

ANIMAL, VEGETABLE, MINERAL: ETHICS AS EXTENSION OR BECOMING?

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Thinking of the animal-as-non-human is an idea that does not solely belong to a myopic yet ameliorable moment of Western philosophy's past. It is central to, even constitutive of that past. It remains characteristic of its present and will likely dominate the character of philosophy—of thinking's—foreseeable future. My contention is that thinking-difference has not, and cannot happen because of thinking-the-animal, and this is precisely due to the conceptual companionship that animality has played between the human and the non-human. This paper explores thinking otherwise-than-animality through the activation of the Deleuzo-Guattarian concept of becoming-plant. Plant life is genuinely heterogeneous to animal life. In this paper I explore the complex phenomenon of plant communication. Thinking through and activating the vital difference expressed by plant signalling can play a role in the activation of real difference in thought, not merely its companionable extension.

1. The Diagnostic: “The First Animal After Humans”

In the course of the past thirty or so years, an enormous quantity of work in philosophy and science has been devoted to remedying an ostensible lacuna in Western philosophy: the exclusion of the animal. I strenuously resist that premise with a three-fold gesture.

Thinking-the-animal is not, in fact, missing from but rather saturates Western philosophy. The tradition has certainly posited and inserted an “abyssal difference” between the human and the animal. One need only recall the polemical Cartesian claim that animals are mere clocks. But, what is much more interesting and subtle to notice is that same tradition has created and sustained for animality a unique proximity to the human which is especially *non-abyssal*. From antiquity through to the present, the concept of “the animal” has played the lead and proximate role for marking, conceptually, what

differentiates “the human” being from every other being.¹ Here is a common refrain: “Dolphins have been declared the world’s second most intelligent creatures after humans, with scientists suggesting they are so bright that they should be treated as “non-human persons.” Studies into dolphin behaviour have highlighted how similar their communications are to those of humans and that they are brighter than chimpanzees.”² “The animal” has been perennially conceived and deployed in philosophy as *what we are not*: the *non-human*. Efforts to conceive or to know or to express the animal through or adjacent to the human, or, to conceive or know or express the human through or right next to the animal—through the genius of analogy, resemblance, and of teleology, through form and function—has produced a very stable, hierarchical scaffolding with *the animal*; like the ontological family pet—always there, right beside us, if a little lower.

Has this privileged conceptual placement been “good for animals”? In general, no. Not when one squares up to the facts of loss of habitat and species, of industrial meat, or zoos and the lives of billions of lab animals. Sometimes an extraordinary member of a type gets noticed and receives a better life and some notoriety: Lassie, or Kisi the grey parrot, or Kanzi the Bonobo. But even here, the best these exemplars can do is place a strong second to us. Even among some of the heroes of animal moral standing for animals we find this ranking happening. For instance, after a long and careful working out of the equal inherent value of all subjects-of-a-life, and the equal *prima facie* right of animals not to be harmed, Tom Regan states rather baldly, “Death for the dog, in short, though a harm, is not comparable to the harm that death would be for *any* of the humans.”³ Regan claims that this outcome is not in conflict with the principles he has worked hard to ground, and he goes on to do a fancy bit of utilitarian shell-gaming to make that ranking stick. Peter Singer

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¹ “The machine” has also played this critical, antithetical role, yet without the range of contrasts and fine-detail available within the animal series. Of course, these two antitheses have on occasion been blended as in René Descartes, “Animals are Brutes,” in *Discourse on the Method* (New York: Cosimo, 2008).

² Jonathan Leake, “Scientists Say Dolphins Should be Treated as ‘non-human persons,’” *The Sunday Times of London*, 3 January 2010. [<http://journalisted.com/article/189fe>]

³ Tom Regan, *The Case for Animal Rights* (Berkeley and Los Angeles: University of California Press, 1983), 324; my emphasis.

practically guffaws at the attempt to level the moral playing field beyond subjects-of-consciousness, declaring outright: "...and we can pass silently by [Paul] Taylor's even more extraordinary claim, that we should be ready not merely to respect every living thing, but that we should place the same value on the life of every living thing as we place on our own."⁴ In making this gesture, I am hoping that what catches our attention for a change is not the strength or weakness of these arguments but the need for "animal heroes"—exceptionals—to deploy them. That, and the fact that humans come out on top even among those with an attested high degree of discomfort with that very outcome, as well as those publically committed to changing it.⁵

Has this thought-scaffolding been "good for other forms of life," or could it be, if we keep trying to extend in the direction of, say, invertebrates and green things, *i.e.* plants? No. Plants—just like the notion of "the environment"—have certainly been relegated to vague background roles or "milieu." Except for Aristotle, they have rarely appeared in 2500 years of thinking and writing philosophy. We live out that gesture of our minds, in our imaginaries and in our everyday set-ups. Just think about your typical natural history museum visit: the ancient, giant *Equisetum spp.*, the ferns, and the freaky angiosperms are the hundred-million-year-old leafy props against which the drama of the dinosaurs, the Stone-Age man, and then the Woolly Mammoth and its disappearance, plays out. And this drama is replayed in the fables that restorationist biologists are now telling about the most desirable moment to "return to": the one just before-humans; the time of the reign of those great Woolly beasts.⁶ Notice that the animal again, even in the historical misanthropic imaginary, sits right next to us. Notice that we are able to see, and are willing to be shown, that we humans start as alligator-like creatures crawling up out of the Devonian mud, from water to air, or, as bird-like beings flopping down from the air onto dirt life, our musculatures and genes evolving, yet still trailing out behind us, connecting us to the fan-shaped Kingdom animalia, back through the reptiles and the birds and those great dinosaurs. That is what we are willing to see as our actuality. And though we know, intellectually, that we always have

⁴ Peter Singer, *Unsanctifying Human Life: Essays on Ethics*, (ed.) H. Kuhse (Oxford, U.K.: Blackwell, 2002), 319.

