

Ways of Inhabiting the World: a science education with/in the midst of/through life

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ABSTRACT – Ways of Inhabiting the World: a science education with/in the midst of/through life. This text presents itself as a manifest, through a writing-workshop (Pontin; Godoy, 2017) to provoke a weave that establishes the urgency of thinking and acting in the construction of other relationships with education in natural sciences in educational spaces. Thereby mobilizing teachings and learnings that weave themselves in the gaps of sympathetic observations, attentive experimentation, and self-educational processes in the midst of life, which cultivate multiple ways of inhabiting and constituting the world. Through a writing-workshop, an invitation to educators emerges from this manifest, no less unsettling, but bathed in vitality, joy and good luck, for them to create circumstances and thoughts with-life in education and in natural sciences.

Keywords: Manifest. Science Education. Writing-Workshop. Inhabit. Life.

RESUMO – Modos de Habitar o Mundo: uma educação em ciências com/em meio à/pela vida. Este texto se faz ao modo de um manifesto, por meio de uma escrita-oficina (Pontin; Godoy, 2017), provocando uma tessitura que instaura a urgência de se pensar e agir na construção de relações outras com a educação em ciências da natureza nos espaços educativos. Mobilizando, assim, ensinagens e aprendizagens que se tecem nas brechas de observações simpáticas, experimentações atentas e processos autoeducativos, com/em meio à/pela vida, que cultivem múltiplos modos de habitar e constituir o mundo. Emerge, desse manifesto, a partir de um fazer escritural-oficineiro, um convite aos/às educadores/as, não menos desassossegador, mas banhado de vitalidade, alegria e boa sorte, de que criem circunstâncias e pensamentos com-vida na educação e nas ciências da natureza. **Palavras-chave: Manifesto. Educação em Ciências. Escrita-Oficina. Habitar. Vida.**

Introduction

You wake up in the morning to an alarm clock. You interact on social networks, get out of bed, take a quick shower, and then eat and drink something - maybe some bread and cheese, some fruit, a cup of coffee. You quickly find your way out of the house to one place: school. When you get there, the first class is science at 7 a.m. What will be the topic? Biology, chemistry or physics? Molecules, cells, tissues? Physical-chemical interactions, ecological interactions, human interactions? Animals, plants, fungi, laws, relationships, evolutions, biophysical changes, organic reactions, energies, matter, stars, genetic mutations. Bodies: multiple organisms, processes, transformations, phenomena, environments, flows of life that can go through the learning of a science class.

How many of these animal, plant, fungal, protist, prokaryotic, viral, mineral, material, immaterial, and virtual bodies have met along the way before the hypothetical scene that outlines the fiction of a science class? How many of the bio-physical-chemical laws and transformations can penetrate the multiple daily lives of schoolchildren, adolescents and adults? How many of the scientific subjects taught in this class do not inhabit the daily banality, coexist with us, live in us? On the basis of this brief path that outlines the daily routine of so many students and teachers, we open, in the manner of a manifest, an initial space with the intention of activating a thought in science education that happens with/in the midst of/through life. According to Ailton Krenak's reflection (2020, p. 28), "Life goes through everything, through a rock, the ozone layer, glaciers. Life goes from the oceans to the land, it crosses from north to south, like a breeze, in all directions. Life is this crossing of the living organism of the planet in an immaterial dimension". The life that lives here, in us, and in you, and in others: other humans, other non-human beings, other beings more than humans, in plants, and protozoa, and viruses, and minerals, and energy, and rays of light, and the moon, and rivers, and rocks, and the sky, and the night, and substances, and... and... and... Inspired by the concept of the rhizome, by Gilles Deleuze and Félix Guattari (2019, p. 48-49):

A rhizome does not begin or end, it is always in the middle, between things, inter-being, intermezzo. The tree is affiliation, but the rhizome is alliance, only alliance. The tree imposes the verb 'to be', but the rhizome has as its fabric the conjunction 'and... and...'. There is enough power in that conjunction to shake and uproot the verb to be. Where are you going? Where do you come from? Where are you going? These are useless questions [...]. It is that the medium is not a means; on the contrary, it is the place where things gain speed. Between things there is not a locatable correlation that goes from one to the other and back, but a perpendicular direction, a transversal movement that carries them one to the other, a stream without beginning or end that gnaws at its two banks and gains speed in the middle.

When we talk about life, we think of it as an uncapturable flow that, according to Tim Ingold (2015a, p. 235) “[...] doesn’t start here or end there but is continuously happening. In this way, living implies conceiving of this continuous birth, generation of beings in becoming - which is “[...] never to imitate, nor to do as, nor to fit into a model, whether of justice or truth [...]. Becoming’s are not phenomena of imitation, nor of assimilation, but of double capture, of non-parallel evolution, nuptials between two realms” (Deleuze; Parnet, 1998, p. 10): to witness the continuity of life, where nothing is pre-ordained, always returning to the currents of its formation, where things become things and the world becomes world. Tracing this path where life erupts has been our wager to inhabit the world of/in/with nature science education, since “The occupant occupies a position in a ready-made world; the inhabitant contributes through his activity to the continuous regeneration of the world” (Ingold, 2015a, p. 247).

In the destinations of life that is activated in its own course, we seek to think about the possible potencies of inhabiting an education in science that happens beyond and beyond the representation of the world, and of existing. Hiata Nascimento and Guaracira Gouvêa (2020) warn us about how the trajectory of science education carries elements of Western thought that are founding or characterizing it. Thus, when thinking about the foundations of science education, the researchers state that:

When acting on the basis of theoretical and methodological devices of the Social Sciences and Humanities, Science Education consequently seizes epistemological contributions of a Euro centered profile and structured from the Western conception of rationality that guides expressive parts of the modern social-scientific thought (Nascimento; Gouvêa, 2020, p. 475).

It is in the dissonance of the Eurocentric, Western, ultra-rational and representational profile that we wish to think, dream and mobilize other ways of (co)creating-habiting science education. How can we mobilize our classrooms and teachings, practices, sayings and doings, towards the construction of a territory that, more than rhetorically inclusive, is multiply populated by as many existences - processes, becoming, materials, transformations, histories - as possible?

