeds human time.[10] Another excerpt from Mitchell helps expose the contemporary resonance:

> We will see that the traditional notions of controlled experimentation as the best scientific method for ascertaining causal structures can fail to accommodate robust, dynamic behaviors. (Mitchell: 2005, p.3)

So, what should experimental natural philosophy / science do? Cavendish's hope was that technology could be integrated into a scientific practice that remained connected to its philosophical, pre-disciplinary roots, assumed a collaborative, partial or long-term view rather than an authorial, independent completion, and, that if experimental scientists could "make men live in unity, peace, and neighborly friendship, it would not only be worth their labor, but as much praise as could be given to them" (OEP: 3, 8).

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Log Decomposition Site: A View From Paris

[10] Mitchell's definition of complexity is one that influences my own understanding. She writes, "biological complexity—is not beyond our understanding; it requires new ways of understanding. It requires, in many cases, a more explicit and detailed analysis of the many roles context plays in shaping natural phenomena. It means that conditions often relegated to the status of 'accidents' or 'boundary conditions' be elevated to the subject of scientific study. Historical contingency conspires with episodes of randomness to create the actual forms and behaviors that populate life on our planet." Sandra D. Mitchell. Unsimple Truths: Science, Complexity, and Policy. (Chicago: University of Chicago Press, 2015), p. 13.

Roughly from 1644 – 1651, Cavendish and her husband were exiled in Paris with other sympathizers of Queen Henrietta Maria. During that time, her household held salons which were frequented by Hobbes, Descartes, Gassendi and other premiere philosophers of the day. Of course, it should be noted that when I say philosophers, this includes thinkers who were doing science, and were themselves strangers to the division as we know and enforce it. In those years, Cavendish arguably gathered and nourished the seeds of her 1666 (second edition 1668) book from which the present essay borrows its title.

In Paris, one of the primary ideas that she cultivated— largely in rejection of Hobbesian mechanism— was vitalism. As we saw above, part of arguing for that vitalism included describing what she called nature's self-motion and self-knowing. One way of articulating this self-motion was through a model of respiration.

> I do verily believe all or most natural creatures have some certain kind of respiration, so do I also find it most probable, that all or most natural creatures have pores. Not empty pores, for there can be no vacuum in nature, but such passages as serve for respiration, which respiration is some kind of receiving and discharging of such matter as is proper to the nature of every creature. (OEP: 5,10)

She was certain that nature required a dynamic process of transformation, holding fast to at least one claim of Epicurean atomistic materialism, namely, that nothing arises out of nothing, and nothing is completely destroyed. For Cavendish however, this isn't because of atoms, but a kind of transformative process called respiration. *There is no void*— it is the original expression of *there is no away.* Nature will (nature must) use and transform its matter, constantly cycling it into energy and matter for new growth.

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There is a 7pm tweeting outside my window tonight. I've learned to guess that it's roughly 7pm by hearing this specific bird. On my long walk to the Log Decomposition Site today, I learned new ways to think about time, new ways to perceive and to feel transformative processes that fall beyond the bounds of my own specificity. And, if the 2008 issue of Granta is right about the new nature writing, then, I'm willing to experiment. There, the editor notes in the introduction that the old nature writing was often "the lyrical pastoral tradition of the romantic wanderer," but, given the facts of climate change and the immediate effects of these changes, among other factors, the new nature writing seems to be increasingly "approaching the subject in heterodox and experimental ways" as "an experiment in forms: the field report, the essay, the memoir, the travelogue."[11]

And if the writers of the now-trending Dark Mountain Manifesto[12] are right about story-telling, then I'll add story, avoiding mere description. In the Manifesto, they suggest that,

> If we are indeed teetering on the edge of a massive change in how we live, in how human society itself is constructed, and in how we relate to the rest of the world, then we were led to this point by the stories we have told ourselves – above all, by the story of civilisation. […] What makes this story so dangerous is that, for the most part, we have forgotten that it is a story. It has been told so many times by those who see themselves as rationalists, even scientists; heirs to the Enlightenment's legacy – a legacy which includes the denial of the role of stories in making the world. (Hine: 2014)

[11] Jason Cowley. Editor's Letter, *Granta,* no. 102, 2008.
[12] Dougald Hine, et al. Uncivilisation: The Dark Mountain Manifesto. London: Brackettpress, 2009, 2014.

We are teetering on the edge. We are in it. Chronicling these changes is sometimes sad labor, and always arduous. It requires long-term attention. The Log Decomposition site is one of the long-term experiments of the Andrews that has sought to make sense of the role of certain members of the forest organism, and increasingly is able to contribute to our grasp of the forest's behavior in the age of climate change.

In the mid-1980's, 530 logs were strategically strewn about the western slope of the southern Cascades. They consist of four species: Douglas-fir, hemlock, redcedar, and Pacific silver fir. The plan was, has been, is, to study these over the course of 200 years in the interest of a deeper understanding of rotten wood, or, more technically, "coarse woody debris."[13] The role of melting giants on the forest floor is (at least) a key to the structure, nutrient cycling, and carbon dynamics of the forest. A simple list of the merits of wood-rot: rotting logs provide critical habitat and form soil, they foster mycorrhizal fungi, and have significant effects on water quality. And yet, as Harmon (1992) points out, forest management is under pressure to remove them. The removal of fallen logs has been justified not only by ignorance of their beneficial roles, but also by arguing that the green and brown cylinders, lying flat like mossy Roman ruins, "reduce fire hazard, increase worker and visitor safety, remove potential blockages to fish passages, and fully use the fiber produced by forests" (Harmon, 1992).