⁵ For a further exploration of this tension in contemporary art on animality, see Karen Houle, "Infinite, Indifferent Kinship," *C Magazine* (Toronto), vol. 107 (2010): 12–23.

⁶ Stephen Lovgren, "Woolly Mammoth Resurrection: 'Jurassic Park' Planned," *National Geographic News*, 8 April 8 2005. [http://news.nationalgeographic.com/news/2005/04/0408_050408_woollymammoth_2.html]

and always will live by grace of the oxygen produced by said plants, and are built from the very carbons of them, and run our entire global economy of the backs of that carbon, we are unable to think let alone live the novel and profound truths of *these* vegetal relations. This backgrounding of herbality—indeed of ecology—is directly linked to the foregrounding of animality. It is a gestalt operation.⁷

One last opening confession: I am not a *lover* of animals. I am a lover of philosophy. My real question is the following: Have these efforts of thinking-the-animal been good for thinking?

No. The animal-as-non-human does not actually belong to a sad, myopic, and ameliorable moment of Western philosophy's past. It is central to, and constitutive of that past: thinking-the-animal plays a critical and an exclusive role in "onto-stabilizing" a certain version of human life, including what questions and answers that human comes up with while thinking and the overall style of existence. And such a conception will likely dominate the character of thought's future, even in domains far from "animal philosophy," for we are speaking here not of the content of thought but of its very architecture. The saturation of Western philosophy by a particular concept of animality traps Occidental ethical and political thought into its stereotypic mental and practical behaviours: judgment, ranking, and remedial extension. Thinking-the-animal has not caused us to take up the difference that difference can, and should make, to thought and to action, to "inherited thinking, its presuppositions and its dogma."⁸

Nor could it. It has blocked, rather than enabled, thought's "engagement to the maximum perspective possible"⁹, and precisely because it has such an assured berth within the dominant modes and habits of thinking, imagining.¹⁰ To *think otherwise*, we have to strenuously resist the premise of the animal. One possible alternative route, which I will now explore, is to think *becoming-plant*.

⁷ Jan Zwicky, *Wisdom as Metaphor* (Kentville, NS: Gaspereau Press, 2003), 25, 45.

⁸ Jacques Derrida, "And Say the Animal Responded?" in *Zoontologies*, (ed.) C. Wolfe (Minneapolis: University of Minnesota Press, 2003), 122. See also Martin Heidegger's similarly expressed concerns about being "on the right track" in *Pathmarks*, (ed.) W. McNeil (Cambridge: Cambridge University Press, 2009), 248.

⁹ Robert Hurley, "Preface," in Gilles Deleuze, *Spinoza: Practical Philosophy*, (tr.) Robert Hurley (San Francisco: City Lights Books, 1988).

¹⁰ Even Deleuze and Guattari are blocked: "We must not attach exclusive importance to becoming-animal." (ATP, 248)

2. Making Heads or Tails of Plant Philosophy

There are not many of us doing vegetable philosophy. What could the philosophy of plants ask? Here is one possibility:

Richard Karban wrote a comprehensive literature review in 2008 entitled, “Plant behaviour and communication.” His overall concern, which in fact engages and inverts a claim made by Heidegger¹¹, is to argue that it is empirically and conceptually incorrect to say plants “react” whereas animals “behave.” This is what Karban writes in support of that conceptual correction and extension:

Plant behaviours are defined as rapid morphological or physiological responses to events, relative to the lifetime of an individual. Since Darwin, biologists have been aware that plants behave but it has been an underappreciated phenomenon. The best studied plant behaviours involve foraging for light, nutrients, and water by placing organs where they can most efficiently harvest these resources. Plants also adjust many reproductive and defensive traits in response to environmental heterogeneity in space and time.... Plant behaviours have been characterized as simpler than those of animals. Recent findings challenge this notion by revealing high levels of sophistication previously thought to be within the sole domain of animal behaviour.¹²

There are other examples I could provide. But we already know that the project of bringing plant life into the existing philosophical conversation is exactly that: a project of engaging philosophy on its own terms and subjecting “the plant” to those terms—terms of resemblance, difference as degrees from similarity of function, relevant functions and their relative value anchored by “the human,” and of hoping, as was the case with the animal, to find a common ground so that plants, (and plant philosophers) can be *taken seriously*. We already know with a high degree of confidence what the conceptual and material outcomes are of this line of thinking: for the status of plants in thought and in action (third place), for the status of the human by comparison (champions) *and* for likelihood of the enriching of philosophy under the pressures of this herbivorous line of inquiry (not likely).

