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Frestas em biologia, devir-monstro e experimentações com a bioarte[1]

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Resumo
As pesquisas apontam a necessidade de inventar novos ensinos de biologia, mas é preciso dizer de antemão que não há resposta a priori a não ser experimentar com as possibilidades. Essa nossa proposta, ao pesquisar a relação entre ciência e arte no Church Lab (Universidade de Havard), almejou a emancipação do pensamento em relação ao ensino de biologia. Nesse período, criamos bactérias transgênicas e desterritorializamos o laboratório de genética para reterritorializarmos em ateliê de arte sendo que muitos fluxos foram liberados pelas linhas de fuga desse caminhar. Escolhemos a cartografia como metodologia por ser possível captar esses fluxos. Durante o processo, um devir-monstro nos arrancou das significações da biologia e nos embalou por entre as frestas da ciência e da arte. Encontramos outras biologias, monstros e possibilidades de criar mundos com bactérias transgênicas que viraram arte.

Palavras-chave: Bioarte. Cartografia. Experimentação.

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Cracks in biology, becoming monster and bioart experimentation

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Abstract
Research points to the need to invent new biology teachings, but it must be said in advance that there is no *a priori* answer other than experimenting with the possibilities. Our proposal, when researching the relationship between science and art at the Church Lab (Havard University), aimed at the emancipation of thought in relation to the teaching of biology. During this period, we created transgenic bacteria and deterritorialized the genetics laboratory to re-territorialize it into an art studio, with many flows being released along the escape lines of this journey. Cartography was chosen as the methodological path because it enables to capture these flows. During the process, a becoming-monster ripped us away from the meanings of biology and lulled us between the cracks of science and art. We found other biology, monsters and possibilities for creating worlds with transgenic bacteria that became art.

Keywords: Bioart. Cartography. Experimentation.

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Grietas em biologia, devir-monstruo y experimentos com bioart

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Resumen
La investigación apunta a la necesidad de inventar nuevas enseñanzas de biología, pero hay que decir de antemano que no hay respuesta a priori, sino que hay que experimentar con las posibilidades. Esta es nuestra propuesta al investigar la relación entre ciencia y arte en el Church Lab (Universidad de Harvard), buscando la emancipación del pensamiento en relación a la enseñanza de la biología. En este período creamos bacterias transgénicas y desterritorializamos el laboratorio de genética para re-territorializarlo en el taller de arte. Muchas corrientes fueron liberadas por las líneas de escape que encontramos en este recorrido y hemos elegido la cartografia como metodología por permitirnos capturar esos flujos. Durante el proceso, un devir-monstruo nos sacó de los significados de la biología y nos envolvió a través de las grietas de la ciencia y el arte. Encontramos otras biologías, monstruos y posibilidades para crear mundos con bacterias transgénicas que se han convertido en arte.

Palabras clave: Bioarte. Cartografía. Experimentación.

A Meeting with Frankenstein

> "It was on a dreary November night that I contemplated the success of my work. With a restlessness that bordered on agony, I gathered around me the vital instruments that could infuse a spark of existence into the lifeless thing that lay at my feet. It was almost one in the morning; the mournful rain was drumming on the window panes, and my candle was nearly extinguished when, by the flicker of a dying light, I saw the yellow eye and the spleen of the creature; it took a deep breath and a convulsive movement stirred its limbs" (SHELLEY, 2017, p. 75).

We begin this text by delivering two important things. The first is that the excerpt above is from Mary Shelley's Frankenstein, when an electrical impulse brings a biological life to the monster's body. Scientist and monster accompanied us in the process of producing the thesis from which this article is part, and perhaps we couldn't have written it without this book. We researched with the intensities provoked by the work and wrote with Frankenstein because we couldn't write without something that both changed us and was transformed by our progress. Everything is in motion in research. The scientist did not create a monster without the monster also creating him. And when we talk about creation, we are referring to the imperceptible particles that made these creatures gain intensities. We suggest that, as you start this reading, you try not to bring the words "doctor" and "monster" here as adjectives. We will use them as nouns, solely to designate intensities, and thus we can feel how one invaded and conjugated with the other. Both are modified: one did not come into being without the other; one did not come into being without carrying or tearing pieces from the other. Torn pieces, spasms, breaths, sighs, unpredictable movements. And this is what happened when we entered the laboratory and these Frankensteinian intensities accompanied and transformed us. Our trajectory was uncertain, shifting, and porous; our movements, our acts of creating science, art, and bioart. We were taken over by affections.