[13] Descriptions of the experiment are widely available. Two that I've consulted frequently are: Brodie, Goodrich, Swanson, eds.; Forest Under Story. Washington: University of Washington Press, 2016; and, Mark E. Harmon. Long-Term Experiments on Log Decomposition at the H.J. Andrews Experimental Forest. USDA Forest Service Publications, 1992. The latter is one of the "older" descriptions of the experiment, but I follow it closely here because I wanted to articulate the origins of the site.

Around the brown gate on the grassy side-path, down the soft green carpet, to the experiment.[14] A writer tasked with reflection, somewhere early-ish among 200 writers tasked similarly, has walked four miles to get here.

My first thought: It's a good spot to tinker.

Science is like play.

The logs are mixed with non-natural colors, flags, a giant nail, tarps.

This is what my almost 4-year-old son's toys look like after a long afternoon playing in the yard. Has he been doing science?

I'm comfortable here.

Except for that bit down the way— except for those blue tarps tucked in over the fat logs, or whatever 6 ft mounds lay underneath. That's a rescue site. That's like a plane wreck they couldn't reach in time, victims still scattered, an accident site they aren't done cleaning.

What happened here? What happens here?

Science plays with the question, plays with the tools. Breaks toys, asks for new ones. Measures phenolic extractives in heartwood, smells the air, takes a sip of water.

I take a sip of water. We want to know: what is a log's breath like? I breathe at the site. Am I noise in the data?

The Carmine — tingles warm —
And if I hold a Glass
Across my Mouth — it blurs it —
Physician's — proof of Breath —

I am alive — because
I am not in a Room —
The Parlor — Commonly — it is —
So Visitors may come —

[14] The smaller area in this first location that I walked into is more precisely: the Detrital Input and Redistribution Treatment study site, another long-term research site related to the Log Decomp site, the larger project next to it.

Am I visiting? The thought of forest management removing the vertical complexity of the forest for the sake of "visitor safety" makes me think it's a worthy question. What is the difference between visiting and sojourning?[15] The latter is a term I picked up in the HJ Andrews library, and I'll come back to this question in concluding. Presently, it is remarkable, the way in which Dickinson and Cavendish speculated, philosophically and poetically, that breath is a crucial component of understanding nature. Anticipating the concerns of experiments in carbon dynamics, Cavendish elaborates:

> But respiration is an action of drawing, sucking, breathing in, or receiving any ways outward parts. Next, although there may be pores in most natural creatures, by reasons that all, or most, have some kind of respiration, yet nature has more ways of dividing and uniting of parts, or of ingress and egress, than the way of drawing in, and sending forth by pores. For nature is so full of variety, that not any particular corporal figurative motion can be said the prime or fundamental, unless it be self-motion, the architect and creator of all figures. (OEP: 5, 10)

Here, "ingress and egress" remind us of the Latin roots of the idea of a physical addition or subtraction: *ingredior,* the root of our word "ingredient." Ingress means matter is added, egress means matter is leaked out. These verbs express that nothing ever disappears completely, or appears from out of nowhere. "[…] nothing in nature […] can be lost or annihilated, but nature is and continues still the same as she was, without the least addition or diminution of any the least thing or part" (OEP: 15, 11). She chooses these words to counter the legacy of creationist cosmology, which would use create, die, arise, disappear, or other more linear and finite terms of change. It is one way of un-telling and re-spinning a yarn.

[15] "A sojourner travels lightly, resides temporarily in an area, learns from others, and shares talents and energy. A sojourner has the time and inclination to connect viscerally with the world around him or her. […] Sojourning is chosen as a metaphor to suggest […] there is a willingness to learn and change." (Fox et al: 2000, p. 72)

Change does not occur because there is a thing to be changed for some reason or another. Rather, a thing is changed because change is always at work. Or, to cease changing would be to cease being alive, but even still, according to Lucretius and Cavendish, there is no real material "ceasing." In my field notes on the day I visited Log Decomp, I was gripped by the notion of infinite change. I wrote:

> I have looked many times at the green fuzzy fallens. I have come to see that any mound, any swell on the forest floor was a log. Is soon to be ground, soon to be a tree. They are like ghosts, the ones farthest gone, barely recognizable as wood, bearing up a tiny new tree. The forest is haunted therefore, by a kindness of trees, we know they breathe but do not require words. I require words; in words I lay my history bare.
>
> A tiny white and gray butterfly with ruffled wing edges has met against my knee. *What thing is this?*
>
> There is no rain on this day. Not even the leftover drops of previous rain, or the mist of future rain. At the log decomp site today, gold flecks flicker down from above, against the jade depths of air, softly disappearing into the logs, logs quietly disappearing into the saplings, saplings stretching up, slowly outliving us.

The decomposing-composing logs were giving me the shivers. In fact, I shivered a little at the presence of my own uncle, whose ashes were laid to rest in a pristine, tucked-away area of Lookout Creek in 2009. I have not been in the area since then. My father's cremains have more recently been laid at his favorite spot on Lone Cone Mountain in southern Colorado. I too, have chosen a place.

On one hand, there's nothing Romantic about the return to the detrital food-chain. On the other hand, I think of nature differently now. I do not think of these events often enough, apparently, as these transformations seem to have a hyporheic presence under my waking conscious. Just a few months after my father's ashes were spread, I found myself having to 'get a hold of myself', as it were, while encountering this passage in the classroom:

> As for example, a man, when his figure is dissolved, his parts dispersed, and joined with others, we may say his former form or figure of being such a particular man is buried in its dissolution, and yet lives in the composition of other parts, or, which is all one, he does no more live the life of a man, but the life of some other creature he is transformed into by the transforming and figuring motions of nature. (OEP: 15, 11).