¹¹ Martin Heidegger, *The Fundamental Concepts of Metaphysics: World, Finitude, Solitude*, (tr.) W. McNeill and N. Walker (Bloomington: Indiana University Press, 1995), 237.

¹² Richard Karban, “Plant Behaviour and Communication,” in *Ecology Letters*, vol. 11, n. 7 (2008): 727–39.

How might we think-the-plant and not end up onto-stabilizing ourselves while intellectually cannibalizing and domesticating them? Serendipitously, one discovers the concept of *becoming-plant* in Deleuze and Guattari's work, a relatively under-explored concept. Crucially, the concept is not *about plants* but about becoming. Let us recall what is meant by the concepts of becoming and becomings.

The concept of *becoming* and *becomings* appear throughout Deleuze and Guattari's *magnum opus*, *A Thousand Plateaus*. A concise and helpful statement is that "becomings are another power."¹³ A becoming is not a description of a property or feature of an entity or type so much as a description of an altered, scalar intensification—"the] tak[ing] on of certain relations of movement and rest" enabled as it enters "a particular zone of *proximity*" in a particular way. (ATP, 273) Crucially,

a becoming is neither one nor two, nor the relation of the two; it is the in-between...the block of becoming that unites the wasp and the orchid produces a shared deterritorialization: of the wasp, in that it becomes a liberated piece of the orchid's reproductive system, but also of the orchid, in that it becomes the object of an orgasm in the wasp, also liberated from its own reproduction. (ATP, 293)

Becoming is the name for this provisional co-creative zone in which the "parties" and their "proper functions" are themselves effaced and augmented.

Deleuze and Guattari named different kinds of becomings: becoming-woman and becoming-child; becoming-animal, vegetable, or mineral; becomings-molecular of all kinds, becoming-particles. What is meant by these? What is entailed by them? They tend to explain what these concepts mean through the example of becoming-animal. Does it have anything to do with actual animals like North Atlantic right whales or dogs? Are we to put on snouts and bark convincingly? No. Do we put on fins and learn to free dive? Maybe. Whatever these becomings involve, according to Deleuze and Guattari, they do not involve or lead us back onto finding their proper relative morphological positions along the Great Chain of Being by way of likeness and unlikeness: "Do not look for a resemblance or analogy to the animal, for this is becoming-animal in action, the production of

¹³ Gilles Deleuze and Felix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, (tr.) B. Massumi (Minneapolis: University of Minnesota Press, 1987), 239. Hereafter cited parenthetically in the text as ATP.

the molecular animal (whereas the “real” animal is trapped in its molar form and subjectivity).” (ATP, 275) Neither do becomings involve imitation or even conceptual proximity:

An example: Do not imitate a dog, but make your organism enter into composition with *something else* in such a way that the particles emitted from the aggregate thus composed will be canine as a function of the relation of movement and rest or of molecular proximity, in which they can enter. Clearly this something else can be quite varied, and be more or less directly related to the animal in question: it can be the animal’s natural food (dirt and worm), or its exterior relations with other animals (you can become-dog with cats or become-monkey with a horse), or an apparatus or prosthesis to which a person subjects the animal (muzzle and reindeer, etc.), or something that does not even have a localizable relation to the animal in question. (ATP, 274)

Neither does becoming entail functionality. It is not about hoping for or accomplishing what we tend to hope for, or accomplish as types, like making babies or sitting in lotus position for a month in an Ashram. The “production of the molecular animal” (ATP 275) means the intensifications of a zone or bloc of life—proximities but not spatial, nor temporal nor even conceptual adjacencies—toward a particular configuration of movement and rest which *expresses* but does not *represent* a quality or qualities of animality, of animal-livings. This is crucial. Notice that the key features of extensionist thought outlined above: proximity as adjacency, resemblance and functionality are antithetical to *becoming*.

What then of *becoming-plant*? In principle, *becoming-plant* would involve our entering into composition—at the level of our bodies, or among our thoughts, ideas, and concepts—with *something else* in such a way that the particles emitted from the aggregate thus composed will be *vegetal* as a function of the relation of movement and rest, or of molecular proximity, in which they can enter. *Becoming-plant* is the emission of particles from a heterogeneous alliance we make that expresses the unique qualities of plants or plant-lives. These qualities would not, in principle, be the same qualities as those of women or women-lives; nor would they be those of canines, or of children and childhoods. Little attention has been paid to what these unique expressions of plant-livings might actually be. This should strike us as truly unfortunate if different becomings are indeed philosophically unique; that is to say, if they express unique logics, phenomenalities, conceptualities, values and imaginaries, and enable us to “enter into” proximity with a new range of thoughts and bodies.

In what follows, I proceed to articulate the unique bloc of *in-between* expressed by the phenomena of plant communication. My work is not intended to establish a truth about plants-in-general; about how the secret life of plants is cool; about how plant life is like or is not like human life, and to what degree; or even that plants are deserving of moral standing.¹⁴ This vegetal modalities of communication *expresses* a genuinely different, rather than nifty *vegetal-variation on*, our dominant modes of enacting communication. Thus it opens a conceptual space distinct from our dominant ways of thinking about what communication is and is in the service of. We want becomings to resonate, not just to register. The punch line is that the *teloi* or “self-realization” of plant communication is neither strictly individual nor even species-specific, but is accomplished in and through radical kinships, through a fantastically versatile and multi-directional capacity to harmonize a multiplicity of actions. The evidence suggests that becoming-plant involves a radical shift in perception, material connection or relationality among many heterogeneous components—an *unnatural participation*—and that thinking/perceiving this “unnatural participation” could free the powers of thought from the bad habits it developed through (over)thinking-the-animal.