Creating such a classroom territory has a certain dose of dreams - inspired by philosopher Paul Preciado (2020, p. 19): “Over the years, I do not know whether out of consolation or wisdom, I have learned to consider dreams as an integral part of life” - as well as delusions and unorganized desires in the consciousness of a given, pre-ordained world. Cultivate a notion of knowledge in science education that is not legislating and limiting thoughts, in favor of knowledge that is thought itself in flux, in activation. Therefore, that does not submit life to the rationalization of experiences but enhances and elevates it: “Instead of a knowledge that opposes life, a thought that affirms life. Life would be

the active force of thought, and thought, the affirmative potency of life” (Deleuze, 2018, p. 130).

Our act of singularization corroborates toward the modulation of thoughts in the natural sciences that are porous to the multiple forms of life that erupt and happen indefinitely, in heterotopic territories (Foucault, 2013). Territories that continually collapse the patterns of the humanities statutes, as Juliana Fausto (2020) writes, precisely because they are linked to the active force of thought that expands the prerogatives of abstract and rationalized knowledge (Deleuze, 2018), brought closer to the living questions of existence.

By mobilizing an education in science with/in the midst of/ through life, we put ourselves in touch with “Inhabiting the problem [...] a way of hesitating, of slowing down the solutions that pretend to be magical. [...] is also to act, to engage in actions, fabulations, and narratives [...]” (Fausto, 2020, p. 96). We write a constellation of modes that contaminate each other, that engender with a will to give what to think about in science education, beyond what has been thought, said and felt, beyond the instituted and institutionalized. We manage¹ a way to inhabit a problem, namely: to show multiple ways of perceiving life and living related to the possibilities of science education.

To do so, we risk ourselves in provoking writing-actions-thinking that mobilize “provisional arrangements” (Fausto, 2020, p. 101), being willing to (co)constitute worlds and recognize the “[...] capacity of life to continuously overcome the destinies that are thrown in its path” (Ingold, 2015a, p. 26). We engage in producing a writing-workshop that performs a manifest, which, as taught by Vivian Pontin and Ana Godoy (2017, p. 1563), “[...] beyond experimentation, requires the making of alliances, requires a weaving of threads, requires the creation of bonds, often of strange, schizoid, unexpected connections, which writing finds the occasion to bring to the surface”.

The manifest is thus made as a possible way to act upon lines of writing and affective forces that demand passage. “Writing is inseparable from becoming” (Deleuze, 2011, p. 11). Becoming, moving in life, between lives, provoking the possible, “[...] agencing with intense multiplicity, of which is composed that half of the world that is pure movement, pure becoming, pure flow” (Tadeu; Corazza; Zordan, 2004, p. 129). With the manifest, we rhizomize hopes and ways of inhabiting the world, of creating worlds, of creating encounters, of creating ourselves in education. To do so, we seek to activate our “vibrating body²” (Rolnik, 2016): to make ourselves porous in the world, in the affections that cross us; to stir our creative and sensitive capacities in the arts of education, in the experiments with sciences, in the encounters with multiple forms of life. Thus, in these intense creations and crossings, it was necessary for us to be aware of the flows that displace any attempt to stand still: impermanence, becoming intense, visceral.

In this way, we regulated a writing made fruitful by the multiple encounters and vibrations that we weave together: we never write

alone, but we are bathed, inspired, approached by the non-harmonious relationship with other beings, human or not³. They are contaminated and contagious, promiscuous lines from which we do not emerge unscathed, for “[...] words make us think and feel” (Stengers, 2002, p. 137). We bet that those who encounter them will also emerge different from themselves, because “[...] bodies also do so by being formed by words, formed with words, created in words [...]” (Pontin; Godoy, 2017, p. 1560-1561).

“The crossroads is the place of uncertainty, of non-evidence, of the strange. And this is not a weakness, but a strength” (Preciado, 2020, p. 32). Like Preciado, we embrace the adventure of the crossing⁴, leaving behind what remains of the old and stagnant in us, giving way to the unusual, to the impermanent, to the monstrous in us, to the strange that we are and to what we cease to be, incessantly. “Changes, displacements, intensities” (Sales, 2022b, p. 27). A mad crossing between becoming educators and becoming scientists, a leap to the flows of thinking life, to what pulsates in our bodies, in the world we inhabit and, in the worlds, we constitute in education, in the classes and in the affective relations that permeate educational relations. Our workshop arrangements, which are also conversations between three researchers and teachers, are the stage from which transformative desires emerge from what we have made of ourselves as far as science education is concerned. Therefore, a writing workshop seemed to be an interesting bridge for our chaotic tensions to emerge as a manifest. We were provoked to write with the noises of the world, as Leandro Belinaso (2016, p. 101) suggests, which does not dare “[...] to silence the life that simmers”. Therefore, because of its communitarian character, which goes beyond its own authorship, these writings produce lines that raise a manifest, weaving and mobilizing thoughts that inspire us in the multiple contaminations between life, science and education. The text is finally born from an intense will to do, in overflowing desires, “[...] the invention of another of education. The affirmation of a knowledge with will” (Corrêa, 2006, p. 17).

Many encounters have inspired and infected us to write the following lines: academic and literary readings, music, philosophies, artistic productions, educational experiences, ethics-politics-poetics of life-education. Such crossings have allowed us to write with a will to do, driven by speed, because “writing must produce speed” (Deleuze; Pernet, 1998, p. 43).

In this manifest, we have gained speeds by mobilizing some affections that permeate us when we think about science education and its connections with the multiple ways of being and existing, of inhabiting, constituting, influencing and creating (in) the world. Such thinking means “[...] discovering, inventing new possibilities of life” (Deleuze, 2018, p. 130). In the sequel, two sections follow in addition to the concluding remarks. The first section: Astonishment. Involvement. Play is animated above all - but not only - by the dimensions of attention, sympathetic imagination, play, and self-education in their multiple pos-

sible connections with education in the natural sciences. Already in the second section Education. Science. Life, we eagerly affirm the urgency of establishing different relationships with science education in educational spaces for the sake of deterritorializing, provocative learning that opens up in the observations, experiments, and inconsistencies we encounter as we inhabit the world.