In vitalist materialism, "body" is always temporary, always partial, always changing. "[t]here is no such things as rest or stoppage in infinite matter, but there is self-motion in all parts of nature, although they are not all exteriorly, locally moving to our perception, for reason must not deny what our senses cannot comprehend" (FOEP: 31,32). Infinity is invoked through presence, not transcendence or separation. Respiration is one way of articulating the movement that transpires in a cosmos where there truly is no "nowhere," no "nothing." The fullness of such a plenum is always at risk of being rock solid, too solid for one woman to be able to walk through the forest. But an expansion and contraction, a breathing like lungs filling and falling, allows things to move about through a space, through air that is still full, still nature, though rarified enough for me to see trees beyond trees; I can see the tiny brown caps that the newest recruitments of needles have worn through the cold, early days of spring; I can watch them bursting off, catching the light, traveling down.

I think Cavendish would be very happy about the Log Decomp site as an experiment. It engages transformative processes in and between natural bodies, encourages patience and collaboration with others and with technology, (knowing the technology for understanding carbon dynamics changed in the 1990's), the experiment has welcomed diverse representations and interpretations, as well as, I would add, the science has been "playful," rather than an act of conquest. I think this would be her kind of experiment.

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Deer Creek Stream Restoration Project: A View From Prague

On May 21st, myself and a musician— another Resident at the Andrews for the month of May— were taken to the McKenzie River Ranger Station to meet Mickey, a stream ecologist who would take us into and alongside Deer Creek to explore the current restoration project.[16]

Meanwhile, always a fan of philosophy "B-sides," I had been revisiting a text that is not often picked up in current environmental humanities discourse these days. Czech philosopher Erazim Kohák's *The Green Halo* (2000) offers some useful wisdom as I reflected on the way in which the musician, the stream ecologist and myself had everything in common.[17]

> At Prague's venerable Charles University, after forty years of what was officially called scientific Communism, I have repeatedly encountered another question: If ecological ethics deals with the meaning of human dwelling on Earth and with the values of sustainability, can it still be a science? (Kohák: 2000, 11)

It was clear in our first encounter (the stream ecologist, myself, and the musician), that our bond had much to do with value. Preparing to dwell in the river, we were issued waders, and we packed up. I was photographed in front of the McKenzie River Ranger Station sign. I was

[16] The Deer Creek Floodplain Enhancement project is in a creek that runs just east of the Andrews Forest. It is a land management project run by the Willamette National Forest which shares a decades-deep partnership with the HJ Andrews research community.

[17] I am not on board with Kohák's reading of ecofeminism as presented in *Green Halo*, and there are ways in which this and *The Embers and the Stars* approach a too woodsy, manly model of nature-loving, but I'll bracket those discussions for another day. Here, I just want to draw from Kohák's compelling discussion of science and philosophy as disciplines.

thus photographed because I requested it. I wanted to send it to my cousin, because my uncle (her father) worked there for decades, and, he was the kind of one who seemed more like a tree than a man: tall, bending, flush with secrets and layers: quiet to the bone, with eyes serene and cautious. I had met a few people in the Blue River area who knew him, who knew that while he never said much, what he said was always rich with deep, long-term knowledge of the area.

Our conversation in the truck was about the taxonomy project and the new philosophies of restoration. It continued without missing a beat as we parked, walked to the stream, walked into the stream. I begin taking notes on a waterproof notepad I keep tucked into my hat when I otherwise need my hands*. I am standing here, in the stream, up to my heart, the chest-high waders shrinking tight against my skin under the cold weight of the water as I learn about this place.* I feel squeezed by the water, its temperature awesomely cold against the waders, its pressure wrapping my waterproof booties tight against my feet. I can look straight out at the surface rippling past my shoulders. The water is no color, and it is undoubtedly also tree-colored, sky-colored, dark amber perhaps, silver where the surface wrinkles like a silk sheet. I am holding up a tiny notebook, building a glossary.

> Uncle = your father's only brother, somewhat distant from your life, but somehow also a presence hewed close to the bone, a resonant power of connection that could not have been achieved through regular holiday small talk.

> Stochastic = able to respond to disturbances

As Mickey talks, and as I pull my heavy body out of the deep pool I've been standing in to follow her to a more shallow place, I think about disturbance, its regularity and its necessity. I think of crisis as the inability to change in response to disturbance.

Meanwhile, Lisa, the drummer-composer, is dragging a hydrophone through the flow. The hydrophone is like a thick disk with complex parts partially visible inside, attached to a long black cord. We hold the end of the cord closest to the giant headphones. We can toss the disk in and out, sort of like fly-fishing. I take a listen. Deer Creek sounds like windchimes and breaking glass at the surface. A few feet under, Deer Creek has a beat below the effluence of the dead that are merely returning to infinite materials, these larger rocks I mean, they cut the flow into a low-sounding: *"plink, drip, drop, ploink."*

Mickey the scientist takes a listen. She smiles, looking up, then at the river. She pulls the hydrophone up to a shallow place, then lets it in lower. *So this is what it is like to be alive*, I write down, *on the earth*. We three Earthlings, the scientist, writer-philosopher, drummer-composer, knowing the river, precariously deep on slick unseen toe-holds, sucked into our clothing by the water pressure, getting to know this river in intimate, playful, rich terms.

> Trash-rack = A large assembly of logs, sticks, or other river detritus, naturally occurring or made by humans with the intention that it accumulates more material floated in from upstream, usually to protect some "resources" downstream, like a bridge. An older engineering term.

> Science = knowing by being there with others, or, 'three people get in the river, deeper than necessary, in order to read and discuss it (yes, read the river, like a book).'

After pausing on a sandy berm to talk more about the drummer's recording equipment, we ask Mickey about restoration, about why it has been called a "new" approach. She explains that the old philosophy of science in her specialty was one where projects needed to hit targets, metric targets. For example, she says, "a stream would have to show 100 pools per mile or whatever. Or, the proposal required some type of X for spawning." But now, she explains, and I translate, stream science allows more verse, more aleatory whispering, a hope constructed around the soft body of vertical complexity. They can admit that they are not 100% certain what forms success will take.