The second thing is that we present here a cartography of the creative process with genetically modified bacteria that carried with them the intensities of mammoths and Frankensteins. Such a cartography cannot be made without triggering a becoming-monster. Thus, what we wrote[4] are fragments of the experiments conducted during the sandwich doctorate period as a visiting researcher at the Church Lab, coordinated by geneticist George Church and affiliated with Harvard Medical School. The proposal was to follow American bioartist Joe Davis, also affiliated with the lab, who

[4] We used the plural to write the text because, although the artist residency was physically undertaken by the researcher Fabíola, throughout the process we were engaged in discussions and negotiations about the paths to be taken.

mentored the investigation between science and art in the works he created[5]. However, being in a laboratory with scientists also means being enchanted by the other research as we encounter it. That's how I met[6] scientists who invited me to somehow participate in the research they were developing or to conduct experiments at the bench. We did not limit ourselves to narrating a sequence of events that happened, but rather to mapping the updating of forces, hence the lines of a map that was being constructed from the intensities experienced and that gently led us to meet another biology. This all took place during the winter in Boston, Massachusetts, which also allowed us to observe the snowflakes falling and dancing with the wind.

We bring here excerpts that led us to engage with Frankenstein, a character we created to accompany us through this journey among scientists, laboratories, art, winter, bacteria, and the creation of new relationships with biology. In this way, these arrangements led us to think about other possible biologies. We no longer speak of a singular biology but rather of multiplicities.

Agency with Monsters: Frankenstein as a Being that Inhabits Us

Accompanied by both the scientist and the monster, we entered the laboratory. The insertion of the monster into biological life is marked in the book by the scientist's terror at seeing the creature open its eyes, his astonishment before a monster that carries within it pieces of death. There is something of sorcery in the architecture of a body, made alive by an electric shock, functioning as a jumble of pieces put together. Years of confinement to make the creature open its eyes, blood flowing through invented veins; a circulatory system beating out of rhythm to pump streams of life and death; a spleen that gives smiles their yellow hue; a liver without function; a brain, still stitched together in processes; skin out of sync with thermal or tactile sensors; feverish tremors; spasms and movements; bodies in a multiplicity of monsters.

At the same time, the creation of the monster also confers a different existence upon the scientist. Embedded in chaos, the scientist found his endeavor when he was touched and permeated by particles of death, particularly through the loss of his mother. From dead body parts collected from morgues and laboratories, he would create life. This led to changes in his physiology and a new

[5] We have already discussed this a bit in the article FONSECA, F. S. R.; CARVALHO, D. F. Living Among Toothpicks, Plastic Insects, Paper Apples, and Aliens: Experimentations Between Science and Art.
[6] We use the singular to avoid confusion about who was physically in the laboratory. Although researcher Fabíola was alone there, the entire research process was accompanied by the advisor, with frequent meetings and support.

relationship with his own body now subjected to long working hours, without hunger, without sleep, and distanced from social relationships. Confinement and alterations in his circadian cycle: one disrupting the other, as they interconnect and experiment with their potentials. Among them, a myriad of other things, populations with what was being. There was a conjugation, an encounter between them, something that passed through, traversed, and enveloped them.

We will refer to this as flow, understood as 'something intensive, instantaneous, and mutating, between creation and destruction. Only when a flow is deterritorialized can it merge with other flows, which in turn deterritorialize it and vice versa' (DELEUZE; PARNET, 1998, p. 63). Flows-particles-monster-scientist. And in this entanglement, beyond their physical and biological existences, we lose track of the beginning and end of this creation. We find a territory where who created whom no longer matters: there is a block of becoming that connects them through particles and intensities of biological life and death.