As we shift our ways of engaging with science and life, we also shift the possibilities for creating and inhabiting worlds in educational weaving. We intend these threads to be useful tools for those who encounter them, for as Deleuze emphasized in his dialogue with Foucault in *The Intellectuals and Power* (Foucault; Deleuze, 2019, p. 132), “A theory is like a toolbox. [...] It has to fit; it has to work.” In this way, the writings presented here do not intend to exhaust the possibilities of thinking and mobilizing in science education, but to contaminate this field with sighs of life, with movements of desire, as tools of dreams/deliriums/classes that can be implemented by the educators who find themselves with them.

To the readers, after all, our impetus is that these words and conjugations of ideas sound like weather, sometimes fresh, sometimes arid, of a thinking that does not want to ride solely by the lines of the schooling processes, which we want to implode their crystals of our bodies too loaded with identities and schooled dreams, making room for other ways of learning and teaching, therefore, of making/creating/living education.

May the life-flow of those who read us mingle with the strangeness of the non-place, of the non-ideality of a text, of the safety of the usual world: may the medium, the landing of territories and performances of the self be suspended and allow non-representational images of education, sciences, and life to be seen. A manifest does not conclude, limit or define. It congregates, drags, pulverizes, makes it dance. May the possible readers of this text dance with us, eager for movement.

Astonishment. Involvement. Play

Close coupling between observers and the aspects of the world that become the focus of our attention. In the construction of what we call scientific thought, to observe, an action verb that is reborn, once forgotten, or neglected, but that designates an interest in what stands between an “I” and the world, in order to know it, unveil it, decipher it: it is necessary to open oneself and not to close oneself in living. To be attentive and alive to the world that opens up and is born under our active perception, producing multiple ways of sensorial participation, putting us into an engagement with the world and not a withdrawal from it. This is effectively inhabiting and constituting world(s).

“You must be attentive and strong” (Veloso; Gil, 1969). It is the thought that agitates and is agitated by the sounds, smells, colors, forms of its environment: to do is to make oneself. To educate is to educate

oneself. It is about reviving our pores, recovering the forgotten conditions of wonder and surprise, to no longer just “[...] skim across the surface of a world that has been previously mapped and constructed for them to occupy [...]” (Ingold, 2015a, p. 86). To offer the means to build that attentional condition, in which the world opens up and makes itself present to us, so that we ourselves can be exposed to it and be transformed by it (Ingold, 2020).

A science education could reorient itself by the edges of wonder and engagement with the movements of life as it is, every day and mundane in its occurrences.

In a world in becoming, however, even the ordinary, the mundane, or the intuitive cause wonder - the kind of wonder that comes from valuing each moment, as if, in that moment, we were encountering the world for the first time, feeling its pulse, marveling at its beauty, and wondering how such a world is possible. I argue that reviving the Western tradition of thought means recovering the sense of wonder banished from official science (Ingold, 2015a, p. 112).

However, intertwined and entangled in relations, beings, contents, things, materials, elements, transformations, living and non-living beings - as the schooled scientific categories insist -, all order of multifaceted encounters of a “[...] wandering through intense paths” (Guarienti, 2012, p. 214). How is “[...] our power to pay attention to what we do not know about the active force of materials, the movements of things and beings, and the way we name all this, to the point of being born together with these formations, reciprocal” (Dalmaso; Rigue, 2021, p. 274)?

After having lived through a pandemic period, which was very painful and distressing, in which the human coexistence was questioned by the coexistence with a virus that was new for us (the SARS-CoV-2), we filled ourselves with the desire - and sometimes also with the fear - to meet, both with other human beings and with non-human beings: to drift out, to permeate ourselves with the possible encounters, with that which dwells in the unusual and in the gaps, in the fruitful wanderings and perambulations of existence.

“Traveling... Have you ever thought about traveling? When the sun fades... Ah, I will travel...” (Azevedo; Valença; Ramalho, 1996). To welcome the journey inherent in life, to enter into its movements, is to relentlessly displace, to accept the invitation, to engage, to say yes, because, as Clarice Lispector has already taught us in *The Hour of the Star* (2019, p. 11), “Everything in the world began with a yes. One molecule said yes to another, and life was born. But before prehistory, there was the prehistory of prehistory, and there was never, and there was yes. There was always. I don’t know what, but I know that the universe never began. To say yes is to accept the intense, unpredictable and unimaginable movements of life, and therefore also of learning, because to learn is to be alive, and to be alive requires the initiation of learning (Rigue; Dalmaso, 2020).

We understand that education deals with “[...] any movement that produces a change” (Corrêa; Preve, 2011, p. 187), therefore it is a process that happens in multiple spaces, times and subjects, being a product of the encounters to which the bodies are subjected. Recognizing this, however, does not eliminate the dimension of agency that exists in educational processes. The educator is an agent of encounters, an artist in the craft of mobilizing concepts, affections and perceptions (Deleuze; Guattari, 1992), of connecting lines, of weaving narratives: the educator has the opportunity to produce, to inaugurate ways of life.

About the educator, Fernand Deligny (2018, p. 126) states that he/she is a creator of circumstances: “Creator of circumstances, so is the educator who struggles with all inertia. Good luck. I advise you to maintain a mode of self-expression. Even if it is only to absorb the foam of delirium that bubbles up around every intense action. Create circumstances, create ways of living in the world, create ways of affecting the world. To co-create. To impact the world. To exist. To educate. Good luck, Deligny (2018) wishes us, and we accept. We will have to accept vulnerability and becoming as we embark on this endeavor, which is to live education, and as we actively engage as educators in the midst of the “foams of delirium” that present themselves in our territories, and immerse ourselves in the schizoid and aberrant movements that take place in education, in learning, in encounters, in the creation of possibilities, beyond neoliberal captures, disciplining mechanisms, and normalizing and hierarchizing processes. Since:

We find effects of disciplinary and control mechanisms wherever we roam. They are gestures and movements that are stipulated according to a certain society [...] they are micro-relationships, each one with its obedience and servility codes. The space, the place in which we are inserted; our location in the geographic space as points, locates us and makes us emit signs to be performed and reproduced (Guarienti, 2012, p. 204).