More specifically, she says, as we crouch down close to a trash-rack of alder limbs, ground water exchange is being studied as something that can cool water temperature at shallow locations. Because water cools most in the exchange, she explains, you need *a lot* of vertical complexity. You need more exchange than speed or shadow, contrary to previous expectations about pool temperature. I write it down. So, water that looks like it will be hot, if it has gone through an exchange, will be kept cool. There are also mixed elevations of river, she adds. I think again of Emily Dickinson:

And lean – and view it sidewise –
And add "How cold – it grew" –
And "Was it conscious – when it stepped
In Immortality?"

Mickey and her team might be artists. They make piles and racks in the river, in order to restore it. They create log-jams, in order to provide conditions for habitat, to return log-jams to the stream's ecology. She smiles, recalling the D-8 Cat driver who so enjoyed hauling trees down and across the beds, undoing history, retelling the story of a stream that was cleared and

straightened for logging. “He’d always be so proud of his log-jams; he always had to stand back and look.” Mickey is clear that under the new philosophical paradigm, the restoration project only “provides conditions,” “gives opportunity,” “removes obstacles.” She adds: their stream restoration work does not try to re-create, they are not trying to mimic. Restoration is not a return, it isn’t nostalgic. And she is delighted, wading in familiar riparian territory, looking for signs confirming that an unpredictable but desired encounter has taken place as a result of their art.

> Redd = a trout nest. Redds are made in half-moon mounds, with the female’s tail in about 4-10 inches of gently flowing, “laminar” current.
>
> Laminar = a current of water so glassy it can paint the details of, e.g., a singular overhanging alder in the photorealistic tradition.

Mickey the scientist gets down and flicks her wrist, waves her hand, imitates the mother trout’s tail as it constructs a nursery. *I will never walk in a shallow stream again*, I say. Well, says the scientist, don’t worry too much. The redds are made of gravel sizes that are big enough to be resilient to foot falls and disturbance, that is, enough water can move through. They can, for the most part, move and shuffle around but retain the half-moon shape.

> Knowing = a kind of thing a fish can do, something I am trying to do as I wonder: what does the mind of the fish feel like when it knows what size of gravel will be the right size for the right reason? I mean, does a fish knows that it knows, etc.

> Envy = the feeling I have when I suppose (perhaps wrongly) that animals enjoy the full confidence of their drives and actions. A trout has not lost sleep worried about this or that question, has never darkened its heart toward sinister or cruel ends.

Kohák argues that the question of where ecology "fits," as if in a kind of Venn diagram of philosophy-versus-science, is the wrong kind of question to be asking. Rather, he writes,

> Even the most thorough familiarity with the mechanism or the organism of life will not answer our most pressing question about the meaning of life— what is it all about? How ought we to live? We cannot leave the answer up to inborn instincts and contingently acquired inclinations. One of the consequences of our freedom, of our defective instinctual equipment, is that we need systematically, consciously to raise the question of wisdom, *how ought we live that we may not only live but live well,* as the basic question of ecological ethics. *Ecology needs be not only science, but also philosophy.* (Kohák: 2000, p. 13; emphasis author's)

> Caddis-fly = an indicator invertebrate; a builder and world-maker, an artist of earthworks, now squeezing its black head out of its rock-skin, then slinking back in, unimpressed with my palm.

I am alive – because
I do not own a House –
Entitled to myself – precise –
And fitting no one else –

As the scientist gently scoops another caddis-fly off a rock, holding what looks like the tiniest little trail cairn in miniature, she explains their significance and their life-cycle. *The indicator invertebrates have a low tolerance for any kind of bullshit*, I understand her to be saying. Two ways to endure: 1) be like the redd and shuffle, adjust, stay put. Or, 2) be like the cadis-fly and get the hell out of whatever is not right for you. In any case, Deer Creek (post logging madness of the mid-20th Century) is evidently flourishing fast in response to the restoration project.

> Salmon fly = huge, with long legs and smoky-quartz colored wings that lay back and nearly cover its whole body. The body underneath, the torso, is a shock of bright neon orange. About 1.5 to 2 inches in length.

Mickey continues to explain the single-channel survey, and we continue with our wet habitat inventory, visiting the organism and the home that is Deer Creek, looking for chinook fry, delighted when we see the redds. Observing a presence of habitation, of spawning, gives the scientist a lift, a spring, a spark of joy. I ask her: what unanswered questions remain? What do you wonder about? She says she is always curious about why and when the rehabitation takes place after or even during restoration. "What signals exactly are we sending out?" She says, looking into the river. The musician records an answer: *"plink, ploink, drip."*

And marked my Girlhood's name –
So Visitors may know
Which Door is mine – and not mistake –
And try another Key –

How good to be alive!
How infinite – to be
Alive – two-fold – The Birth I had –
And this – besides in Thee!

— Emily Dickinson

This is a poem by Nature. That is, it's a poem that seems to me now to haven been written by Nature herself, the sort of nature theorized in the natural-scientific-philosophy of Cavendish. The door that we open when we don't merely visit nature as a passive onlooker, is a kind of unpredictability, and an encounter within a community.

To clarify, consider my cousin's stories about *visitations* to nature in the Blue River and McKenzie Bridge area, in the age of Instagram and Facebook. As a local to the area, indeed someone who has lived on the same land (raising food, both vegetables and meat) her entire life, and is now raising her own children there, she laments that social media has ruined so

many local swimming holes and camp spots. And at the same time, rural life increasingly requires the use of such tools to communicate and remain in contact with one's larger networks. Hanna's stories are about how people broadcast and reveal favorite places, once 'off-the-beaten-path' places. She never expected that she herself had the sole right to these secrets, but she laments that the increase of people, no matter how highly they "rate" a section of a river, or how much they claim it renewed their love of nature or whatever, leave an increase of garbage, erode the often fragile contours of stream and river pools, and create traffic jams on narrow roads. Just *visiting* isn't yet an ecology.