3. Becoming-Plant-Communication

Research into plant communications (also called “plant signalling”) began in earnest in North America around 1983. Since then, there has been an explosion of research and peer-reviewed articles into the subject, appearing in every major scientific journal. All my sources for this paper are from work published in the past two years. The collection of plant signalling data and the discussions of the results have been framed by a predictable set of expectations and a predictable underlying ontology—teleology and Being. Those premises are revealed by these typical questions and answers about plant signalling:

- (1) *What* actually happens? Plants have a “volative profile” (VOC) which is a kind of chemical fingerprint. This is made up of possibly hundreds of different chemicals which it gives off in a resting state, and, when a plant is stressed (it is being eat-

¹⁴ By contrast with efforts such as: Christopher D. Stone, *Should Trees Have Standing?* (Los Altos: William Kaupmann, 1974).

en by bugs like aphids, or encroached upon by couch grass, or shaded or thirsty or even mechanically damaged) its volatile profile changes.

(2) *What is it?* A plant's immune response, since the new volatile chemicals attract natural enemies to the bugs that are eating it or the weeds that are encroaching upon it.

(3) *Why* would a plant "communicate"? In reaction to an alien invasion, as a protective mechanism. This chemical shift comes at an energy cost to the plant, so even if the individual plant is sacrificed, the mechanism serves to increase the reproductive fitness of its type: kin selection.

(4) *Which direction* does signalling move? From the inside of individual plants, and outward according to the natural law that "requires it to grow and develop itself on all sides, according to the tendency of the inward forces which make it a living thing."¹⁵

(5) *Where* does communication "happen"? On the surface of the leaf and flower cells by virtue of chemicals which have travelled through the air toward it.

If we stopped here those of us unfamiliar with this phenomenon might go away surprised and impressed by the fact that plants have a "self-defence system"¹⁶ and a capacity to communicate.

But consider the following statement by the leading scientists in the field, Heil and Karban:

...there are theories at hand that could explain the evolution of emitting airborne signals but there is a lack of empirical data to test them. It is known empirically that plants can perceive VOCs but there are no theoretical models to understand the evolutionary origin of this capacity, neither is it known how volatiles are perceived and translated into signals. Even after accepting plant-plant signalling via airborne cues as a physiological possibility, many researchers have doubted its ecological relevance...¹⁷

¹⁵ John Stuart Mill, *On Liberty* (New Jersey: Prentice-Hall, 1956), 72.

¹⁶ Richard Karban and Kaori Shiojiri, "Self-Recognition Affects Plant Communication and Defense," *Ecology Letters*, vol. 12, no. 9 (2009): 502-506.

¹⁷ Martin Heil and Richard Karban, "Explaining Evolution of Plant Communication by Airborne Signals," *Trends in Ecology and Evolution*, vol. 25, no. 3 (2010): 137-44, here 142.

I am going to walk us through six observations which help us to understand the bewilderment expressed by Heil and Karban. I will point out the starting (ontological) premises and then state the more viable premise implied. Taken together, these begin to express plant-becoming.

A. At the Level of “the Individual” Plant, and Communicating Outward?

There are two pertinent observations that contest the view that plants are isolated types reacting outward to other plants.

First, it turns out that the chemical profile of a plant is often entirely unique to *that individual plant*. There does not seem to be a simple or generic “chemical fingerprint” associated with, say, barley or corn in general. “All plants release volatile chemicals, and the chemical profile from different plants is different and can be specific to that plant.”¹⁸ This observation complicates the fundamental claim that, in signalling, a plant is acting as a genetic type in the service of kin selection.

Second, even a given individual plant’s volatile profile changes in different ways depending on what kind of stress it endures: if it is mechanically attacked it gives off a “wound signal.” If it is attacked by an insect, another type of signal. Another kind of insect: yet another.¹⁹ This forces us to attend to the fact that individual plants are continuously co-evolving *with*, and *in*, varying environmental relations that are themselves evolving. This puts pressure on the idea that plants are not in any meaningful way beings at a distance from an externality which is configurable as alien, against which they need immunity (vegetal versions of negative rights), but rather are always already *in* and with *fluid relations* beyond themselves: in inter-being.

These observations put pressure on the possibility that individual plant organisms are embedded singularities, or, put otherwise, that the most real and basic indivisible units (or bodies) of finite existence are what Spinoza called “modes,” “particular things that actually exist”²⁰—each with its own nature—rather than types or essenc-

¹⁸ Sarah Y. Dewhirst and John A. Pickett, “Production of Semiochemical and Allelobiotic Agents as a Consequence of Aphid Feeding,” *Chemoecology*, vol. 20, no. 2 (2010): 89–96, here 89–90.