Such process of acceptance and submersion becomes even more precise especially when we embark on the ethical-aesthetic-political positioning of affirmation, recognition, and defense of the multiple forms of life, of the schizoid existences, of the minorities, of what cracks the egoic delirium and reveals itself to be other, incessantly other. This defense is a work of creating and inhabiting the multiple expressions of the modes of existence, of perceiving ourselves as always being other:

If on the one hand we face this scenario that prevails by the enlightenment, which excels by its potential concentrated in the rational thought of ideas, in an education by representation, by certainty and clarification of significances, on the other hand, we can experience the singularities, this potentiality of opening spaces for what we really are and opening to an education of the expressions of different ways of life (Guarienti, 2018, p. 117).

The power of a life science education within this multiple prism, which is the knowledge and action that emerge from encounters with beings, is a delicate, complex and inevitably open line to “[...] ethical care with what is felt, passes through the body” (Rigue; Dalmaso, 2020, p. 146). A dimension of attention that extends the stimulus-response mechanics of the teaching and learning premises of behaviorist techniques, approaching an ethics of the encounter of each body with knowledge, with others, even with “[...] self-education - or the reading that the individual makes of the world from his experiences and capacities” (Corrêa, 2000a, p. 74).

To say yes to movements of self-education - modifications of the self - is to be open to encounters, to be porous to the possible agencies in the unpredictable territories in which we experience our existence. Drawing the threads of her teaching career in science education and in the training of science and biology teachers, Lucia Estevinho (2020) worries us with the narrative of a student who, despite coming from a family that cultivated oranges, did not perceive or recognize trees as living beings. “By fixing life in a scientific concept, the teaching of biology is reduced and does not allow a biological understanding of life itself. As I noticed in the case of the student in the 5th grade who did not understand that the tree was a ‘living being’” (Estevinho, 2020, p. 153). These intersections also emphasize one of the main axes at the core of what we popularly know in science and biology education: the dimension of biological life and organism, of what is alive and what is not. Estevinho (2020, p. 161) finds gaps in the creative, artistic and fabulous processes mobilized in the training of science and biology teachers, in order to “[...] be open to the currents that cross us”.

An intricate web (Ingold, 2015a) in which there are no classifications of living and non-living beings, but an indiscernible zone of existence, woven by the tangled threads of its inhabitants, mixed with substances and environment, where one is unthinkable without the other. As Ailton Krenak (2020, p. 71) writes in *Life is not useful*, “Other beings are with us, and the recreation of the world is always a possible event. It is from this active hope that we proliferate, as descendants of a future in education, wishing to think the life that flows in natural science⁵ education as lines and forces that cross and intertwine in a world that is never complete, but always in continuous birth.

In the path of thinking the life that flows in science education, the text *Diversity, Human Rights and Right to Life in Natural Sciences Education* (Sales; Rigue, 2022) defends the notion of right to life in this field as a possibility to extend the notions of diversity and human rights:

To break the dualism - human and non-human - is to explore an open path to valuing life that regenerates with the different beings that share multiple experiences in our territory. Therefore, thinking about the importance of scaling dialogues involving the right to life in no way negates the reflections pertaining to Human Rights, precisely because it is expanding this discussion (Sales; Rigue, 2022, p. 7).

John Maxwell Coetzee (2009), in *The Life of Animals*, suggests that there is a need to permanently operate with a “sympathetic imagination” in these different ways of being-in-the-world so that it is possible to resonate processes of creation and fabrication of lives with beings. As a desirous impulse to enter rhizomatic thoughts, Coetzee (2009, p. 43) points to the urgency of activating sympathy as a line that comes to meet “[...] sharing the being of the other,” being the distinct variations of literature - such as poetics - powerful ways to inhabit the “[...] commitment with it” (Coetzee, 2009, p. 61), with the multiple beings.

Rising a science education contaminated by this sympathetic imagination summons our bodies to experience an ethical, aesthetic, and political stance towards life, to the point that we no longer exclude its dissonant variations from the spaces of thought of natural science education. Rather, we must commit to “[...] reimagining the world and telling another story” (Fausto, 2020, p. 81), fabricating other implications, eliciting “[...] events in which a ‘becoming able’ is at stake” (Stengers, 2007, p. 62). Becoming capable of being present with the beings in our educational processes - activating the students in science classes to be involved with the observation of the world, in an open-air experimentation, attentive, perplexed to everything that is seen.

Does knowledge actually lead to wisdom? Does it open our eyes and ears to the truth of what is in the world? Or, on the contrary, does it hold us hostage within a self-made compendium, like a house of mirrors that blinds us to all that lies beyond? Would we see more, experience more, and understand more if we knew less? And is it because we know too much that we seem so incapable of dealing with what happens around us, and of responding with care, common sense and sensitivity? Who is wiser: the ornithologist or the poet - who knows the name of every bird, but already has them pre-classified in his mind; or who knows no names, but looks delighted, amazed, and perplexed at everything he sees? (Ingold, 2015b, p. 22-23).

An involvement with crossings of the urgent affective alliance that we need to establish with/for the world, being, therefore, science education an interesting link for this gesture of germination to be possible. A gesture implied in the education in natural sciences also corresponds to activating the student’s presence towards the relations of forces that, increasingly, have exhausted this planet’s resources and life forms as if we could incessantly consume it. To provoke with the students an ethical-aesthetic-political posture of bonding with the planet, with beings, with rivers, beyond an anthropocentrism, since everything is nature, we are nature (Krenak, 2020).

Inspired by Brian Massumi (2021, p. 48), we co-create with the notion of a sympathetic imagination in favor of a science education through play, triggering a field that “[...] creates the territory that maps, in new emerging variations in an already existing arena of activity,” envisioning a mapping that expresses and imagines existence with beings.

