

Re-enchanting Biology: how does a root grow when we decide to look at it?

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ABSTRACT – Re-enchanting Biology: how does a root grow when we decide to look at it? How does a root grow when you decide to look at it? This has been one of the questions that has posed a quest to re-enchant biology. This search is not based on a sequence of previously determined steps, but on the possibility of experimenting with the scientific knowledge introduced in the discipline of biology. The need to re-enchant assumes a disenchantment, this one produced by the hierarchy of species in evolutionary stories told even before they happen. Fragments of the Botanical Experimentation course are brought to give clues on how to create a body without organs and how this makes it possible to shuffle the senses so that biology is reinvented.

Keywords: Biology and Art. Botanical Experimentation. Body without Organs.

RESUMO – Reencantar a Biologia: como cresce uma raiz quando decidimos olhar para ela? Como cresce uma raiz quando se decide olhar para ela? Essa tem sido uma das perguntas que tem proposto uma busca para reencantar a biologia. Essa busca não está calcada em uma sequência de passos previamente determinados, mas sim na possibilidade de experimentar com o conhecimento científico posto na disciplina de biologia. A necessidade de reencantar assume um desencanto, esse produzido pela hierarquia das espécies em histórias evolutivas contadas antes mesmo de acontecerem. Fragmentos do curso Experimentações Botânicas são trazidos para dar pistas de como se cria um corpo sem órgãos e como isso possibilita embaralhar os sentidos para que se reinvente a biologia.

Palavras-chave: Biologia e Arte. Experimentações Botânicas. Corpo sem Órgãos.

First Words

Our proposal, in this text, is to present the intensities of the experiments that took place during a course promoted by the Líquen Projeto¹, entitled Botanical Experimentation. In this course, we gave presentations on the biology of roots and, while we were waiting for them, we created some exercises that were intended to light up our eyes and senses as we experimented with their growth. For this purpose, each course participant collected plant cuttings and placed them in a glass bottle with water, so that photographic records and observations during the process were possible. A notebook was requested during the process in which the participants' exercises and notes would be taken.

We start from the need to find new possibilities of being in the world, to create other relationships with nature, which includes us, and to challenge ourselves to awaken other senses. Taking a step back, this need arises from an environmental scenario designed above all by human actions that have intensified the planet's climatic processes. The climate changes or emergencies that are underway bring a new challenge of how to be in the world and how to create new relationships that allow us to actually inhabit a world together with other species. The question posed is how to live together and create another ethics from this coexistence.

Thus, as biology professors, we assume an urgency prior to discussions on teaching biology, which is to question the following: what kind of biology is this that we teach? It is in this sense that, even before talking about strategies, teaching methodologies or possibilities for innovating it – which has already been widely discussed in research – we want to take this step back. Our decision is not arbitrary, as we base ourselves on the fact that our understanding of biology has reverberations in the formation of social textures and in the ways we relate to other species.

If we are questioning biology here, it is because we are immersed in a landscape globally marked by climate emergencies that is locally connected with such biopolitical issues as homophobia, misogyny, xenophobia, racism, environmental degradation, production of vulnerability. We cannot lose sight of the fact that, when we talk about an environmental crisis like the one we are going through, it becomes urgent to look at our relationships with nature, but without forgetting that we are nature too. If, as an assumption for this crisis, human actions have been seen as intensifying the planet's natural climatic processes, it is urgent to cast new eyes on the background that sustains such a crisis.

Therefore, at the same time that climate change points out its urgency and makes the need to mitigate its traces equally urgent and, as Guattari (2017) says, to understand it beyond its technical aspects, it is necessary to adopt a broader understanding that it is not confined to natural resources. Precisely for this reason there is no simplistic solution, we need to feel for ways, in the face of uncertainties and things that move out of scale, which puts us before the unpredictable, posed by Danowski and Viveiro de Castro (2017): we do not know what to expect.

It is because, faced with the intrusion of Gaia (Stengers, 2015), we are left to grope for small possibilities of new encounters, because “[...] To name [Gaia] is not to say what is true but to confer on what is named the power to make us feel and think in the mode that the name calls for” (Stengers, 2015, p. 48). In such a way that this puts us in front of other possibilities of feeling with this intrusion and “[...] to characterize her as blind to the damage she causes, in the manner of everything that intrudes. That is why the response to create is not a response to Gaia but a response as much to what provoked her intrusion as to its consequences” (Stengers, 2015, p. 48). Which implies to say that such an intrusion can never be seen disconnected from what produced it: the expansion of capitalism and its capillarization in a network, as stated by Stengers (2015, p. 52, emphasis in the original).