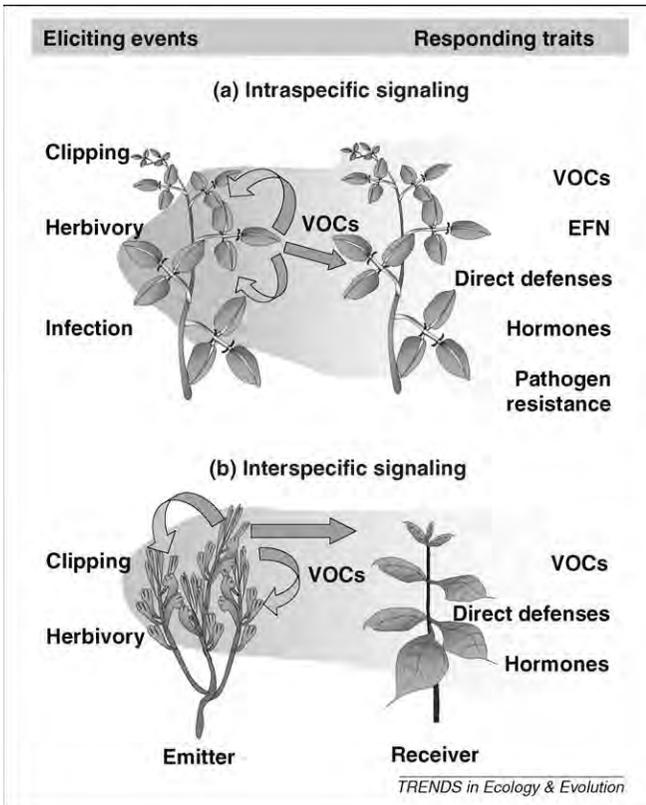
¹⁹ *Ibid.*, 90.

²⁰ Spinoza, *Ethics*, (tr.) by G. H. R. Parkinson (Oxford: Oxford University Press, 2000), Part II, Prop. 9.

es²¹ and that these singularities are, by necessity, fully immersed in, constituted by, and constituting, a milieu.

B. Communication among Blood Relations?

Across dozens of examples²² we see that *one kind of plant* ("plant A") experiences one kind of stress (x), and its VOC signals to an *entirely different (genetically unrelated) kind of plant* ("plant B") which enables the second plant to do something that improves its success: mount a defense against some further kind of stress (y) including something as amazing as the second plant changing its rates of seed germination.



Source: Heil and Karban (2009), 139.

²¹ *Ibid.*, def. 1–7.

²² See Table 1 called "History of research on airborne plant-plant signalling" in Heil and Karban, "Explaining Evolution," 138.

This is an example of the mechanism: Sagebrush plants cut. Give off volative chemical. Induce resistance in wild tobacco to grasshoppers and cutworms.

Conceptually, we are already talking about communication between neighbors and not blood kin. This still goes by the name plant-plant signalling but it changes the story we can tell quite radically. "Data from at least two systems...demonstrate that being related is not a prerequisite for communication."²³

C. *Between* Plants: Dyadic "Mutualisms"?

What I have just underlined about inter-plant relations is nothing new from an ecological perspective. Ecology does not presume individuals or isolated species but sets of context-specific life forms that have co-evolved into a variety of partnerings: *predator-prey*, *mutualistic*, *commensalistic*, *opportunistic*. These name the combinations and permutations of benefits and costs across a given non-related pair. Interspecific (plant A – plant B) signalling default to the presumption that these are *mutualisms*. Hossaert-McKey *et al.* weigh in: "As in many other interspecies interactions, chemical signals are suspected to be important in the functioning of these mutualisms."²⁴ "Mutualisms are cooperative interactions between species, in which each partner benefits from the association."²⁵ Let us focus on the words *between* and *partner*, "*sur la proposition deleuzienne: 'entre'* [on the Deleuzian proposition: 'between.']"²⁶ Consider the case that Deleuze and Guattari loved to talk about, one of their "*métaphore végétale*": the orchid–wasp pairing. The wasp–orchid is a prototypical mutualistic *partnering*: a plant (flowering, often then fruiting) and an insect or an animal (a wasp, a bat). The plant "offers" the wasp a place to lay its eggs and a ready-to-hand snack when the larvae hatch (the fruit). The insect "offers" the plant dispersal of pollen, sometimes directly and sometimes indirectly through further "parasites and predators associated with these mutualisms." (FS, 75) Whatever the mechanism, "...each *partner* depends *directly* on the

²³ *Ibid.*, 142.

²⁴ Martine Hossaert-McKey *et al.*, "Floral Scents: Their Roles in Nursery Pollination Mutualisms," *Chemoecology*, vol. 20, no. 25 (2010), 75–88. Hereafter cited parenthetically in the text as FS.

²⁵ J. L. Bronstein, R. Alarcon, and M. Geber, "The Evolution of Plant–Insect Mutualisms," *New Phytology*, vol. 172, no. 3 (2006), 412–428.

²⁶ Arnaud Villani. *La guêpe et l'orchidée: essai sur Gilles Deleuze* (Paris: Belin, 1999), 9.

other for its reproduction.” (FS, 75; my emphasis) In some cases “these mutualisms are quite specific: each partner depends *exclusively*, or at least partially, on the other for its reproduction, enforcing tight physiological co-adaptation.... [P]lant and pollinator have evolved extraordinary reciprocal specificity, often approaching one-to-one obligate specificity.” (FS, 76; my emphasis) What these explanations suggest is that, even though plants, insects and animals *are* parts of larger, complex and dynamic blocks of vitality, within that, nevertheless, there are tight (exclusive, monogamous) interspecies couplings or dyads. This view conceives the dyad as if an isolated “individual” and the pairing as if having a central and identifiable function: that pairing in perpetuity.