In this block of becoming, monster and scientist produced their expansions, they infected each other. We are interested in these modes of contagion, propagation, and occupation. 'These multiplicities of heterogeneous terms and co-functioning of contagion enter into certain assemblages, and it is within them that man operates his animal becomings' (DELEUZE; GUATTARI, 2017, p. 24). We are not interested in determining who is the scientist and who is the monster, but rather in the forms that merge and create this territory where animal becomings operate, where multiplicities ignite. It was these becomings that drove the characters, increasingly connected with each other.

In the block of becoming between the scientist and death, the monster already existed in particles of monstrosity even before its biological existence, and, in conjunction, a scientist also existed. “[Becoming] is, above all, an encounter between two realms, a short-circuit, a capture of code where each one deterritorializes” (DELEUZE; PARNET, 1998, p. 57), and it is these intensities that pass between them without ever transforming one into the other, always mutant, always nomadic.

> This is the point that needs to be explained: how a becoming does not have a subject distinct from itself; but also how it does not have a term, because its term, in turn, only exists within another becoming of which it is the subject, and which coexists, forming a block with the first. It is the principle of the reality specific to becoming (the Bergsonian idea of a coexistence of “durations” that are very different, whether superior or inferior to “our” duration, and all communicative) (DELEUZE; GUATTARI, 2017, p. 19).

A monster is not created without also experiencing what it is like to be a monster. Not being in the sense of becoming one, but of allowing something to pass through, to traverse. These are flows being released, not through a mere exchange, but through encounters with differences that end up transforming things into other things. This occurs through agency, understood as "precisely this growth of dimensions in a multiplicity that necessarily changes in nature as it increases its connections." (DELEUZE; GUATTARI, 2017, p. 24). In other words, agency is that encounter in which something passes through, something affects, and thus, something changes, becoming something else and establishing new relationships. The relationships with that which affects and traverses are an agency. An encounter that modifies the ways things operate and creates new relations. It is not about imitation or copying, but about the actualization of potentials.

We are therefore talking about a multiplicity, which, because of this, "has neither subject nor object, but only determinations, magnitudes, dimensions that cannot grow without changing nature" (DELEUZE; GUATTARI, 2017, p. 23). Thus, when we talk about the encounter with Frankenstein, we refer to a multiplicity in processes of deterritorialization and reterritorialization: an experimentation triggered by the encounter. We do not become Frankenstein, but we certainly carry traversals, especially because it was our encounter with him that created openings for other multiplicities to flood a map that was being developed during this period as a visiting researcher at the Church Lab.

Through the reading of the book, we created another monster as well, and it was this monster that helped us navigate the journey through which we encountered science, art, and education. Driven by these creative desires, I ventured through laboratory benches, brushes, and bacteria to create other monsters and thus explore what a bacterium or a brush can do. I began to understand how a brush can open up to the multiplicity of biology, stepping away from the linear path of established biology from the laboratory and the perspective of a researcher in science and biology education, while simultaneously being influenced by it. This is because, whether in an artistic, scientific, or philosophical process, we do not traverse them without being traversed by these processes ourselves: this is one of the peculiarities of an act of creation.

As sorceresses, we created Frankenstein to haunt the boundaries between science and art, knowing that countless becomings pass through them. It was our creation with him that guided us in this journey, triggering other becomings along the way. This cartography marks some moments of this process.

A Cartography of the Alliance with Monsters

I arrived at the lab in the heart of Boston's winter.

The reading of the book led us to seek out artworks rooted in the interface with biology. Initially, before even traveling to Boston, I encountered the fantastic beings of artist Walmor Correia; the illustrated forests of Hélio de Lima; and João Agreli's animal totems. Later, I discovered artists collaborating with research laboratories Marta de Menezes's butterflies with modified wings and Eduardo Kac's fluorescent rabbit. However, it was with Joe Davis and his transgenic bacteria that we formed an alliance. Joe Davis is an American bioartist who creates artworks at the Church Lab. Among his artistic practices, Joe Davis experiments with and creates protocols to translate phrases into DNA language and then insert these created fragments into *Escherichia coli* bacteria.