Gaia is ticklish and that is why she must be named as a being. We are no longer dealing (only) with a wild and threatening nature, nor with a fragile nature to be protected, nor a nature to be mercilessly exploited. The case is new. Gaia, she who intrudes, *asks nothing of us*, not even a response to the question she imposes. Offended, Gaia is indifferent to the question ‘who is responsible?’ and doesn’t act as a righter of wrongs – it seems clear that the regions of the earth that will be affected first will be the poorest on the planet, to say nothing of all those living beings that have nothing to do with the affair. This doesn’t signify, especially not, the justification of any kind of indifference whatsoever on our part with regard to the threats that hang over the living beings that inhabit the earth with us. It simply isn’t Gaia’s affair.

It is in this sense that Stengers talks about *reclaim*, translated into Portuguese as *reativar*. For Sztutman (2018), Stengers’s invitation is for us to once again inhabit the areas devastated by capitalism and modernity. This is because it is necessary to create possibilities to confront what Pignarre and Stengers (2005) call “capitalist sorcery”, characterized by the way this system captures our relationships, placing us as cogs in its gear. In such a way that reclaiming and re-enchanting our senses makes us face the need to strain the logic of exploration placed in our ways of relating to ourselves and to other species, which implies that our sociability must be revisited. Therefore, the production of our desires based on these logics must also be revisited in this sense. Guattari (2017) says that we are heading towards a gradual loss of our gestures; with gestures, words; with words, solidarity; with solidarity, the other species have also disappeared. Still according to the author, our sociability has been captured by the logic of the profit axiom, of time counted in the value of an hour of work, of insensitivity to the other, of standardization. In this sense, climate change calls into question our ways of living together and building our existences.

That is how we decided to stop and look at the biology that is taught at school: how have we entered this rhizome of creating sociabilities? How have we created conditions to experiment with biology?

We were inspired by Isabelle Stengers to think about re-enchanting biology. We bring here fragments of our experiments carried out during the Botanical Experimentation course as an invitation to think with plants and no longer about them. To re-enchant biology is to reclaim our senses, it is to enter devastated areas to inhabit them in a different way, thinking about composing with them and with those who were dragged and made invisible in it. Thus, we make this text also an invitation to rub shoulders with biology, to occupy a place where it is possible to find ways to be enchanted by the study of life. We thereby question: How does a root grow when we decide to look at it?

Clandestine happiness: the creation of the body without organs

The isolation and social distancing imposed by the pandemic that started in 2020 brought the need for small inventions to keep us on our feet. We found ourselves facing a virus that spread rapidly around the world, taking lung after lung and claiming countless victims all over the world. It was with astonishment that we followed the growing number of deaths, the countless sad stories of interrupted lives.

Let's imagine that, during that period, a person, who still took short walks, went collecting traces of that walk. The collected plants were left in the water to root. There was something magical and indescribable about this process, especially when the roots began to emerge from the stem. Very clear at first, a new biological tissue was being formed at the same time as it began uncertain growth in water. That right there was exactly what Clarice Lispector called clandestine happiness.

It was then that, finally pulling herself together, she said to her daughter in a firm and calm voice: 'You are going to lend this book right now.' And to me: 'And you can keep this book for as long as you like.' Do you understand? It meant more than if she had given the book to me: 'for as long as I would like' is all that a person, big or small, can dare to want (Lispector, 1998, p. 11).

Clandestine happiness began to sound like a joy that no one captures, because it is related to a very intimate and, at the same time, silent relationship. A Deleuzian revolution (Deleuze; Guattari, 2016), that is, one that produces vibrations, linkages, openings, its victory being marked by immanence and the new links it establishes. A silent revolution, impossible to put into words, which is of the order of action and, perhaps, of feeling.

We populate ourselves with thoughts about how to experience clandestine happiness with biology and created the Botanical Experimentation course, which we carried out during the pandemic, in 2021, and remotely. To this end, we gathered a group of students, composed of artists, writers, professors and editors who were interested in the proposal of bringing together biology and art. We were a scientist-artist and an artist teaching a course that involved an intense process of observation, or even contemplation of the roots.