Another overly-quick glance might suggest that is the end of the story. It is not. The details of these so-called *pairings* suggests that whatever is going on *between* plants is not so simple, not so “exclusive”. For how, exactly, are these ostensibly exclusive dyadic offerings made to one another, and the couplings cemented? By a third agent.

In many cases that third agent is a “flower volatile,” a chemical signal. A perfume. Studies of the chemical profiles of these signals reveal a mind-boggling array even in a controlled environment like a greenhouse where one finds only a few species, not entire natural ecosystems. A flower volatile is by no means a one-note spritzing aimed directly at a single wasp but something almost unfathomably complex both in what it is and what it has to do. On the one hand, flower volatiles must be able to “maintain[] the specificity of pollinator attraction [and] signal[] the appropriate phenological stage for pollinator visit.” (FS, 75) Furthermore, “the scent signal emitted by the host plant must be specific, to attract its specific and obligate partner.” (FS, 76) These specific and obligate partners are not just hanging around the right neighborhood: they are dispersed, and plenty of other possible suitors are nearby. The successful encounter of the host plant and its mutualist insect therefore also requires a very strong signal. “The signal emitted by the plant and the capacity of the insect to detect the message...must be strong and precise enough to extract ‘signal’ from ‘noise.’”²⁷ For these reasons, the scent emitted by the host plant and perceived by the insect should contain not only information about the specific identity of the plant, but also

²⁷ Robert A. Raguso, “Olfactory Landscapes and Deceptive Pollination: Signal, Noise and Convergent Evolution in Floral Scent,” in *Insect Pheromone Biochemistry and Molecular Biology*, (ed.) G. J. Blomquist and R. Vogt (New York: Academic Press, 2003), 631–50.

on its developmental stage, particularly information about whether or not the plant is receptive, i.e. ready to be pollinated and thus has the right resources to offer.

Scientists write of this (ostensibly) third's role: The "transfer of information about resources opens up a large number of questions. How is specificity of the signal achieved? Moreover, once specificity is achieved, how do plant-pollinator relationships change, how do they diversify?" (FS, 85) A simple signal (combined with a fine sensitivity for this compound in the pollinator) may be an isolated adaptive peak, whereas a more complex signal offers more possibilities for change. As increasing numbers of associated species adapt to exploit the resources exchanged by mutualists, are mutualist pairs that are locked into a simple signal unable to shift, whereas those that use more complex signals can respond more easily to such pressures? Could it be that if they appear, simple-signal systems may relatively quickly disappear, rather than leaving descendant lineages?

What I think we learn here is that dyadic view of mutualisms underplays and oversimplifies the truths of the critical sophisticated and still-largely-not-understood agency of other elements, in this case the inorganic. When we really focus on this feature of the so-called *partnering*, we discover that whatever is going on *between* two kinds of plants is neither simple nor *in-between*. These "simple perfumes" "may be the 'silk' that holds together the complex web of interactions..." (FS, 85) Organic compounds—the non-living—is an *actant* in a complex interaction and not merely a background or vehicle for the interaction of a couple. "...as soon as we stop taking nonhumans as objects, as soon as we allow them to enter the collective in the form of new entities with uncertain boundaries...it is not hard to see that we can grant them the designation of actors."²⁸

D: Still Other Others: *Alliance*, not *Filiation*

Here are four known non-dyadic systems with alliances across kingdoms:

- (1) There is a beetle which eats maize. When attacked by these beetles the root systems of the maize emits a chemical which

²⁸ Bruno Latour, *The Politics of Nature: Bringing the Sciences into Democracy*, (tr.) C. Porter (Cambridge: Harvard University Press, 2004), 76.

attracts a nematode. This nematode eats the maize root-worm.²⁹

(2) There is an aggressive grass which induces defence in barley. When the roots of barley are stressed by the grass they emit a chemical which reduces the number of aphids which land on the barley.³⁰

(3) There is an ant which attacks acacia. When attacked, the acacia emit a chemical which attracts or increases the population of bacterial associates.³¹

(4) There is a bacteria on the tobacco plant which communicates with other bacteria by releasing a lactone (AHL). This lactone increases resistance of the tobacco to a certain caterpillar.³²

In this fourth case, Heidel *et al.* conclude this: “Our results demonstrate that AHL can affect herbivore resistance, although it is *not clear whether this is a direct or an indirect effect.*”³³

What is happening here? Our concepts of individuals and dyads implode when we admit that “...plants manage simultaneous interactions with diverse organisms.”³⁴ The idea that *communication* is initiated within a two-some by virtue of some force or impulse contained within one of these beings, implodes. The story that these thirds are indirect, accidental and incidental, implodes. The range and variability of these mechanisms shatter the confidence in our

²⁹ Ivan Hiltpold, Stefan Toepfer, Ulrich Kuhlmann and Ted C. J. Turlings, “How Maize Root Volatiles Affect the Efficacy of Entomopathogenic Nematodes in Controlling the Western Corn Rootworm?,” *Chemoecology*, vol. 20, no. 2 (2010): 155–62.