So, how does visiting, and how does philosophical science, become ecological? Without a doubt, the interdisciplinary, long-term activities of the 17th century being cultivated at the Andrews hold something of the answer in view. It's good to be on nature's time rather than your own, always asking the question of the size of the footprint and future effects of your actions everywhere you go. And, it's advantageous to challenge the preconceived edge of your discipline as well as assumptions about its authority. The right kind of experiment will add the work of *reason* and *feeling,* (what Cavendish called rational and sensitive perception), in order to always think about the whole, dynamic, complex system, rather than struggle desperately to be the first to hit "the" answer, or the "thing" at the bottom of the explanation, and the kind of experiment that will outlive the scientist is particularly powerful in its capacity to appreciate and expose nature's time.

Kohák's response to our current question also resonates. For Kohák, an immediate experience of nature is not yet ecological or philosophical without reflection. One possibility here— one that is an opportune area that I'll leave undone— is to explore whether this explains

the problem with social media and nature. Namely, is the instant dissemination of images merely an immediacy left bare, bereft of any reflective capacity that could guide and transform the question of whether and how we visit? In any case, Kohák suggests that,

> The tasks of philosophy include the transformation of immediate lived experiences into words, or, in Zdenek Kratochvil's words, from *mythos* into *logos*. Philosophy here operates at the edge of poetry, conceptually preparing the immediacy of experience for reflective thought. (Kohák: 2000, p. 14)

The "transformation" Kohák talks about, from experience into words, is not just mere description. If we recall Mitchell's insistence that thinking about nature avoid a descriptive fundamentalism, then, we might even think that ecological thinking *transubstantiates*. Where reflection and transformation do work on experience, it becomes something else. This is less mystical than it sounds, but I do mean to emphasize that transformation is different than representation.

Representation can become a repetition that locks us into limited expectations. Without reflection, experience alone is even vulnerable to maligned transformations. As an example, consider again the Dark Mountain group, as they contend that,

> For all our doubts and discontents, we are still wired to an idea of history in which the future will be an upgraded version of the present. The assumption remains that things must continue in their current direction: the sense of crisis only smudges the meaning of that 'must'. No longer a natural inevitability, it becomes an urgent necessity: we must find a way to go on having supermarkets and superhighways. We cannot contemplate the alternative. (DM 15)

Here, the phrase "wired to an idea of history" is crucial. The work of reflection and story-telling holds the capacity for breaking this, for the contemplation of alternatives that can make scientific results and studies politically salient. And the Manifesto authors also reveal something about the 'urgency' that might be nearly a human condition these days. For some, it is urgent

that we "save" the representation of the past and reproduce it as closely as possible. For others, it is urgent that we "save" our ability to be earthlings, sustained by this planet, and *this* latter possibility seems to be increasingly in opposition to the former.

Kohák further explains that transformative story-telling matters for the question of what ecology is, or, the question of when science and philosophy become ecological. As he explains, "In Czech usage, the word *science* has at least three distinct meanings" (Kohák, 2000). One is the way in which practicing scientists use it, as an indication of a "purely empirico-mathematical examination of physical reality," (Kohák, 2000). This usage "prides itself on its objectivity which it considers a guarantee of its truth" (Kohák, 2000). Clearly, this is not yet the kind of transformative reflection that could be ecological. As Kohák expands his exploration of the various meanings of science, he considers its relation to the German concept of *Wissenschaft*. Wissenschaft includes "all systematic inquiry which requires professional competence and public verifiability of its claims" (Kohák, 2000), thus, as Kohak continues, it could include art history, biology, theology, any inquiry which deals with "human inputs." But Wissenschaft is still not yet ecological. While it engages a community, it does not yet offer reliable guidance for our acting.

> The question is not simply what life is, but what its meaning is, and most pressingly, *how we ought to live it. […]* In Czech thought, Jan Amos Komenský used the term Scientia in this sense still in the 17th century, so did his younger friend, Gottfried W. Leibniz. (Kohák: 2000, p. 13)

Thus Kohák concludes, "Ecology needs be not only science, but also philosophy" (Kohák, 2000).

In sum, if transformative story-telling science all sounds good, who could ever be against it? If we leave it at this, we run into one of those moments in environmental writing where we

think, sure, that sounds good, I think we've done that, *why isn't it working?* In her reflection on the history of science, Mitchell suggests that complex, philosophically-attuned science must become political, it cannot be separate from "making decisions and crafting policies that help navigate the complex structures that populate the world in which we live" (Mitchell, 2005). It remains to be seen in what follows what that connection might look like, and whether this business about ecology being science that becomes philosophical, is just a bunch of words.

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Deep Uncertainty and Integrated Pluralism: Can Ecological Stewardship be Taught?

At my table in the Greenhouse Apartment, with last night's moth stuck to the screen, coffee waking me, I simply want to continue writing this essay in order to point to some patterns and possibilities, and thus raise the specter of why the work done at LTER sites such as this is so incredible, so poignant, crucial. Also, perhaps I can leave some of my own preliminary reflections on the hardest question, the most ancient, the one that Socrates explores with Meno: *can virtue be taught*? Or, if we've got something so right going on here, how can we really get a handle on continued and better advocacy for ecological stewardship?

The way a scientifically-trained-philosophical-type might enter a site and "poke around," take a look under a leaf, count something, assess another thing, listen for something, take a

twig and twist open a mound of scat, so too, a science-attuned-philosophically-trained-type goes into the Andrews Library and offers a few hours, assessing, pulling out this or that tome, scanning, sitting down with, taking a pulse.