In the first meeting of the course, we asked the participants to make plant cuttings and place them in water to follow the rooting process. We warned that we were starting a journey with uncertainties, since you never know in advance what might happen. We reserved the initial moments of our meetings for the students to tell about their processes and, during the course, we carried out writing exercises, artistic techniques, conversations, listening. The growth of roots involved another time, impossible to mark on a clock. It was a time proper to plants, for them to create scars in the torn tissues and throw themselves with their roots into the water.

We talked about the fragility of these movements. It was slow, some started to root when life started to become scarce in the plant body; others did not take root. We assume the fragility of life as one of its greatest powers. It is in this space of uncertainty that the intense things of a lifetime happen: the negotiations of existences. At the same time, we made clandestine happiness out of it, especially at a time when we needed to create in order not to succumb. Thus, we begin to create a Body without Organs (BwO) with the roots.

The creation of the BwO is, most of all, an experiment so that we can rescue desires from strata of significance and is, therefore, an opening to other possibilities of looking, feeling and creating worlds. It meets processes of re-singularization of our desires, which have been ripped from us by subjectivities, meanings and organizations imposed by hegemonic forces, as if there were one single way of being in the world. "It's just that the body itself is torn from its immanence so that an organism, a meaning, a subject can be built" (Schöpke, 2017, p. 289). The organization is an imprisonment of the body so that it can be mesmerized, stratified in layers that moralize it and that Deleuze and Guattari (2017) call strata. We realize that the enemies of the BwO are not the bodies that compose it, but the organization that one makes of them. Therefore, the BwO is a reunion with desires and singularities, an affirmation of life as potency, and its creation is a war against the powers and intensities that were stolen from it to transform it into an organism. Therefore, creating a BwO is an opening process that can help us to perceive the subjectivities created by capitalistic, therefore, hegemonic forces. This is how we will open ourselves to the power of things and meet other biologies.

But how to create a BwO?

A BwO is made in such a way that it can be occupied, populated only by intensities. Only intensities pass and circulate. Still, the BwO is not a scene, a place, or even a support upon which something comes to pass. It has nothing to do with phantasy, there is nothing to interpret. The BwO causes intensities to pass; it produces and distributes them in a spatium that is itself intensive, lacking extension. It is not space, nor is it in space; it is matter that occupies space to a given degree—to the degree corresponding to the intensities produced. It is nonstratified, unformed, intense matter, the matrix of intensity, intensity = 0; but there is

nothing negative about that zero, there are no negative or opposite intensities. Matter equals energy. Production of the real as an intensive magnitude starting at zero. That is why we treat the BwO as the full egg before the extension of the organism and the organization of the organs, before the formation of the strata., as the intense egg defined by axes and vectors, gradients and thresholds, by dynamic tendencies involving energy transformation and kinematic movements involving group displacement, by migrations: all independent of accessory forms because the organs appear to function here only as pure intensities (Deleuze; Guattari, 2012, p. 16).

The need for prudence comes from the fact that this creation of the BwO needs to draw a line of flight to create a full egg. Two points must be considered in this creation: 1. that the line of flight has no *a priori* direction, and 2. that the BwO can be filled with the most diverse intensities. Hence the necessary doses of prudence. “The line of flights, to the contrary, is intransitive: it carries on” (Ingold, 2011, p. 14). The line of flight is what, at a given moment and provoked by an agency, deterritorializes itself from a regime of signs and begins to run by itself, opening itself up to new possibilities. There is no way to predict the direction of the flight line. In this sense, “[...] on lines of flight there can no longer be but one thing: life-experimentation” (Deleuze; Parnet, 1998, p. 61).

“A line of flight is a *deterritorialization*” (Deleuze; Parnet, 1998, p. 49), it is through it that we leave what is segmented, stratified, signified and discover other possible worlds. Drawing lines of flight is creating other paths, inventing new steps, and this cannot be done without launching ourselves into the unknown. In our case, we traced and have traced lines of flights from the possibilities that we have created to experiment with the roots.