³⁰ Dewhirst and Pickett, “Production of Semiochemical and Allelobiotic Agents as a Consequence of Aphid Feeding,” *Chemoecology*, vol. 20 (2010): 89–96. See also Glinwood *et al.*, “Change in Acceptability of Barley Plants to Aphids After Exposure to Allelochemicals from Couch-Grass (*Elytrigia repens*),” *Journal of Chemical Ecology*, vol. 29, no. 2 (2003): 261–74.

³¹ Martin Heil, Domancar Orona-Tamayo, Sascha Eilmus, Stefanie Kautz, and Marcia Gonzalez-Teuber, “Chemical Communication and Coevolution in an Ant-plant Mutualism,” *Chemoecology*, vol. 20, no. 2 (2010): 63–74.

³² Andrew J. Heidel, Oz Barazani, and Ian T. Baldwin, “Interaction Between Herbivore Defense and Microbial Signalling: Bacterial Quorum-sensing Compounds Weaken JA-mediated Herbivore Resistance in *Nicotiana attenuate*,” *Chemoecology*, vol. 20, no. 2 (2010): 149–54.

³³ *Ibid.*, 152.

³⁴ Gail M. Preston, “Plant Perceptions of Plant Growth-Promoting Pseudomonas,” *Philosophical Transactions: Biological Sciences*, vol. 359, no. 1446 (2004): 907–18, here 913.

classic x-y narratival axes of: *direct versus indirect, origin versus outcome, organic versus inorganic, kin versus alien.*

E. Harmful or Beneficial?

What about that other forceful prong of function: the premise of *benefit*? That “...each partner depends directly on the other for its reproduction?” (FS, 75)

There are *many interspecies cases* where there are no obvious positive fitness consequences to the “emitter” at all, let alone a short jump of benefits followed by detriment. There are many instances where attacked con-specifics *warn* neighbors without getting anything “back” for it. Airborne signals usually improve the resistance of the receiver, but without obvious benefits for the emitter, “thus making the evolutionary explanation of this phenomenon problematic.”³⁵ What we often seem to have is a unidirectional inter- and intra-species, and even intra-kingdom, signalling system. “Communication between plants can produce large effects in terms of induction of putative defensive chemicals as well as resistance to herbivores, although it is not clear at this time that either of the plant species tested benefit from this communication.”³⁶ Recall the model case of the sagebrush and the tobacco. The tobacco experiences enhanced protection against a bug (herbivore) that does not even negatively affect the first plant, the sagebrush, and which was not the stress factor that precipitated the chemical emission by the sagebrush. We see this also between ostensible plant-insect mutualisms: “The purpose of this chemical communication from cotton plants to wasps is presumed to be to allow the predatory wasp to more easily obtain the location of its preferred prey—one of two types of parasitic herbivores feeding on the cotton plants” and,

The communication system studied here [nine chemicals, complex syntax], could have evolved to save the wasps energy in finding the right plant to land on. However, the advantage to the cotton plant is less clear as the wasp does not destroy the herbivore immediately (using the herbivorous host for egg laying) so that

³⁵ Heil and Kargan, “Explaining Evolution,” 137.

³⁶ Richard Karban, I. T. Baldwin, K. J. Baxter, G. Laue, and G. W. Felton, “Communication Between Plants: Induced Resistance in Wild Tobacco Plants Following Clipping of Neighboring Sagebrush,” *Oecologia*, vol. 125, no. 1 (2000): 66–71, here 70.

the herbivores remain feeding on the cotton plant for some time after the chemical signalling.³⁷

These cases loosen the grip on the beneficiary-functionalist premise of mutualism, at least if we restrict our definition of “benefit” to reproductive purpose.

F. *Where? Above or Below? Territories or the Rhizosphere*

A further twist occurs when we learn that while “[m]ost initial studies concentrated on the role of above-ground volatiles”³⁸ plants, in fact, communicate intra- and inter-specifically through other media than air and in different regions than the above-ground. Chemical signals travel underground. “[T]he connections of unrelated plants underground via mycorrhizal networks might be a major thoroughfare by which information is exchanged in plant-plant interactions.”³⁹ A recent study designed to control for above-ground transmission confirms the rhizosphere—the full body of the Earth—to be a major zone of signalling.⁴⁰ Where were we looking?

Naturally we presumed that communication needs ears—human or canine—that pick up vibrations and air to carry vibrations into it, and noses that pick up olfactory cues and eagle eyes that receive light and especially mouths, palates, tongues and uvulae to utter sounds- if not words then sound-signals. And that if real communication happens, it will be between and across beings with those parts and those who live in the area of the biosphere we inhabit: in air, above ground, out of water: territories. Yet plants enjoy the inhabitation of two distinct zones: the sky part and the earth part. Plants enjoy a relation to touch that we do not, by virtue of their slow straddling two elemental zones: the earth and the air. As air-breathers they can connect up with anything in that sphere. As earth-touchers, they can connect with anything in that sphere. And possibly enjoy qualities and freedoms of movements—passions—not

³⁷ Laurance R. Doyle, “Quantification of Information in a One-Way Plant-to-Animal Communication System,” *Entropy*, vol. 11, (2009): 431–42, here 441.