Although the research scope at Church Lab involves studies on the chemical and physical structure of DNA (deoxyribonucleic acid) and searches for techniques in genetics, the project that drew my attention was one aimed at reconstructing the genetic sequence of a mammoth. For this, the gene-editing technique known as CRISPR-Cas9 is used, a technique that earned the Nobel Prize in Chemistry (2020) for Emmanuelle Charpentier and Jennifer Doudna and was patented by Church Lab after a long legal dispute for having experimented with it in mammal cells. The mammoth is an extinct animal, but specimens were found beneath the glaciers in Siberia with preserved genetic material, which allowed for comparison of these materials. From this project, the lab director, George Church, gave several talks titled "Jurassic Park," referring to the film that recreates dinosaurs.

After arriving in a foreign country and enduring the cold temperatures of the season, Eriona was a comforting presence. She is one of the researchers on the mammoth project team. Over time, we shared ping-pong games in the lab, had meals together, and exchanged aspects of our cultures—Brazil and Albania. Silently, we began to infect each other with particles of science and art. To the phrase "singing or composing, painting, writing has no other goal: to trigger these becomings" (DELEUZE; GUATTARI, 2017, p. 66), I would add researching, because this artistic residency I had at Church Lab was precisely that: a triggering of becomings.

> Becoming is, starting from the forms one has, the subject one is, the organs one possesses, or the functions one fulfills, extracting particles among which we establish relationships of movement and stillness, speed and slowness, those closest to what we are in the process of becoming, and through which we become. In this sense, becoming is the process of desire (DELEUZE, GUATTARI, 2017, p. 67).

When we write this text to discuss a becoming-bacteria, it is because we want to map out the lines and intensities we engage with them, and through this, bring forth other intensities that have encountered us since they became these anomalies. “The anomalous is neither an individual nor a species; it only harbors affects, and does not contain either familial or subjectified feelings, nor specific or significant characteristics” (DELEUZE; GUATTARI, 2017, p. 28), and thus, they tear out and graft particles, they traverse. If we previously thought of bacteria within the limits of biology, classification, and pathogenicity, this experimentation with science and art has shown us other bacteria that do not exist in biology textbooks.

Perhaps this is one of the things that bioart has taught us in such a short time: to expand the biology of the field of biology itself, to saturate this space, and bring it into education by questioning: what can a bacterium do? Thus, we might have an opportunity to think about a more dynamic life, even while being traversed by biological classifications that provide clues for understanding and exploring the world, but without it being a capture of life by the logic created by biology. Without it being an end in itself. By also focusing on expanding our senses when we question “what can a bacterium do?” We are led to invent other stories that provoke us to experiment with these beings and to enter into becoming with them. We come to understand them as part of our own bodies and challenge the hierarchical position of our species at the top of the food chain—as we have been taught and learned especially considering that without bacteria, we would not be able to digest countless foods. Thus, we write with these bacteria that somehow make us question rankings and hierarchies, while also awakening in us the need to create, to deterritorialize laboratory benches with paintbrushes. Consequently, bacteria open up possibilities for another form of existence: how could science be more inventive?

Precisely because of this, we want to say that no crossing is made without creating alliances. As Deleuze and Guattari (2017, p. 19) state, “It [becoming] is of the order of alliance,” always with the anomalous, for it is through them that we are silently dragged. We are dragged to cross. This is how Captain Ahab strangely connects with Moby Dick. She is the anomalous one, and it is through her that he reaches the other whales. He is in becoming-whale. And this is what moves him through marine infinitudes. The alliance is part of the becoming block, and without it, one does not escape representations. It is through this that becomings drag us out of significations. Becoming is a process of creation.

> Becoming is never about imitation, nor doing as, nor fitting into a model, whether it be of justice or truth. There is no starting point or end point to reach or be reached. Nor are there two terms that exchange. The question "what are you becoming?" is particularly foolish. For as one becomes, what one becomes changes as much as oneself. Becomings are not phenomena of imitation or assimilation, but of double capture, of non-parallel evolution, marriages between two realms. Marriages are always against nature (DELEUZE; PARNET, 1998, p. 10).