Here's what I found. The call to being interdisciplinary can't be taken too lightly. Pulling in the reigns on my evident enthusiasm for "un-disciplined" ecological learning, Kai Lee has written that,

> I want to stress the implication for individuals of the fact that the roles are separate. *A single person cannot play several different roles at once.* Any single person's probability of achieving success depends upon competition— what is called 'fitness' in biology— and only very rarely does any single person achieve high levels of success in more than one arena. (Lee, 1993: p. 164)

After reading Lee, I begin to think that it is true that one doesn't wish to end up in an ambulance with an art historian. And it is also the case that the expectations about citations, currency, and data, across disciplines are still in many ways like foreign languages to each other. In fact, as I was thumbing through the archives at the camp library one evening, I chatted with one of the researchers, asking if I could possibly take these cool articles from the early 70's back to my cabin with me for a night. He looked at me like I was crazy. They were ancient and thus irrelevant to him, he explained. You can have them, he added. They're vintage, I said; I like learning from ghosts.

I would concede that it is a very tall order to really be highly skilled, productive, and successful at the deepest level of multiple disciplines. But I am not convinced that we have set the contours of these disciplines with enough experimental margin. Lee explains further that,

> If costs of movement did not exist, we would observe persons who combined excellence in science with success in politics, administration, and professional practice— persons I

> have labeled 'philosopher-kings,' after the wise and powerful governors of Plato's *Republic.* A few paragons of this type are reputed to exist, although closer inspection […] raises the question of whether their success was their own, or instead the reflection of a good staff (Lee, 1993: 164).

Lee's restrictions on what a professional might conceivably be good at are mostly offered in the context of thinking about institutional change and environmental policy, or in the interest of effecting new policy changes. And some reliable, long-term stability in the roles of those involved in bureaucratic organizations is needed.

But in terms of playing with nature in order to relate oneself more deeply to emergent, uncertain futures, I cannot conceive of a discipline that could *not* contribute to an ongoing, long-term inquiry about nature. Interdisciplinarity is not a free-for-all. I think it's crucial to observe that bringing different skills and perspectives to light on the same question is less about a relativistic hodge-podge without standards than it is a question of knowledge becoming politically salient and communicable. One concern is that if the experience of an experiment is not shared, either during the process or in terms of the result, it fosters elitism. And I would add that the issue there is not just elitism, but that it's very hard to advocate or educate the merits of ecological research from a vastly divided gap between "haves" (knowledge, technology and access), and "have nots."[18]

[18] This is a William T. Borrie formulation, to which he adds: "Postman (1992 p. 9) suggests: 'those who cultivate competence in the use of a new technology become an elite group that are granted undeserved authority and prestige[…]'," (Borrie, 2000, p. 88).

Mitchell adds another reason why the pluralistic-interdisciplinary approach is not just a relativistic hodge-podge.[19] She writes,

> This position supports the view that there are multiple correct and useful ways to describe the world, while completely rejecting any form of naïve relativism: not every posited description will be either correct or useful. Standards that justify a given representation consist of a combination of measures of predictive use, consistency, robustness, and relevance. (Mitchell: 2005)

The point of interdisciplinary sympoiesis, *making-with*, and being-with, is embracing collaboration and openness to the unpredictable possibilities that can add to and communicate our knowledge of nature. But why is collaboration good? I myself am a fairly introverted cat. I work best in a room with nobody but a desk. But, compelled by wanting to think about what's going on in LTER, I arrive and write. Collaboration can simply be a culture of trust in a plurality of representations, or, transformations. What I do is palpably trusted from the outset as important and relevant and unpredictable, thus, I become enthusiastic about learning and contributing. I am able to collaborate across time, forward to the 200th writer, backward to the originators of the experiments underway.

Thus, being interdisciplinary does not mean expecting wild success as a genius-polymath, and collaboration does not *necessarily* mean having to appear enthusiastic at the ropes course on team-building day. Being interdisciplinary can instead be thought of as "integrated pluralism." As Mitchell defines it, integrated pluralism is essential to the new experimental sciences because it "integrat[es] multiple explanations and models at many levels

[19] Another good excerpt from Mitchell, in which she describes ways to avoid a sacrifice of standards of truth, is this: "Granted that there can be different answers to different questions, it still remains to be determined what relationship holds among the answers. Are they consistent, independent, connected in any way?" (Mitchell, 2005).

of analysis instead of always expecting a single, bottom-level reductive explanation (Mitchell, 2005). This is crucial when studying nature as a complex and dynamic system over the long term.

Thus far, I've advocated for the merits of the Long-Term Ecological Research and Reflection, and collaborative, transformative, interdisciplinary experimentation. But the connection yet to be discussed is the one Cavendish also wondered about, the translation from this into ecological stewardship. To get there, I want to highlight the discussion of "deep uncertainty" that runs throughout all of my sources. Mitchell writes, "Complexity often carries with it a type of ineliminable or 'deep' uncertainty that is not adequately represented by methods better suited to more certain, predictable, and static parts of nature" (Mitchell, 2005). The connection to stewardship, (and possibly to policy) which thus emerges, is one in which environmental research has to advocate for the merits of *not*-knowing-but-knowing. That is, policy makers and others ought to be encouraged to grasp the kind of uncertainty which is not ignorance, but a partial completion of LTER. Grasping is one thing, so too is the creation of flexible policies that express a grasp of these certain uncertainties.