A notion of playing that “[...] involves its participants, making it trans-situational and trans-individual” (Fausto, 2020, p. 170), going towards intensive instants that modify all who play - as happens in the realm of animal politics - “The more one plays, the more one invents; the more one invents, the more apt to improvisation one becomes, that is, the more apt to life itself” (Fausto, 2020, p. 165).

How many laughs, conversations, shouts and attitudes labeled as undisciplined disconcert us in our educational practices, based on the games played by our students? Why, within the perspective of a teaching culture, do these attitudes affect us so much, leading to a certain feeling of deauthorization? Would it be possible, in our classroom situations, to weave partnerships with the students, together, in collective relationships, in the ungovernable force of a becoming-child and becoming-animal, contaminated by play, by fun, by smiles, by the joy of an encounter?

Slowing down the tendencies that propagate immediate answers in the world and, at the same time, in science education, comes in the direction of mobilizing bodies so that they are willing to bring out instants of learning - inventive and improvising - with the beings of the in-the-world, cracking and expanding our human regimes, predictable and abstract, that inhibit the chance of becoming and experimenting with life. Play, then, presents itself as an inherent aspect of a co-creative engine that reconfigures our modes of response, meeting an abundance of experimentation that is spontaneous and instinctive. A lambasting of the impermanent nature of living that allows us to welcome novelty.

A science education that interests us echoes fabulizing, sympathetic, minor molecularities that escape the “[...] subject/object duality and the ready-made character of an object, thus reinserting sympathy into a transindividual field” (Fausto, 2020, p. 170-171). A gesture of continuous invention that is possible when we live intensively “with” others, when, at the same time, life has the chance to make itself present in the thoughts we activate (Deleuze, 2018) in science education.

From the account of the student present in the writings of Estevinho (2020), it is possible to realize that for some people there is no recognition of plants as living beings. Perhaps it is precisely because of their abnormal and strange character, far from the notion of the human self that has historically been propagated in the Westernized field of teaching natural sciences, that the young woman did not recognize trees as living beings: they are the other. Along the same line of thought, it is possible to conclude that although the schooling process frames knowledge from the field of natural sciences in the school - classes, didactic materials, curricula, among others - the canonical teachings remain so far from being alive that they constantly mobilize us to separate ourselves from everything: from rivers, from forests, from the world.

Increasingly, students are reduced to scores that supposedly measure what they have learned. Tests, exams and examinations are constantly present in the different levels and stages of schooling, dissociating the concept from its reality through the prevalence of exercises that

favor memorization skills (Rigue; Corrêa, 2021). The crystallized knowledge – linked to a logic that has surrendered to the utilitarian sense of life (Krenak, 2020) and to the prospect of the future of institutionalized machines (Corrêa; Preve, 2011) – distances us from thinking with life and from other experiences of existence, causing abstract rationalization to prevail. This humanistic and representational rationalization is precisely the one that places the human being in the referential center, losing the chance to modulate the thought that dances with the life that compels, moves, guides, animates us.

The abysses that echo in the prevalence of predictability in scientific schooling bring the education of students closer to the dualistic assumptions: nature versus man, subject-object, natural-cultural, inside-outside, self-world. Our science education inevitably ends up distancing itself from thinking about/in/with life because it is projected onto stratified knowledge. This fact confirms the understanding that the limits of rationalized knowledge in science education do not support the alienation, the contact, the multiplication of life-forms-forces-flows that inhabit – generate – the world with us.

In order to germinate and fructify other spaces of creation in science education, beyond the totalizing and molar pretensions, it is necessary that we - the educators - engage in the activation of an extraordinarily different thinking, which goes beyond a “natural faculty”. It is crucial that we cultivate an experimentation with thinking in science that does not come close to inoperating thinking itself, to render sterile the capacity to observe the world, not with passivity, but with participation, perceiving and experiencing its modulations and untimely intensities (Deleuze, 2018), responding to it with action, attentive and careful to its signs. Such efforts can inhabit teaching in different instances of educational work, from the planning of activities to their development materialized in the case that a class is, along with the resonances that keep echoing in the subjects that find themselves in these territories of learning and education (in) natural sciences.

Education. Science. Life

To inhabit the environment in which we live is to be part of it, a practice that allows this territory to become part of us. Science, in its long authoritative construct that creates points of view, has told us how this environment, the world and life, is or should be, leaving us little freedom to experience it, to live it in constant birth, to perceive the environment without necessarily recognizing it in frozen and classificatory forms and dispositions of things, existences and matters, but to connect them, the flows and movements, the currents of its - and our - continuous formation (Ingold, 2015a).

Science education, as we have outlined so far, is powerful as far as it expands the possibility of co-creating and regenerating worlds. In this respect, the audacity of manifesting ourselves by mobilizing the present activation of the forces of writing is marked by the urgency of ten-

sioning what we have made of ourselves - beings - in the Anthropocene. As anthropologist Anna Tsing (2019, p. 14) suggests, “The term Anthropocene marks a difference: as industrial and imperial infrastructures have spread, the dangerous unanticipated effects have skyrocketed”.

In the infamous age of the Anthropocene, the multiple and strange existences that inhabit and produce activity in the world are not prominent. As a result, we live in times of ruin brought about by violent and indistinct changes on and under the earth. Living in these times is challenging, both for us humans and for the other life forms that share the Territory-World with us. However, encouraging and empowering, Tsing (2019, p. 18) reminds us that “[...] the world of the Anthropocene is full of strange and surprising things we need to know, and it is time to renew our collective interest in what is happening”.

The researcher Donna Haraway (2016, p. 2), also following in the footsteps of the Anthropocene’s suspense, says of the perils of these times: “I think our task is to make the Anthropocene as short and tenuous as possible, and to cultivate with one another, in every way we can, epochs to come that can rebuild refuges. The creation of refuges becomes something essential to our permanence, to the preservation of life, because “[...] right now the earth is full of refugees, human and nonhuman, and no refuges” (Haraway, 2016, p. 2). Consider, then, the urgent need to find ways to forge these refuges in education, in our relationships with scientific knowledge and technological production, in science education, in the spaces in which we operate, in the practices, pedagogical strategies, and narratives that we produce and update about life, species, interactions, reactions, matter, substances, movements, among the many others, in short, who insist and resist in order to stay alive.