³⁸ Marcel Dicke, Anurag A. Agrawal and Jan Bruin, “Plants Talk, but are They Deaf?,” *Trends in Plant Science*, vol. 8, no. 9 (2003): 403–405, here 403.

³⁹ *Ibid.*, 404.

⁴⁰ Heidel, Barazani, and Baldwin, “Interaction between herbivore defense and microbial signalling,” 151, Fig. 1. AHL treatment in WT plants weakened resistance against *M. sexta* compared to untreated WT plants demonstrating an effect of belowground microbial signalling on aboveground plant-herbivore interactions.

available on the surface. “Touching is hidden away...beneath the earth.... In the damp, soft warmth some contact would persist...If it does not die completely, it is because it remains still under the earth.”⁴¹ Irigaray admonishes us: “We need to...remember or learn about the role of movement in the passions...all forms of passively experienced passions in which the subject is enclosed, constrained, deprived of its roots, whether vegetal and earthly or ideal and heavenly. Sap no longer circulates between the beginning and the end of its incarnation.”⁴² Plants could remind us of our passions because they express differently. And fish as well, living in another range to emit and receive within. And cormorants, air and water. Fetuses, water then air. Bacteria, every possible zone, and in motion and rest.

If “signalling” is happening through any and all chemical and mechanical means, then that means that it is happening in any and all in-between: wherever and whatever gives (“emits”) and receives chemical, mechanical, photovoltaic, and kinetic “particles” (to use the term Deleuze and Guattari like to use). The elemental planes—earth, air, fire, water—are not incidental to communication, a background environment for communication to happen within or on. They are actants.

Conclusion: Becoming-plant?

Let us assemble our lacks: a lack of evidence confirming that improved fitness is the “point” of communication; an inability to confirm that growth or reproductive functions are served by communication, or at least the growth and reproduction of individual beings or types; an inability to localize “the communication” to direct signals within a dyadic unit; an inability to account for the permanent and varied role of organic and inorganic “thirds” in every communication mechanism; and the lack of sampling through all possible strata of communication. Expressed at the intersection of what plant signalling *might not be* is *becoming*. Deleuze and Guattari write: “Becoming is not an evolution, at least not by descent and filiation.... It concerns alliance.... If evolution includes any veritable becomings, it is in the domain of symbioses that bring into play beings of totally

⁴¹ Luce Irigaray, *Elemental Passions*, (tr.) K. Collins and J. Still (New York: Routledge, 1992), 33. Thanks to Andrew Robinson for pointing out this reference to me.

⁴² Luce Irigaray, *An Ethics of Sexual Difference* (Ithaca: Cornell University Press, 1993), 72–73.

different scales and kingdoms, with no possible filiation..." (ATP, 238)

Thinking plant-thoughts shoves us toward the concept of "the assemblage." The assemblage is not a unit of analysis in the sense of a stable physical entity with a particular form and having one or two particular components and one or two dominant functions. Rather it is a description of the quality or intensity of collectivity: an expression of the "unholy alliance" Nature is capable of:

It is quite simple; everybody knows it, but it is discussed only in secret.... Unnatural participations or nuptials are the true Nature spanning the kingdoms of Nature. This involves terms that are entirely heterogeneous: for example, a human being, an animal, and a bacterium, a virus, a molecule, a microorganism. Or in the case of the truffle, a tree, a fly, and a pig; these combinations are neither genetic nor structural; they are inter-kingdoms, unnatural participations. That is the only way Nature operates – against itself.... These multiplicities with heterogeneous terms, co-functioning by contagion, enter certain assemblages. (ATP, 241–42)

Whatever plants are really up to when they "signal," this analysis aims to have opened us "...to the idea...that the elements of the different individuals we compose may be nonhuman *within* us. What we are capable of may partake of the wolf, the river, the stone in the river."⁴³ Becoming-plant is a unique becoming, a unique field of forces *qua* idea or *qua* thing.⁴⁴ Thinking plant-becomings loosens the grip of the tyranny of form and function. It also loosens the tyranny of the narratives that include the tendency to conceive of lower functions as if in the service of higher ones as well as the tendency to think of distant things as in the service of proximate ones. This has massive political and ethical implications. It opens up thinking about relations as transient alliances rather than strategies. It credits the accomplishment of identity and intimacy as a *radically collective achievement*, crossing faculties, bodies, phyla, and even the most basic cut we so confidently declare: the organic and the inorganic. "Plant communication" expresses the unthinkably complex web which holds together what things are, what they are trying to be-

⁴³ Hurley, "Preface," ii–iii.

⁴⁴ "To every idea there corresponds some thing, and to every thing, an idea." Gilles Deleuze, *Expressionism in Philosophy: Spinoza* (New York: Zone Books, 1992), 116.

come and unbecome: “by life we mean self-nutrition and growth and decay.”⁴⁵

Perhaps most importantly, “plant communication” re-describes the accomplishment of life itself—*becoming* rather than *growth*—whether in thinking or in extension; in other words, that which can happen not within a successfully managed organic encasement of what a thing is (its Being, its progeny), but as that which happens by virtue of *a certain unfaithful power of connectivity*.

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⁴⁵ See Aristotle, “De Anima,” in *The Complete Works of Aristotle: The Revised Oxford Translation*, Volume 1, (ed.) J. Barnes (Princeton: Princeton University Press, 1986), 412a14.