I formed an alliance with Eriona, and it was through her that I reached the laboratory bench to create transgenic bacteria used as ink to make drawings. I drew a mammoth and a Frankenstein with the bacteria that expressed fluorescence and could be seen under ultraviolet light. On the bench, with me, were the intensities of other artists who also deterritorialized the scientific research laboratory and reterritorialized it into their artworks: Nurit Bar-Shai, Marta de Menezes, and Anna Dimitri

Nurit Bar-Shai's work[7] is inspired by the research project "The Social Life of Bacteria," led by Professor Eshel Ben-Jacob at Tel Aviv University. The project's goal is to understand the possible forms of interaction and communication systems created by the Paenibacillus vortex bacteria. According to the research, this species exhibits a high degree of social behavior. In her artwork Objectivity [tentative] (2015), the artist cultivates colonies of these bacteria on agar and stimulates them during growth with sound frequencies that cause them to generate geometric shapes and color patterns as a result of the movement induced by the sound. The second part of the work takes place in the gallery, where the artist performs the biological experiments: she transmits sound waves into the culture medium using a liquid placed on the Petri dish. As the liquid cools, it forms topographies on which the bacteria will grow and create shapes. Visitors to the gallery can view the Petri dishes mounted on the wall, allowing them to witness the growth of the colonies.

Marta de Menezes[8] also created artworks with bacteria. In 2007, the Portuguese artist produced DECON: deconstruction, decontamination, decomposition, a piece that uses biotechnology methods to develop living paintings during the exhibition. This involved creating replicas of Piet Mondrian's paintings with paints containing bacteria of the species Pseudomonas putida, which is harmless to humans and the environment. Marta's artistic research was conducted in collaboration with Professor Dr. Ligia Martins from the Institute of Chemistry and Biology in Lisbon, who investigates biological strategies for degrading highly polluting textile dyes. In this laboratory, the artist researched the best

[7] http://www.nuritbarshai.com/objectivity/ Accessed in November 2023.
[8] http://martademenezes.com Accessed in November 2023.

conditions for bacterial activity in this context, so that during the exhibition, the paints in the replicas of Mondrian's paintings were consumed by the bacteria, which created a reinterpretation of Mondrian's works.

Another artist who also creates her works with bacteria is Anna Dimitriu[9]. he "Hypersymbionte Enhancement Salon" is a performance created in collaboration with Dr. John Paul, Dr. James Prince, and Kevin Cole, members of the Modernising Medical Microbiology Project. In this performance, the artist sets up a space resembling a cosmetic clinic and sits in a chair next to a table, where she receives and advises patients willing to transform their bodies into superorganisms. She starts from the premise that symbiotic bacteria, present in our microbiota, have co-evolved with the human species. During the performance, she suggests that these bacteria can be enhanced using new technologies and transformed into hypersymbionts. Once introduced into our bodies, they are capable of colonizing and creating a superorganism.

These are some of the artists we highlighted, though there are others who have also influenced and inspired us. However, these artists have notably desterritorialized laboratory bacteria to reterritorialize them in their artworks. There is no desterritorialization without the liberation of previously confined flows. And there is no desterritorialization without a betrayal of signs, an establishment of other speeds and movements that impose a rupture, a break: the laboratory is desterritorialized as a place solely for scientific knowledge production and reterritorialized as an artistic creation studio.

This occurs with the flows that emerge in the regime between the boundaries of science and art. Something diverges from the routes of significations into lines of flight. Deleuze and Guattari (2015) describe a line of flight as something that escapes the significatory paths of a sign trapped in a semiotic system. Thus, when the laboratory is reterritorialized as a studio, something is released from its sole function as a site for scientific production. The line of flight represents this opening, a liberation of other lines that can come together. It is not possible to encounter these lines without experimenting with them, as they do not exist beforehand they are traced, interwoven, and composed. This is how rhizomes operate: a constant composition of lines always open to heterogeneous connections.

> Every rhizome includes lines of segmentarity according to which it is stratified, territorialized, organized, signified, assigned, etc.; but it also includes lines of deterritorialization along which it continuously escapes. There is a rupture in the rhizome whenever segmentary lines explode into a line of flight, yet the line of flight

[9] https://annadumitriu.co.uk Accessed in November 2023.

> is part of the rhizome. These lines keep referring to each othe (DELEUZE; GUATTARI, 2017a, p. 25-26).