In biological studies, an ecosystem is understood as a set of communities, populations of different species that coexist and interact with physical and chemical elements. This coexistence is not peaceful: there are the hunters and the predators, the feeders, the foragers - roles that change in many moments. There are the producers who capture the sunlight and, in the deepest beauty of existence - so well translated by the song *Luz do Sol* by Caetano Veloso - transform the sun rays, along with water and oxygen, into glucose through the biochemical process of photosynthesis, feeding the multiple forms of terrestrial habitation; the herbivores who feed on these first photosynthesizing producers; the carnivores who feed on the herbivores; and the decomposers who return the materials that came from death to the movements of life. These biological cycles are interwoven in multiple relationships that we, researchers and educators of life, constituted within formations with humanistic biases, are constantly trying to close, in an effort to represent them and, at the same time, to situate ourselves, the supposedly powerful humans, on the outside. However, thanks to the metamorphic force of life and the events that surround it, these relationships mutate and spill over, drawing schizoid lines and other energy flows.

To carefully observe a territory called an ecosystem is to perceive the incredible beauty and abundance of existence, viscerally endangered and in flux. We can see this by looking at our spaces of life – and the end of it. Death approaches life, and it is only because of this that life is possible. “Life and death are related in the currents and dangers that run through a life” (Sales, 2022a, p. 6). Flows of energy, movements of matter, vitalities, reactions, transformations, relationships, connections. In these paths it is perhaps possible “[...] to create a Phoenix: reborn from the ashes. To germinate life out of mourning, out of confrontation, out of death, [...] out of science, out of philosophy, out of encounters... To germinate new worlds in the midst of uncertainties and to learn other ways of passing, of becoming a bird, of walking *pari passu*” (Sales; Estevinho, 2021, p. 290). Life and death, walking *pari passu*, connected, in motion⁶ - is there room in science education to break the taboos around talking about death, to think about life and death as instances that are made together?

The pulverization of these writings-thoughts, like someone who dances frenetically, stirring up a dense dust of what was previously stagnant, becomes part of what we have tried to mobilize in the educational spaces we inhabit, even if we do not have answer boxes-protocols to settle what we move and boil. We believe that in the gaps lies the power to actively influence the study of the natural sciences, which can and must be transposed, translated, and transcribed in educational spaces: in museums, parks, schools, science fairs, mediation, teaching, and science classes. Such thematic intersections can be linked to several fields, such as ecology, biochemistry, zoology, botany, organic chemistry, thermodynamics, but they always extravasate, thanks to their transdisciplinary character, in lines of escape (Deleuze; Guattari, 2019), deterritorializing the spaces through which they pass. Atomic existence itself can be understood as shapeless, abnormal, queer, pulsating, as proposed by the queer researcher Karen Barad (Barad; Marçal; Ranniery, 2021). Atoms, micro-forms and minimal existences enable the structuring of life-biological and chemical-physical phenomena, so dear to the natural sciences, also act in queer movements, messing up what was perceived as statically organized, showing themselves to be schizoid, strange and multiple, just as life is.

Once again, we see the world itself disrupting the attempts to represent life, to close it off, to stereotype it in a pedagogical effort of schooling that has the human being as a “model species” (Fausto, 2020) that dictates knowledge and training scripts. How, then, to rehearse an education of life in the natural sciences - an implicit education - that escapes the networks of representation and is limited by rationalized knowledge that limits - and even animates - existence and thought?

A clue to such an undertaking can be found in the writings of Emanuele Coccia (2020), when he reflects on the metamorphoses that participate in the maintenance and constant updating of life. The Italian philosopher focuses his critique on ecology and the construction of the notion of the planet as home, of “nature” as a static space, stating

that for biology “everything is defined according to a relation of utility. The biological world is structured as the basic social order among humans: the home” (Coccia, 2020, p. 162). For the author, this is problematic in that “[...] we tend to project our own experience of sociability onto plants and animals” (Coccia, 2020, p. 163), for “everyone is at home and must remain there until death. When one leaves one’s home (one’s ecosystem), it is an invasion of a foreign territory or the disturbance of an equilibrium” (Coccia, 2020, p. 163).

This notion of home imprisons us, locks us into the home, as if the place where we live were the only possible place to be inhabited, and we extend this view to the other animals, plants, minerals, and the many others that coexist with us on Earth, as if we knew what each of them could or should do. To defend the home is to limit the power of nomadism, of movement, of wandering.

For Coccia (2020), it is precisely the drift that allows us to stay alive: we are movements, we make ourselves in dislocations, in vehicles, in flows, outside of houses. In these drifts, in each of us, there is a lot of the other.

Each one of us is the physical encounter of several species, each one of us is a small zoo that always carries many more species than the one we imagine we belong to. Life has made each living being an ark for infinity of living and non-living beings. Everything becomes landscape. [...] Birth and death, for example, are here to allow each one to be an ark: being born means settling into the life of another body, being conveyed for nine months, to then become a vehicle, the ark of your genetic identity, your breath, your memory for the rest of your life. [...] Life is not a quality proper to certain bodies, it is only a consequence of the vehicular nature of matter, of the planetary structure of this world (Coccia, 2020, p. 154-155).

Constitutive and frighteningly coemerging multiplicity, in which life is prolonged, continues, in an endless continuum. There arises in us the desire to create encounters that happen in education in the natural sciences, through drifts, through the escape from the houses, from the securities, from the inertias, being aware of the multiplicities that live in our bodies, in our classrooms, in the communities that we form and in the possible learning through in-with-life.