Therefore, as Schöpke (2017) points out, this line of flight, which can be a line of life, can become a line of death. The author points out that experimentation is fundamental in the creation of a BwO, but it is important that it is linked to the act of thinking to prevent bodies from succumbing. And to think, for Deleuze and Guattari (2016), is to create. To create a complete and revolutionary body is to enter this war of prudently dismantling the organism. It is a revolutionary becoming that goes beyond individuals or identity groups. Hence the importance of getting rid of the “I” – of identities – to create the BwO.

This is how it should be done: Lodge yourself on a stratum, experiment with the opportunities it offers, find an advantageous place on it, find potential movements of deterritorialization, possible lines of flight, experience them, produce flow conjunctions here and there, try out continuums of intensities segment by segment, have a small plot of new land at all times. It is through a meticulous relation with the strata that one succeeds in freeing lines of flight, causing conjugated flows to pass and escape and bringing forth continuous intensities for a BwO (Deleuze; Guattari, 2012, p. 27).

Deleuze and Guattari (2017, p. 203) state that “[...] all fabulation is the fabrication of giants”. Fabulation has nothing to do with an amplified memory, or with the creation of phantasy. Fabulation is “[...]a question of freeing life wherever it is imprisoned, or of tempting it into an uncertain combat.” (Deleuze; Guattari, 2017, p. 202). That is why philosophers claim that scientists, philosophers and artists are like seers, not because they predict what is to come, but because they are able to see what is invisible, hear what no one hears and, thus, provoke corruptions in the hegemonic way of thinking within a social formation.

Then the BwO opens up to the joys that are inherent to desire, to becomings. To build such a machine is also to resist everything that tries to equalize us, steal our creativity, our production powers.

It is only there that the BwO reveals itself for what it is: connection of desires, conjunction of flows, continuum of intensities. You have constructed your own little machine, ready when needed to be plugged into other collective machines (Deleuze; Guattari, 2012, p. 27).

So, experimenting with growing roots was the way we found to create a BwO and re-enchant biology. “The more a living being experiments, the more susceptible they are to joy and, therefore, the more power to act they can come to acquire” (Vinci, 2018, p. 333). Hence the urgency to experiment in order to find clandestine happiness and thus re-enchant biology.

Re-enchanting Biology

To think about the need to re-enchant biology is, above all, to assume that there was or is a disenchantment. Perhaps this disenchantment comes from the fact that we build a biology in which everything has *a priori* meaning: the butterfly imitates the colors of the environment to camouflage itself; false coral snakes mimic the colors of the true coral snake in an attempt to prevent predators from preying on it; orchids produce scented substances that mimic female wasp pheromones to deceive male insects; the flowers of some carnivorous plants smell like rotten meat to attract flies; a male who becomes alpha mates with several females and thus passes on his genes; and so on.

Genes, cells, tissues, organs, organisms, species, populations, communities, ecosystems... Orders, classifications and definitions. Knowledge was generated in Biology according to arborescent models, which were constructed dichotomously, considering a genealogy from the less differentiated structures to the more differentiated ones (dos Santos; dos Remédios Brito, 2019, p. 60).

Life has an interpretation even before it happens, and what has been guiding these interpretations has an economic, Taylorist, standardizing bias. We speak, for example, that the orchid deceives the wasp and, thus, increases its chances of reproduction, or in the words

of Despret (2016, p. 19), we speak of the living beings “[...] as rational and calculating economic agents, who maximize their reproductive potential – tricked the insects, which, in turn, are just passive victims of strategies designed to exploit them”. Also, we use the concept of adaptive value, *fitness*, to talk about individuals who achieve greater reproductive success. Therefore, in an interpretation aligned with Taylorism, the species that are evolutionarily successful are those that, once adapted to the environment, manage to invest a smaller amount of energy and produce their descendants.

Despret (2016) talks about the sexist interpretations that have been given to groups of animals that live in packs. For a long time, the patriarchal interpretation of relationships in these groups of animals was not questioned, mainly because we live and build our relationships guided by a patriarchal system that legitimizes and reinforces a set of sexist practices. She starts from the research of feminist scientists and questions the use of the word “harem” which implies a domination of males over females. “Well, who said that males choose females? That they appropriate them, that they take possession of them, and that they are their sovereigns or rulers?” (Despret, 2016, p. 11).