A cartography is an experimentation with these lines and marks these agenciamentos as a conjugation and encounter of flows emerging from lines of flight. It is these agenciamentos that define a cartography. As Lins (2012) states, a cartography is a search, but not one based on previously established steps. Instead, it is something that unfolds as one walks and encounters us along the way. It is a nomadic, open walking, belonging to those who are always in-between.

> In cartography, lines are crossed, arranged, and interlock with one another, creating maps that connect to others. Lines with numerous origins, in which paths fold, bend, and delineate shifting edges and mutating contours: the becomings. These extract particles, among which they establish relationships of movement and rest, speed and slowness; the closest to what we are in the process of becoming, and through which we become. In this sense, becoming is the process of desire as flow (KROEF, 2018, p. 23).

The encounter with these artists led us to recognize the potential of these bacteria, especially because during the course of biology, we learn to classify living beings, their physiology, and some survival strategies. Yet, they wither when confined to these static, framed, and defined locations, constrained by their survival strategies. We become trapped in these ways of thinking about life and, to complement this, we invent the importance of beings based on utilitarian criteria. There, we learn that a false coral snake mimics a true coral snake to deceive a predator, that a frog camouflages itself with the coloration of the forest floor to avoid being seen, that a spider mimics the shape of an ant to deceive other ants in the colony, or that a butterfly mimics eyes on its wings to deceive predators. Your exploration touches on how human perspectives and utilitarian views shape our understanding of life and death. By imposing human-centric values on other living beings, we often overlook how these entities might experience existence in ways fundamentally different from our own. Your comparison of different historical and scientific approaches to extending life illustrates a broader quest to defy or delay the inevitability of death, reflecting a deep-seated human desire to overcome mortality. This inquiry into the various ways humanity has tried to confront death whether through myth, science, or literature can offer profound insights into our existential concerns and the ways we relate to other forms of life.

Your work seems to beautifully embody the idea of experimentation as a means of discovery rather than interpretation. By engaging with the lab, bacteria, and other elements in such a dynamic

way, you're not just exploring new methods or concepts but actively reshaping your understanding and the boundaries of your field. It's a fascinating way to apply Deleuze and Guattari's ideas practically, turning abstract philosophy into concrete experiences and becomings.

A Brush, a Monster, and a Workbench

Joe invited me to go to the lab bench. He asked me to create a phrase in Portuguese so that we could insert it into a bacterium, but we were already at the end of my residency in the lab and I needed something that could be done quickly. It was he who encouraged me to invite Eriona to help with this creation. I should note that to enter the lab, we need to complete a biosafety course and a safety protocol course in case of accidents. Only after that does the university provide us with the necessary documents to request an academic ID, a card with a barcode that we use to enter the lab and open the doors.

I mention this because it is indeed an important point for those researching in the bioart interface. When we genetically modify a living organism, there are a series of regulations that must be followed, and usually, we cannot take genetically modified organisms out of the laboratory unless the transportation is from lab to lab and follows the established rules. There is also a heated discussion about the environmental impacts of GMOs, which started being produced in laboratories and cultivated on a commercial scale in the 1990s. Joe Davis addresses this in his work Microvenus (1986), a transgenic artwork that he managed to exhibit inside a biological container in the year 2000 at the Ars Electronica Festival in Linz, Austria).

Going to the bench also opened up discussions with Eriona about what we would do. We decided that we would draw with the bacteria and for that, we needed to create the ink, prepare the plates, and choose sizes and dimensions that would be visually interesting. We started the process of working with the bacteria and decided to use *E. coli*, classified as a level 2 biosafety microorganism. There is a risk classification for microorganisms that ranges from 1 to 4, with class 2 organisms presenting a moderate individual risk but limited pathogenicity. In other words, they do not pose serious health risks, and if they were to cause an infection, the preventive measures are well known.

The first bacteria we worked with did not express a visually interesting fluorescence; it was somewhat opaque, which made photographic records more difficult. Although we followed all procedures according to experimental protocols, we had to discard the first batch. We decided to use bacteria from samples provided by another researcher, who had recently conducted experiments and

achieved good results for fluorescence. What we did was the following: we placed a small amount of the bacteria into a test tube along with a bit of culture medium to keep them alive. Along with this medium, we added the gene fragment we wanted to insert. This fragment originally comes from a species of jellyfish and expresses fluorescence in the green spectrum. Together with this gene, we introduced resistance to a specific antibiotic because the bacteria that did not incorporate the fluorescence gene would not survive the antibiotic we added to the culture medium. Only the bacteria that received the gene into their DNA would survive in this culture medium.