For us, the writers and filmmakers of this manifest, it was of interest to mobilize this increasingly latent desire to pulverize the urgency of thinking about living spaces in order to tension the meanings and practices of science education with students, following Deligny’s advice (2020, p. 61) to “MAINTAIN THEM alive”. Far from the totalizing premise that presents paths for each individual, “in schooling or outside of it, it is necessary to affirm the intensities of life, of what is experienced in existence, of this potentiation of subjective capacities” (Rigue, 2021, p. 27), of this learning of natural sciences that allows to be territorially glued to the earth, to be able to “[...] live life outdoors” (Ingold, 2015a, p.

154). A life that is not segmented at any point, on the contrary, is constantly mixed, traversed, embodied by the multiple connections that make it possible.

How can we trace the paths from which life emerges, following what happens, becoming something else along the way? How do we live, narrate these paths and make them our field of practice in science education, in the relations between the knowledge of children, adolescents and adults? Thinking in the spectrum of the sciences, based on what we experience, requires accepting the journey through the co-creation of the activity of thinking with-in-my-way-through-life, rehearsing ourselves in improvisation, sensitive to what makes us ceaselessly different in the drifts, in the educational encounters, and in our existences.

We crack our provisional identities and recognize ourselves as strangers. In fact, perhaps we can exist thanks to our states of foreignness: to what dislocates us from comfort, from representation, from the self, from identity bubbles, and we become others as a condition of existing in the world. It is necessary to cultivate a certain porosity for coexistence with the other, because without it is not possible to create a territory to be (co)inhabited, to weave webs of relationships with existences - "it is from this affection for the other that a different understanding of life on earth can emerge" (Krenak, 2020, p. 104). This porosity goes hand in hand with the maintenance of a "vibrating body" (Rolnik, 2016), a body that maintains its capacity to be affected by the world that surrounds it and based on this, actively takes up the position of being able to inhabit and constitute worlds.

Here is a challenge: how do we, in our becoming teachers and becoming students, maintain the capacity to be affected by the multiple forms of life that can enter our curricula, our teaching practices, our (in) constant learning, and our science classrooms? Are we open to perceiving, recognizing, and encountering these other forms of existence in science education? In what ways can we activate our "vibrating bodies" (Rolnik, 2016) for joyful encounters in moments of scientific thinking, creating territories that are alive and highly fertile to embryonate and be inhabited by other lives?

Strangeness is an inherent part of this life. Therefore, to teach and learn science with/by/in the midst of life is to be actively willing to live the unpredictability of the questions that open up in observing and experimenting with the world, in the inconsistencies that we encounter as we inhabit – and constitute – the world. The educational process, interested in willing thinking, requires the creation - and here we mobilize this intention - of a willing opening of thinking spaces in science education that mobilizes a living, restless, indeed learning body. A body that is affected and capable of being affected as it breathes and moves in the world with the following provocation: "Either you listen to the voice of all the other beings that inhabit the planet with you, or you wage war against life on Earth" (Krenak, 2020, p. 73).

As Corrêa (1998, p. 70) writes when referring to the educational work with workshops:

[...] the workshop is designed to train educators, people capable of creating situations of dialogue with people interested in what is being proposed. The use of these strategies aims rather at breaking hierarchies both among knowledge and among people, which would lead to non-authoritarian educational situations.

Similarly, when thinking about the initial training of chemistry teachers, Rigue (2020, p. 250) suggests the “workshop as a view of what happens – of the encounters”, of those events that begin “[...] when you want to know something” (Corrêa, 2006, p. 28), thinking and activating the body to establish relationships, moments of liveliness in education. In mentioning the work of workshops, we do not want to situate them in any way as a “solution” for science education in the present, but “[...] the workshop is an opportunity, a means, a passage” (Rigue, 2020, p. 255), it is a horizon – an intense way out and freedom to learn – that can contribute to inhabiting the world with beings, without denying them, belittling them, representing them. Therefore, the orientation of the workshops has the commitment “not to produce schooling effects [...]” (Corrêa, 2006, p. 28), to open itself to the unknown, to reduce what Corrêa (2006, p. 28) calls “[...] investment in the security of the same, is to want the other; not to cultivate hopes that make one wait and that comfort”.

As an unprecedented scenario, science education is done with the students, with the beings, going to “[...] meet the exercise of autonomy and self-education” (Corrêa, 2000b, p. 120). Of practices of transformation of the self with others, in this broad “[...] ‘ecosystem’ of knowledge” (Corrêa, 2000b, p. 151) that is found in the world and can be cultivated by us – educators – with our present students. Intensive lines that can leak and produce escape routes, deterritorialized, that escape the positivization of a Westernized, dualistic, prescriptive, overly human science education, and are therefore capable of inventing a missing science education (Deleuze, 2011), which, as Juliana Fausto (2020, p. 201) comments, does not mean “[...] that it is about messianism - it is not about an elected or emancipated, exclusive or universal people - but about becoming”; and that they are collective utterances of a lesser people (Deleuze; Guattari, 2017).

Our professorial and professorialized body fabricates the invention of a scientific education implicated, involved, committed to the alliance with the world itself, with beings, “[...] alliance with the outside” (Fausto, 2020, p. 203). A molecularity that, materialized in writing, triggers a collective agency of enunciation-a non-human, contaminated affect, being: “Writing, then, and thought itself become hybrids, escaping from essences and toward the encounters that constitute the experience of life on earth” (Fausto, 2020, p. 212).

We want them to be useful tools that can be mobilized in planning, in teaching, in pedagogical practices, in experiments conducted through encounters with others, with scientific knowledge, with the multiple forms of life, in the creation of ways of existing, of inhabiting and constituting the world.

Here we activate the desire to activate the germination of an attentive scientific education that promotes intensive exits to live (in) the world, with beings, to constitute oneself as a world, to influence the world, to update and create the world – or perhaps other worlds, when this one is outdated, in need of becoming another (in) world. Something very dear to us, urgent and necessary: “[...] thought that makes life something affirmative” (Deleuze, 2018, p. 131) – the rhizome of our collective will to produce difference, differentiation, amid the practices of education that limit thinking to the memorization of information and the emission of answers.