Still thinking about ecological relationships, we categorize and measure them with values such as positive and negative, but having a hierarchy between species as a parameter. We learn the importance of a species based on its economic value, either through the way in which its metabolism can be transformed into a commodity, or through its pathogenic potential. We learned that the flower is beautiful, but the weeds, which have recently been called invasive plants, are ugly and undesirable. In the definition made by Lorenzi (2008, p. 8), “[...] a weed is any plant being that grows where it is not wanted” and, in the following paragraph, “when weeds grow together with agricultural crops, they interfere with their development by reducing their production”. Thus, an entire narrative is constructed to tell the story of weeds as unimportant, uninteresting, causing harm to other plants and disrupting agricultural production. Plants that do nothing but cause damage and reduce the producer’s profits. A way of managing lives that are unwanted within a productive-economic valuation system is thereby constructed, characterizing what Foucault (2008) called biopolitics, a categorization for the living beings that distinguishes them between those who can and those who cannot live. These categorizations have been the measure of various prejudices.

In general terms, the categorization of species contributes to sustain our racism and fascism, generate cheap labor and justify a great deal of social exclusion: the generation of wealth – carried out from the exploitation of natural resources or services – for a reduced number of people implies an exorbitant growth of poverty and vulnerable people. It is not surprising that the number of people who started to live on the streets of São Paulo increased by 30% with the pandemic (Bernardo et al., 2022).

Categorizing living beings as unimportant is opening the door to justify the unimportance of these lives and, in this context, unimportant lives are authorized to be explored and discarded. This explains the data that indicate that, in areas of hyper-exploitation of work, the most frequent workforce are children, women and black people. Not without reason, we find ourselves in the midst of a socio-environmental crisis that connects all these relationships and *modus operandi*, creating what Guattari (2017) calls capitalist subjectivations, which corroborates Pelbart (2013), when Pelbart says that our existences have been understood within a system based on the axiom of profit and productivity.

It seems that we experience a biology that separates life from the living. We rip from the “[body – biological or not –] everything that is most characteristic of it, its pain in the encounter with the exteriority, its condition as a body affected by the forces of the world” (Pelbart, 2013, p. 31). And, in fact, we thereby take away all the possibility of thinking about what affects bodies and what, as part of this process, makes these bodies reinvent themselves. As Chaves (2018, p. 15) says “[...] we line up life in single file (the so-called evolutionary iconographies are there to show)”. How, then, are we going to talk about the evolutionary history of species if we’ve already told a story beforehand? If the butterfly’s bet is on imitation, evolutionary history becomes a succession of imitations, a succession of strategies that work. A story that has already been told before it even happens. Thus, a logic of understanding life is produced that contradicts what is most pulsating in life: unpredictability.

The unpredictable and uncertainty are the certainties of the living being.

Even so, we have built up to now a biology in which life is based on certainties, as if relationships were predictable. “We think of life as levels, succession, arrival, and we narrate it as a retrospect” (Chaves, 2018, p. 16). We have forgotten that every encounter between a flower and a wasp, or between a butterfly and the colors of the environment, is a negotiation, or else an exchange. It is as if, in this encounter, something passes from one to the other, something crosses. This is indeed one of the most pulsating things in biology, so that each encounter is also an intensification of these existences. The flower intensifies its existence when the insect comes to visit it, while the insect also intensifies its existence through the flower. This is because the encounter is also constituted as a rearrangement, a reordering of what is populated by the encounter. It’s experiencing each other, creating rhizomes.

Orchids, I’m not saying anything new, co-evolved with pollinating insects because that was the only way for them to move around. And this movement, at a given moment, invented itself throughout the history of orchids, as it constituted a means of creating links with other orchids. From there, we can already build two stories, which are by no means incompatible, but each one will insist on a way of considering the strategy of orchids and insects: on the one hand, in the first story, we can say that the strategy is that of orchids, and that it allows avoiding self-pollination

or favoring reproduction by cross-fertilization; on the other hand, however, and this is the other story, one can assign an active role to the two secret agents, orchids and harvester insects, and consider that this narrative option reminds us that life *is* about relationship: not just relationship with other plants through an insect, but also a relationship with insects, a sensual, affective relationship in the broad sense of the term, a relationship through which beings affect each other (Despret, 2016, p. 18-19).