We took this tube and placed it in a machine that delivers an electric shock to the bacterial cells. This is one of the techniques used to insert the gene into microorganisms. We needed to let them grow in the incubator overnight, and the next day, we would have a sufficient quantity to use as ink. We were creating a rhizome, expanding our dimensions as we encountered the bacteria, the laboratory machinery, Eriona, and the other scientists. All of this caused silent movements, certainly a short-circuit that brought monsters to life.

This moment in the research, in the process of creation, introduced a certain slowness. A certain silence. I had already decided to draw a Frankenstein, a mammoth, and an image of George Church with the word "thanks." It was the final stretch in the lab, and moving to the workbench brought an intensity that still resonates with me today. The electric shock was a process of assemblage, a shift in direction, marking proliferations and population growth. It wasn't just the bacteria that were changing their genome; it was also the release of other possibilities of life, of times and speeds. What can a bacterium do[10]?

I thought about the bacteria, the fluorescence, the wandering walk through the lab benches until I found them, and later, the brush. I entered a shifting zone in such a way that everything I understood about bacteria, all their biological determinations, was suspended. It was strange to pull the bacteria away from biology, from the classifications we assign to them there: a biological reading that had seemed like the only possibility until then.

At the same time that biology captures bacteria within a classification and biological hierarchy, we interrupt other flows, prevent deterritorializations, and put a final point with classifications such as useful/non-useful, pathogenic/non-pathogenic. We classify them, mark their functions, uses, and attributes: Gram-positive/Gram-negative. And we do not allow ourselves to be affected by them, to think about how they are composing the world, creating something around them in the relationships

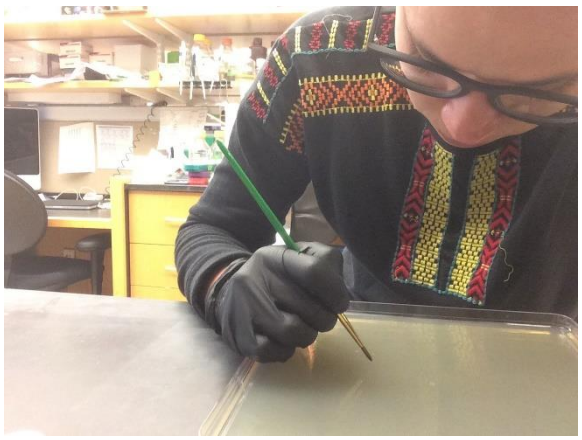
[10] The question is an allusion to the one raised by Spinoza: "What can a body do?"

they form, without this being aligned with an anthropocentric perspective. In this way, we teach a biology that hierarchizes and reinforce a refined system of exclusion and disregard for other forms of life. We think of life as a sequence of events that happen as if they were a timeline. We mark a point of departure and arrival, where the unfolding of life itself is predetermined. We have arrived in a captured world, distributed into boxes, made of signs, and we can't break free from this. We don't open ourselves to let things come together or find other forms of connection. We erase the intensities of encounters and the singularities of beings.

> We line up life in single file [...] and because of that, we carry a vectorial weight. We are prisoners of a scale that, whether ascending or descending, is always directed towards something, has a destination. Everything in nature comes to be seen through the lens of *telos*. Therefore, it is not surprising that in the teaching of biology, there is always a *for* (a heart to pump blood, kidneys to filter, roots to sustain, mitochondria to breathe), a functionality that precedes the structure. A life thought of outside of life (CHAVES, 2018, p. 15).