In essence, deep uncertainty is another name for a kind of certainty. It is sort of like saying, "we are sadly very certain that things are not going well for the Earth." Another interaction with the scientist in the library, as we exchanged our distinct views on what counts as current research, was in his description of the daily grind of his career as a LTER researcher. Looking slightly away, out into some vague point in the middle of the room, he described the routine of gathering data as sometimes feeling like "chronicling the end." This is a deep layer of data that is less apocalyptic than it is a measure of a new normal, at least for certain sections of

the southern Cascades. But it reminds me of a university librarian's recent comment on a trip he was taking in August. He was planning to leave Chicago to visit family in Oregon, as he always has. But he has changed the dates of his trip, and he plans to start going as much as possible now, because the family has told him that "the fire line gets closer every summer." They know their days on their property are numbered.

Deep uncertainty knows for certain that without drastic measures, bad things will happen, bad situations will worsen, and will do it faster. It is a kind of scientific knowledge that is oriented toward the future, and necessarily so, as it models and predicts. Too often, however, power that wishes to subjugate such knowledge cites that it isn't 100% proven what will happen in the future. "To try to force decisions about complex domains of deep uncertainty into inadequate models is wrong for many reasons. Most importantly, it can lead to ignoring the scientific knowledge we do have and prevent our policies from being informed by that science" (Mitchell, 2005). Another quote from Mitchell connects to Kohák's call for the philosophical element of scientific thinking. The kind of expansion that Mitchell describes is what philosophy does, "we need to expand our conceptual frameworks to accommodate contingency, dynamic robustness, and deep uncertainty. The truths that attach to our world are not simple, global, and necessary, but rather plural and pragmatic" (Mitchell, 2005).

While I was in residence at the Andrews, I debated whether to scroll the news. I allowed myself to do so, and found this gem. It is a lot of material, but it's important. I've trimmed it down and highlighted some key phrases:

> Republican lawmaker: Rocks tumbling into ocean causing sea level rise[20]
>
> By Scott Waldman, E&E News
> May. 17, 2018 , 9:10 AM
>
> *Originally published by E&E News*
>
> […]
>
> A leading climate scientist testifying before the panel spent much of the two hours correcting misstatements.
>
> […] Rep. Dana Rohrabacher (R-CA) said he was bothered that established climate science has not been questioned more by the committee, which has accused federal climate scientists of fraudulently manipulating climate data and subpoenaed their records.
>
> "I'm a little bit disturbed by, No. 1, over and over again, I hear, 'Don't ever talk about whether mankind is the main cause of the temperature changing and the climate changing,'" he said. "That's a little disturbing to hear constantly beaten into our heads in a Science Committee meeting, when basically **we should all be open to different points of view.**"

So far in what I've written, given my support for *a plurality of representations* and a play of undisciplined approaches to science, one might think I wouldn't disagree. But this plea is a dangerous manipulation. This is one of those moments where we have to think through the standards offered above by Mitchell, Borrie and others, which reject the idea that interdisciplinary ecological thinking, or deep uncertainty should be approached as an uncritical free-for-all. We should *not* be open to every different point of view. This sounds like an odd thing to say, but part of being a good thinker is being a critical thinker, and knowing how to identify ideas and views that are harmful, wrong, or otherwise not worth entertaining. To clarify, it's worth examining this exchange further:

[20] *E&E News. Copyright 2018. E&E provides essential news for energy and environment professionals at* ***www.eenews.net***. Posted in: **Scientific Community**. doi:10.1126/science.aau2090

> Rep. Lamar Smith (R-TX), chairman of the committee, entered into the record an opinion piece published in *The Wall Street Journal* yesterday that claimed sea levels are not rising because of climate change, a view that rejects thousands of scientific studies. […]
>
> "To solve climate change challenges, **we first need to acknowledge the uncertainties that exist,"** Smith said in his opening remarks. "Then we can have confidence that innovations and technology will enable us to mitigate any adverse consequences of climate change."

This is a very concerning moment, and it isn't isolated. The outdated demand for 100% perfect "proof" allows the policymaker to hold solutions at bay. Thus, while I've been thinking about the merits of deep uncertainty in philosophical science and experimentation, I am well aware of how easily abused any talk of uncertainty can be. If I can be allowed a quote within a quote within a quote, Mitchell brings the frank words of Revkin to bear:

> Climate change presents a very real risk. It seems worth a very large premium to insure ourselves against the most catastrophic scenarios. Denying the risk seems utterly stupid. Claiming we can calculate the probabilities with any degree of skill seems equally stupid (Prof. C. Wunsch, quoted in Revkin 2007, Mitchell, 2005).

This frightening and dangerous (or just "stupid," as Prof. Wunsch puts it) demand, to have exact certitude and predictability on hand before action can be taken, is not uncommon. "Yearly (1996) has argued that policymakers use uncertainty and lack of scientific consensus to delay responses to environmental problems. Appeal to inevitable uncertainty creates an opportunity to challenge the credibility of any scientific claim, to the point of creating a policy environment in which all scientific contributions are dismissed" (Mitchell, 2005).

In the next excerpt, note that the scientist is accused of being philosophical the moment he considers an ethical issue in response to Posey's absurdly ignorant question:

> "What do you say to people who theorize that the Earth as it continues to warm is returning to its normal temperature?" Posey asked.

> "Look, if you want to characterize a temperature above today's temperature as normal, you're free to do that, but that doesn't mean that's a planet we want to live on," Duffy said.
>
> "I don't want to get philosophical; I'm trying to stay on science here," Posey said.
>
> "I'm not getting philosophical; I'm getting extremely practical," Duffy said. "I'm being extremely practical — if we let the planet warm 2 or 3 degrees, we will have tens of meters of sea-level rise, and the community where I live will essentially cease to exist."
>
> Posey responded: "I don't think anybody disputes that the Earth is getting warmer; I think what's not clear is the exact amount of who caused what, and getting to that is, I think, where we're trying to go with this committee."