It is in this encounter, in this duration, that the most silent transformations take place and it is in this process of becoming that species create their evolutionary histories. The evolutionary history of the species is happening in that portion of chaos that is produced by the encounter, whether by the encounter with another species, coevolution, or by the encounter of the same species, placing sex as a possibility of a rearrangement of forces or a biochemical reordering, as Margulis and Sagan (2002) say. Something happens between those involved in the encounter and nothing can be said *a priori*. All that remains is to experiment: becoming-life.

Life taken as a becoming is disturbing because it forces us to deal with an open world, which is always to be built. The life to come does not authorize anyone to speak for it, to trace its path, understand or judge its ways. It dispenses with a moral and can deliver its own ethics (Chaves, 2018, p. 20).

Arriving at this point allows us to visualize that life never is will be is being, it is happening, it is creating its stories; always in the middle, unfinished and in process. A process carried out at each encounter in which something crosses and makes, through the encounter, the production of difference, which produces all the dynamism of life. What becomes essential, therefore, is the possibility of experiencing the various facets of oneself. If, on the one hand, we can conclude about the fragility of the encounter, we can, on the other hand, see in it a great power of life, an obstinacy of beings.

An education through fabulation is made from the addition and subtraction of times with adjustments, agreements and repetitions, always unprecedented, unusual. Always having the same mad tea time [allusion to the book *Alice in Wonderland*], but never sitting in the same chair. Maintaining the constant movement of inventing dialogues, materials, intervention, life (Barin, 2019, p. 103).

Hence the need to re-enchant biology, to ignite new practices, to open up new possibilities and, above all, to experiment: we are tired of this world that already has meaning and interpretation, we are equally tired of a biology that already has a point of arrival. For Isabelle Stengers (2015, p. 20) it is time to “[...]reinvent modes of production and of cooperation that escape from the evidences of economic growth and competition. ”, which is in line with what Guattari (2017) says about the need to create a new logic, the logic of intensities. Perhaps, in this way, we can rescue life from where it was imprisoned, captured and subjectivated.

Re-enchanting biology has become a necessity, if not a practice, for us. In the inspirations promoted by Isabelle Stengers (2017) we have been looking for ways to experience with her and reactivate our senses. And when we talk about searching, we are not talking about a predetermined path, a step-by-step that exists *a priori*, but about a movement of putting oneself in motion, of experimenting with the walk. In this sense, to reactivate is to rescue the uncertainty of these experiments, not to resume something, but to understand how we can be lulled to other places, how it awakens other sensibilities in us.

Reclaiming means recovering, and, in this case, recovering the capacity to honor experience, any experience we care for, as 'not ours' but rather as 'animating' us, making us witness to what is not us (Stengers, 2017, p. 11).

Thus, Stengers (2017) gives us clues on how to re-enchant something: it is necessary to think of ways to experiment *with*, to create new practices to experiment with.

How to create other ways of experiencing biology? How to create other relationships with the world based on this? How is biology transformed when other forms of experimentation are practiced? Perhaps reclaiming our senses is a possibility of re-enchanting ourselves, of making ourselves porous to the other, to the sensibilities that are ignited by the interaction with the other. Which implies creating other affective relationships with human and non-human species, walking along paths that produce vibrations, feeling your feet touch the ground. Small clandestine happiness, small refuges of joy that give us a single guarantee: that we will not come out of this encounter unscathed.

How to find Allies?

Majestic, the roots began to emerge in the silence of their alleged revolutions. If there is a logic to life, it can be said that it is based on the uncertainty it carries with it, and in that uncertainty lies an enormous fragility. At the encounter, this fragility became a great power: would the stakes take root in water or not? An uncertainty resonated in different ways: one participant cried when describing the encounter, another placed more stakes in the water, another started looking at the roots of the sidewalks in the city where she lives, confined to the small squares of land, another was impressed with the light color of the emerging roots, he saw something delicate but strong in that, and decided to draw them in shades of blood red. The proposal of the course was for the records to be jotted down so that later there could be a curatorship and an object-book could be composed².

Our concerns were not located in questioning the biological knowledge about the roots, on the contrary, in our classes, we talked about their biology, the structures, the types, the adaptations and negotiations that they make with the environment in which they grow, the biological tissues – a whole body of knowledge constructed and legitimized within the practices of biology as a science. What we sought was

to create possibilities for experimenting with this scientific knowledge and, thus, expanding our ways of being with plants, emancipating our existences with them.