Final Considerations

In this manifest, tensions and hopes were materialized that keep us interested and alive as teachers and researchers in science education. The very agencies woven by the writing furrowed gaps to escape the solidified lines that present themselves in everyday education, seeking to create spaces that - in their subtleties, minorities, fragilities and impermanence - are fertile to dreams, to desire, to the defense of multiple forms of life and, above all, to the possibility of mixing with them, of being other and the possibility of mixing with them, and, above all, to the possibility of mixing with them, of being other, and of experiencing difference as a way of life capable of rehearsing itself, in constant co-creation with beings and things in the world, other ways of being, other perspectives, other physical and mental connections with possibilities for learning and education.

A science education that is itself bathed in the life sciences, that goes beyond the limits invented by an expired “humanity”, to the point of learning to create a laboratory of uninterrupted flirtation with the language of play (Massumi, 2021), of sympathetic imagination (Coetzee, 2009), of the living game of relational struggle, of infinite experimentation, of gestural communication, of wonder at the other that is different and challenging. Of a present staged by the playfulness of becoming, which leads us to disparate, aberrant physical and mental territories that open gaps to the unknown and poetic within us: the continuum of life. A science education that activates our “vibrating bodies” (Rolnik, 2016), together, in the cartography of the movement of/among beings, landscapes, environments, stars, days, nights, and skies.

To build scientific relationships with the world, through the opportunities and formal or non-formal ways of science education, is to conduct ourselves, all of us, as communal beings sharing a life together. A life that flows among things and beings, in their dissonant connec-

tions, in the oscillations and exchanges that occur in the midst of the constellation of life forms that inhabit the world with us. It is out of this living with so many other beings that educational territories are formed, in the interweaving of life and knowledge.

It is precisely on the path of the margins, of questioning, of escaping judgments, of disharmonic collectivities, of nomadism, of drifting, that we believe it is possible to create a fertile ground for multiple forms of life in education in the sciences. We believe that in the potency of an education through becoming, through the space in which things gain speed in the middle (Deleuze; Guattari, 2019), it is also possible to fracture what we perceive as too human, to make cracks in an excessively humanistic, identarian and representational education, since the very institution of the human has proven to be limiting in its major character, dominant, agent of indistinctions⁷, stagnating the movement and multiplicity that dwell precisely in life, and therefore moving us away from it.

In this manifest, we ally ourselves in the collectivity of three teacher-researcher bodies, in defense of an ethical-aesthetic-political stance in relation to life, to education in the sciences, and to encounters activated in/with territories, highly fertile spaces for learning. We launch here an invitation to educators and - eternal - students, no less disturbing, but bathed in vitality, joy and happiness, that we intensify our attentional relations (Ingold, 2020) with the world and with life in the field of science education. May we provoke imaginative, compassionate and playful gestures, so that it is possible to mobilize thought and action with life in the sciences, without subordinating ourselves to the gray and solidified stratifications that distance us from the world, being able to inhabit and constitute worlds amidst the unnamable, imponderable and unrecognizable of the world. Finally, we wish all of us, educators, joy and happiness! May the journey continue. We are ready.

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Notes

- 1 The concept of agency to which we are linked comes from the writings of Gilles Deleuze and Félix Guattari, which spill over into other productions, such as Deleuze and Parnet (1998). Although Deleuze and Guattari did not focus on presenting a limited conceptualization of agency, they tried to create conditions for thinking it within its operationalization, as a symbiosis, “[...] a co-functioning, that is, the effort between bodies, and the bodies can be ‘physical, biological, psychic, social, verbal’. To act, then, is to be in the middle, among bodies, so that each and every act of agency takes place among several other acts of agency” (Deleuze; Parnet, 1998, p. 43). Agency thus has dimensions that range from the state of things or bodies to lines of enunciation, territorialities, and deterritorializing movements. In this way, agency in the Deleuzian-Guattarian view means differentiating oneself in all areas of life, tracing intensive lines of escape.

- 2 Suely Rolnik (2016, pp. 12-13) calls the “vibrating body” the - suppressed - capacity of our sense organs that “[...] allows us to grasp the alterity in its state of a living field of forces that affect us and make themselves present in our body in the form of sensations. [...] The other is thus a presence that integrates itself into our sensitive texture and thus becomes part of ourselves. Here the figures of subject and object dissolve, and with them that which separates the body from the world. There is a paradoxical relationship between the body’s ability to vibrate and its ability to perceive. It is the tension of this paradox that mobilizes and drives the force of creation, because it puts us in a crisis and forces us to create forms of expression for the non-transmissible sensations through the representations we have. Thus, moved by this paradox, we are constantly forced to think/act in order to transform the subjective and objective landscape”.
- 3 The text *Between humans and non-humans: what can Science Education do?* (Rigue; Sales, 2022) mobilizes ways of thinking about the powers that inhabit science education in perspectives beyond anthropocentrism.
- 4 A text that relates and poeticizes the intensive crossings in teacher training in natural sciences, along with research in education, is *When the Mapmaker Goes into the Field: Crossings and Poetics of a Young Teacher* (Sales, 2022b).
- 5 In the path of thinking about the life that flows in science education, the text *Diversity, Human Rights and Right to Life in Natural Sciences teaching* (Sales; Rigue, 2022) defends the notion of right to life in this field as a possibility to broaden the notions of Diversity and Human Rights: “Cracking the dualism - human and non-human - is to explore an open path to value life that regenerates with different beings, who share multiple experiences in our territory. Therefore, thinking about the importance of scaling dialogues involving the right to life in no way negates the reflections pertaining to Human Rights, precisely because it is expanding this discussion” (Sales; Rigue, 2022, p. 7).
- 6 Two works that tension the relations between life-and-death, through the pandemic territories emerging with covid-19 and AIDS, are *Cartographies of Life-and-Death in Pandemic Territories: Wound-Marks, Necro-Bio-Politics and Lines of Escape* (Sales; Estevinho, 2021) and *AIDS as a Device: Lines, Te(n)sions and Educations between Life, Death, Health and Illness* (Sales, 2022a).
- 7 Concept produced by Agamben (2004) that connotes that in this indistinctness it is not possible to define whether the being is in charge of protecting life or producing death.

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