The demand is that the scientist "sticks to science," in the most outdated, restrictive, inappropriate sense of the discipline. And then there's the assumption that philosophy, in the form of the very good question of how we might want to live, is somehow irrelevant to governing.

For now, with a tiny fly of some sort— a kind I've never seen— accompanying the lamp over my table, I'm going to close this essay. My answer to the question of whether ecological stewardship can be taught is this: no. Ecological stewardship cannot be taught. *But it can be learned.* Nature is our only teacher, and I think all good ecological education should be an act of demonstrating how to learn form that teacher. This seems to me to be at the heart of LTER. Educating in philosophy and in science has to demonstrate the right kind of attunement to the urgent, objective messages in *uncertain or partial data*. We have to teach the ability to imagine and create flexible futures, and to respect what science is clearly showing us, even when it uses the language of what still remains to be known. A second thing: we have to put scientist-philosophers in office. What Lee didn't discuss about the philosopher-kings of Plato is that they

are said to be, at first, reluctant to serve. They do not begin from wanting to be in power, they begin from wanting to be good.

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Conclusion: Spiritual Morticulture

> *Environmental Protection Agency (EPA) head Scott Pruitt said his desire to use the Earth's resources like oil and coal is grounded in the Bible.*[21]
>
> "The 'environmental left' tells us that, though we have natural resources like natural gas and oil and coal, and though we can feed the world, we should keep those things in the ground, put up fences and be about prohibition," he said. "That's wrongheaded and I think it's counter to what we should be about."

I find this beyond troubling. There is a disgust it produces. It's hard to read. I bring it to bear in this essay because I think that appeals to merely revamping a spiritual or theological connection with nature as a mode of engendering ecological stewardship, is on pretty thin ice. The religious right in the US has stolen the spiritual story, if I may be so bold, and these are currently the ones in charge of environmental offices.[22] It is hard to feel spiritual about nature when someone in a position of power over environmental policy hold views about nature that are

[21] http://thehill.com/policy/energy-environment/375148-pruitt-bible-says-harvest-the-natural-resources (shortened for the purposes of this section).

[22] A good reference here for a thorough examination of the issue is, William E. Connolly. Capitalism and Christianity, American Style. Durham: Duke University Press, 2008.

utterly archaic and morally bankrupt.[23] A common rebuttal here is to defer to the Papal Encyclical *Laudato Si'.* And it's a good response. I won't explore this further here, but I think *Laudato Si'* is— for those who wish to handle the ecological question in theological or spiritual terms— a good way to re-tell and transform the narrative about religion and nature. But again, the problem at least in these United States, is that those inclined to vote on religious grounds or for candidates of an apparent Christian background, are unlikely to be voting for an ecological candidate when they do so.

I found some consolation along these lines in another book I sourced at the Andrews Headquarters Library. In "Sojourning: A Specific Wayfaring Metaphor Related to Environmental Ethics"[24] the authors ask, "Is it possible, in the face of complexity and uncertainty, to construct theory and practices that are mindful?" (6th World Wilderness Congress Proceedings, 2000, 71).

> Perhaps as we stand along the edge, like a sojourner, who has lived among multiple places and peoples and can no longer claim one singular identity, we will sense the tensions, the paradoxes, the possibilities, and the ongoing rhythms necessary to live in multiple worlds and layers. (Fox, et al: 2000)

I feel like I have done this at the Andrews. I lived here, I observed, I participated. But there is a larger point. I think this essay from "way back" in the 2000's is ahead of its time in embracing the fact that the emphasis in environmental literature on sense-of-place writing fails to recognize the extent to which so many people can't expect to stay in one place their entire life, or to keep one career in one location for its duration. Many of us, though not all, are more

[23] Update, July 2018. It makes no difference that Pruitt is gone. His replacement is equally lacking of any ecological sensibility, knowledge, or concern.

[24] Karen M. Fox, Gordon Walker, Leo H. McAvoy. Personal, Societal, and Ecological Values of Wilderness: Sixth World Wilderness Congress Proceedings on Research, Management, and Allocation, Volume II. USDA Rocky Mountain Research Station-P-14. July 2000, pp. 71 – 76

transitory in our dwelling than stationary. In any case, it also glosses the "visiting" that Dickinson poetically describes. If visiting can become sojourning, and scientific philosophy can tell enough stories to become not just ecological but political, perhaps we don't need to think we are doomed. How do we do that? Below, a list of three resonant excerpts from the piece that speak back to some of the moments from this essay, offer some direction for the integrated-pluralistic, transformative story-telling capacity of ecological work, and remind us about what to resist.

- A sojourner travels lightly, resides temporarily in an area, learns from others, and shares talents and energy. A sojourner has the time and inclination to connect viscerally with the world around him or her. […] Sojourning is chosen as a metaphor to suggest […] there is a willingness to learn and change. (Fox et al: 2000, p. 72)

- What the sojourner is, is contingent, changing, and finally, simply an analytic distinction. (Fox et al: 2000, p. 72)

- Harm or trespasses originate when individuals or societies conceive and live their partial understanding as if it were a universal. (Fox et al: 2000, p. 72)

So, why is it important that I went to the woods? I definitely didn't come here to forge my survival alone. I hope I did not merely visit. In closing, I hope this experiment in forms has accomplished three things: 1) reminded us that philosophy's past anticipated current trends in natural science, and thereby also laid groundwork for a transformative, integrated thinking that is a crucial component of all ecological research, 2) demonstrated ways in which exploring and experimenting with the boundaries of our disciplines can reveal the depth of our experiences in and with nature, with one another, 3) advocated for story-telling as more than an appeal to the power of creative writing. Story-telling to my mind can assume a wide variety of forms,

including political action. This is a direly needed way of taking control of a narrative, of compelling people to grasp the import and consequence of environmental research beyond the legacies of universalizing certitude and conquest.

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