Thus, in our first classes, we talked about the biology of roots, about the fact that they are responsible for fixing plants in the soil and for absorbing water and mineral salts; about the types of roots; about the adaptations and negotiations they make with the environment in which they are; the biological tissues that compose them; and the movements of negative phototropism, geotropism and positive hydrotropism. Our intention was to offer the course participants a portion of scientific knowledge so that they could use it as a starting point in their artistic propositions to create fables with it. Among the topics that drew the most attention are nomenclatures, mucilage production, root movements. We question: what can a root? And we answered in a Spinozist way: we will only know when we experiment with them.

Mucilage appearance in the water was an intense moment. As the roots populated the glass, a slimy and transparent substance appeared. This substance is a mucus, produced by the region of the root cap and which, while protecting the tips of the roots from friction with water or the soil, releases substances rich in carbon, which attract other beings – fungi, bacteria, small worms, among others – that will feed on this sugar-rich substance. The alliances of and with the roots began, the creation of an entire territory for themselves, and the territory (Deleuze; Guattari, 2016) would be exactly this creation of colors, smells and textures that will become inseparable as they become expressive: the growth of roots is a populating.

Mucilage is launched in biochemical compositions and attract fungi and bacteria, forming alliances with the roots in a process that is not friendly at all. There is an ongoing infection, metabolic productions, toxicins. Here, in this fragile combination, the need for life reaches a potency that asserts itself as a perseverance to live. A transformation of the living being is in process, life unfolds in multiple possibilities that include death. It is an intimate negotiation between those involved that reverberates in the establishment of their existences. Fungus and bacteria intensify the existence of the root, at the same time, the roots also do the same to them. It is just that in that silence of the encounter, in that small portion of chaos that shuffles relationships, something crosses fungi, bacteria and roots.

There is also more to be said about this encounter.

Every ordinary encounter, therefore, is exposed to the possibility of an instantaneous turnaround that can throw everything out of kilter. It is as if life itself feels shaken by this crease in which an ordinary experience is folded next to another, the extraordinary one. We sense that the actual complexity of the encounter experience depends on what happens in this fold, which is why it is necessary to seek its explanation. Each one feels and expresses in their own way this simultaneous occurrence of divergent lines, the strange folding in which those joined

together experience their own bond as being what throws them in a time out of kilter (Orlandi, 2014, s/p.)

It is in this fold, in this crease, that something passes, something crosses, pure becoming. Becoming “[...] is rather an encounter between two reigns, a short circuit, the picking up of a code where each is deterritorialized...” (Deleuze; Parnet, 1998, p. 57). It is a whole universe of possibilities, micro-perceptions, of imperceptible-becomings. Flows that rearrange, conjugate and compose themselves at that moment when forces establish life in symbiosis.

Fungi and bacteria absorb zinc, phosphorus, copper and other minerals, which are essential for the development of roots, at the same time, from the production of photosynthesis, they generate carbohydrates that are food for fungi and bacteria. Life in symbiosis is not organized, there is no certainty, there is a composition with the combination of metabolisms: an entire landscape in progress, an entire existence at stake. In the soil, this encounter, which begins with these alliances, proliferates and opens up space for other microorganisms, small animals such as worms and earthworms, which mark the earth with their tracks and make room for aerating the soil.

During the classes, the participants presented their flasks, showed the mucilage, talked about their processes, showed their drawings, read their writings. Small revolutions underway and new ways of relating to plants were in process. One of the students even said that she had an orchid that had lived in the backyard of her house for years, but that she only looked at its roots surrounding the tree when she started with the rooting processes proposed in the course. To experiment is to have the opportunity to learn from the other.

Each must undertake their own experimentation, according to the compositions in which they find themselves entangled. In short, and once again, we cannot judge from the outset what is suitable or not for a living being acting in a unique situation, there is no pre-established way to know it properly, there is only experimentation and nothing else (Vinci, 2018, p. 332).

To experiment is to mobilize these affects that can enhance our existences, it is to get in touch with the multiplicities of what is experienced and to be able, at the same time, to make the experience a rearrangement with what affects us in this process. “The affect is not a personal feeling, nor is it a characteristic; it is the effectuation of a power of the pack that throws the self into upheaval and makes it reel” (Deleuze; Guattari, 2017, p. 22). The delicacy of the drawings, paintings and words that appeared in each act. We no longer felt *the* plant, but *with* the plant. Moving process.