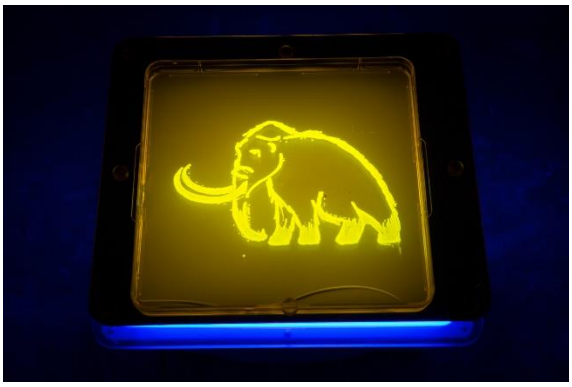
On the day I was to draw with them, I brought with me a brush kit I had purchased. One of them gave me an interesting result, as I was able to make a stroke that was neither too thin nor too thick. The bacteria would grow from the stroke I made. It was just the beginning of the drawing; the rest would be up to the populations they would form on the plate. The experimentation with the bacteria, the unfolding of becomings, has provoked—and continues to provoke—new perspectives on biology, although stepping outside of these significances is not easy. We have been experimenting with living beings, using biological knowledge as one point of entry; experimenting with these significations creates cracks and fissures, opening up space for us to create new ways of relating to other beings. Becoming-bacteria: something crossed over and continues to resonate today.

Figure 1 - Painting with Bacteria on a Petri Dish



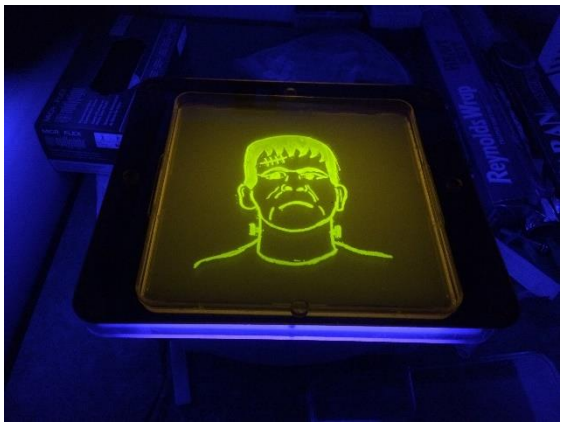
Source: Own Collection

Figure 2 - Mammoth Drawn with Bacteria



Source: Own Collection

Figure 3 - Drawing with Bacteria



Source: Own Collection

The production of the bacteria was a composition, a becoming that, as movements occurred, something was deterritorialized and released flows of life that had been imprisoned in a bacterium we had, until then, seen only through the limited perspective taught by biological sciences. We also do not create bacteria without ourselves becoming something else, without bacterial particles stirring desires to compose with them. Something passed, and the bacteria were no longer the same. At that workbench, I pulled the bacteria away from biological classifications and, along with them, ventured into the territory of art.

And why can't a bacterium become art?

This encounter with the bacteria, the brush, and the workbench also led us to trace lines of flight that allowed us to think beyond the significations of biology. A bacterium can change the entire course

of a life, a brush can deterritorialize an entire environment surrounded by machines with the primary purpose of generating scientific knowledge, and a work of art can be stored in the cold chamber of the lab, sharing the same shelf as the bacteria from scientific experiments. This encounter with the bacterium and the brush had the power to proliferate life where it was stagnant.

And what if science laboratories also became places for artistic practices? Wouldn't it also be possible to reinvent our ways of existence? New possibilities of being in the world? Another kind of education where experimentation would have a place?

Final considerations

We have increasingly been reflecting on the categorizations we invent for the lives of living beings, the utilitarian character we attribute to these other forms of life, and the way we organize all of this to create the concept of nature, always outside and distant from us. Who said that the butterfly wants to imitate eyes on its wings to deceive predators? We cannot perceive such intention. The eye-like shape on its wings is a negotiation with the environmental particles that pass through it. It is simply being. It is in an assemblage, composing with particles that affect it. It is a rearrangement of forces that has occurred over the years of the species' evolution. These are wings that carry the butterfly's encounters with what surrounds it during its existence. And so it composes the world with its colors, with its wing beats that, when observed casually, look like blinking eyes.

Moving between science and art has placed us in this movement of experimenting, in attempts to escape the significations and frames we impose on what pulsates. We try to organize the world, but end up imprisoning life and closing our eyes to other possibilities of flight. We must retain some porosity to allow ourselves to be affected.

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