In this sense, the “experience grows from the middle” (Manning, 2019, p. 11) by disregarding any fixed points or parameters that guide, above all, the time of the experience, in such a way that it becomes impossible to locate the experience in a timeline with beginning, middle and end. It lasts while it resonates, while it rearranges forces and moves

all the singularities that this process summons. “As in Whitehead, time for James is the time of the event, a time too complex to parse in the past-present-future account of metric time we are accustomed to” (Manning, 2019, p. 14).

“Experiment, don’t signify and interpret! Find your own places, territorialities, deterritorializations, regime, lines of flight!” (Deleuze; Guattari, 1995, p. 81). Experimenting with the roots means that, from a plan made of infinite possibilities, creations leap from there. Subjectivities are also visited in this process of creating, mainly because singularities summon them. Smaller gestures that make up the experience unfold with and through it. This involves improvisations when we experiment, which puts us in an intimate relationship with things.

Intimacies with the roots, contemplating cellular transformation, their urgency and time. An experimentation that invites us, from other places, not only to understand the biology of the root, but to make from it new possibilities to experiment with them; it invites us to compose with the forces that expand from this encounter, settle in the middle and, thinking with Lapoujade (2017), subtract the richness of the gesture to establish an existence through the details that highlight it. An experience oriented from the uncertainties of the encounter with the other.

Enraizar tornou-se Verbo (Fonseca; Hacla, 2021) was created with the features and traces of the course participants’ artistic creation processes, although we know that many of them continued their productions even after the course. Artists’ books were published³ and some held artistic exhibitions with the processes initiated during the course. Perhaps clandestine happiness resides in this space of small fissures, like forces. “Strength as vitality, constant creation of new gazes and encounters. Happiness is the art of not letting yourself die from lasting habits, in all fields of existence” (Lins, 2021, p. 90-91). And maybe experimenting really has to do with a search in which we can vibrate with what is smaller, what is not captured. That is why all happiness can only be clandestine, like the one that does not give in to established parameters. Would it be anything but the creation of an ethics based on joy?

There is, in fact, a joy that is immanent to desire as though desire were filled by itself and its contemplations, a joy that implies no lack or impossibility and is not measured by pleasure since it is what distributes intensities of pleasure and prevents them from being suffused by anxiety, shame, and guilt (Deleuze; Guattari, 2012, p. 19).

The urgency of the roots was our time; the uncertainty and rupture of the process, our strength; clandestine happiness, our movements. Small gaps for experimentation of what we want to be, of the process of becoming something that never arrives. Just as the root celebrates its encounter with water, and in that encounter, we are led to admit that our existences are in the between of things. What happens between our senses and a root? A whole creation of a BwO! Perhaps the strength of the living being is located in the encounter, in an unspeak-

able communication, impossible to put into words. We created a BwO with roots against other imaginable biologies.

What can a root?

Final considerations

We believe that the need to re-enchant biology is also crossed by the creation of practices that allow us, above all, to experiment. Create forms of proximities, make cracks, inhabit fissures. Re-enchanting has therefore been creating refuge spaces to think with plants, with ants, with clouds; learn from the traces, from the tracks; become porous to and through the entire process. In this sense, the BwO as a practice has brought us closer to other possible biologies.

Thus, features and vestiges have interested us, as they are what has guided our possibilities of experience towards the microevolutions that the study of life can bring about. Everything that escapes from, that remains from, and that shuffles the linearity in which life has been placed is of great importance. It is in these blurred spaces that we have found a clandestine happiness, where the study of life holds possibilities of enchanting. Re-enchanting is, therefore, entering through the middle, finding places where it is possible to experiment and reclaim, it is to make virtual existences become real, so that, in this process, we also become with them.

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Notes

- 1 Líquen Projetos Educacionais is a space for non-formal education in which we experience the content of science and biology with art. There, we propose courses in which we start from scientific knowledge and embark with it towards creative and poetic possibilities. To access the project's Instagram, see @liquenprojeto.
- 2 Book-object is an artistic proposition that breaks with the idea of a book, by shifting it from the proposal of a source of information and turning it into a source of artistic creations.
- 3 Artist's book is a category of work of art, just like sculpture, printmaking, or painting.

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