Photosynthesis:
Cosmic Convivia of *Meteora* Alloys

The attempts and discoveries of Priestly and Ingenhousz …have been so significant not only because they triggered a huge leap in progress of understanding plant physiology, but also because they uncovered a radically novel view on the Earth's atmosphere. The air which we breath is not merely a purely geological or mineral reality—it is not just there gratuitiously, it is not effectuated by the Earth as such—rather it results, literally, from the breath of the other animate beings.[1]

—Emanuele Coccia, *Die Wurzeln der Welt: Eine Philosophie der Pflanzen*, 2016.

1 Coccia, from the German translation: "Die Versuche und Entdeckungen von Priestley und Ingenhousz […] waren nicht nur deshalb so bedeutend, weil sie einen riesigen Fortschritt im Verständnis der Pflanzenphysiologie ermöglichten, sondern weil sie einen radikal anderen Blick auf die Atmosphäre durchsetzten. Die Luft, die wir atmen, ist nicht eine rein geologische oder mineralische Realität—sie ist nicht einfach nur da, sie ist keine Auswirkung der Erde an sich—, sondern sie ist tatsächlich der Atem anderer Lebewesen" (Emanuele Coccia, *Die Wurzeln der Welt: Eine Philosophie der Pflanzen*, trans. by Elsbeth Ranke, Munich, Carl Hanser, 2018 [2016], kindle edition, loc. 574).

Plants "nourish" themselves from the substance of light—they synthesize with photons, so we commonly say. Yet how are we to think of such "nourishment" or such "metabolism"? Plants are plants because and insofar as they photosynthesize. Plant nature can be separated from photosynthesis as little or as much as human nature can be separated from thought/intellect. Is there something to be made of this analogy between photosynthesis and intellect? If we think of it in an analogy to language and the traditional question of language's substance in literary terms, would plant nature then be a Great Banquet, as Dante's *Convivio* depicts the nature of Tuscan vernacular at the allegorical table of the Latin language, featuring authority and host to the "lingo-gonic"[2] scene he dramatically depicts? What would be in the position of Latin if this analogy were indeed an interesting one? Or ought we rather think of such nature, as Plato imagines in his Symposium, as akin to the philosophical? Plato's Symposium is a locus that is and is not a marketplace. In this site, conceived as that of a symposium, there is a host and there are guests, but it is merely words that are exchanged for food and drink. Drinking and talking, more

2 I speak of lingogony here, the coming into being of a language, as one speaks of theogony, e.g., Hesiod.

so than eating, give the cue that tempers the idea of such a wisdom-loving site that gathers guests around a common table by having them participate in a "friendly" contest.

Is it utter nonsense if we try to extend something meaningful from attending to the nature of plants in analogy to the nature of intellect, such as to develop a more general—a generic, perhaps—idea of nature according to photosynthetic terms? Would we not rather call such transformative metabolism thermodynamic "work," in the apparently sober (non-metaphorical) sense of transforming energy from one form or state into another? These questions give the directionality that my attempt here to consider photosynthesis as a (new-materialist) concept strives to catch up with. What I am circling around is how and whether we might think of something like *quantum literacy* as a kind of quasi-photosynthetic nature.[3]

3 Regarding "quantum literacy," cf. Vera Bühlmann, *Mathematics and Information in the Philosophy of Michel Serres*, London, Bloomsbury, 2020b; Vera Bühlmann, Felicity Colman, and Iris van der Tuin, "Introduction to New Materialist Genealogies: New Materialisms, Novel Mentalities, Quantum Literacy" in "New Materialist Genealogies," edited by Vera Bühlmann, Felicity Colman, and Iris van der Tuin, in special issue, *Minnesota Review,* Vol. 88, Durham and London, Duke University Press, 2017a, pp.47–58.

Pulsating Alloys of Androgynous Nature

We are at least distantly familiar with photosynthesis as a natural process—we know that trees and bushes, flowers, and grasses all nourish themselves from the sunlight and, through their metabolism, help to create a life-friendly atmosphere. And yet, we are seldom amazed by it. We do not think of light as a "substance." We are not at ease with thinking of light in material terms. We are rather well used to thinking of photosynthesis *as a process*, that is, in relation to how it works technically. Since learning to handle with greater and greater sophistication processes that are familiar to that of natural photosynthesis or that explicitly harvest its effects, organic chemistry is producing synthetically natural alloys that permeate nearly every aspect of our lives (fabrics and materials, medicine, food, and all forms of agriculture). Yet, if we want to come up with a concept that does not describe the process but rather tries to capture photosynthesis as something worth grasping in its own right, as a principle, we need at least to clarify whether such a conception is a matter of epistemology or ontology. Or should we refer to it perhaps better in the blended terms of an

"onto-epistemology"?[4] Either one, I want to maintain, is bound to miss the most unsettling aspect of photosynthesis. What I mean is its *economical* aspect—the aspect of a cosmic economy, of spending and banking, hosting and servicing, withholding and hypothecating, in short, a substitutional dynamics that conditions material rememberings as much as material negligences, and which one has to maintain that it is natural, universal even.

To consider this economic aspect, we need not necessarily revert to literature and philosophy, as with the theme of the *Convivio* and the Symposium. We can think about photosynthesis as a principle in mechanics. But to fully picture where we would be, we need to consider an alienating shift as well, namely that between classical and quantum mechanics. We need to ask what it means to speak of principles regarding alloys. For Newton, principles belong to the domain of mathematics, not physics, while physics knows forces that *obey* those mathematical principles. This makes up the backbone of the apparently self-evident conception of passive matter: matter as hosting indifferently physical forces that are, in themselves, considered as de-

4 Karen Barad, *Meeting the Universe Halfway: Quantum Entanglements of Matter and Meaning*, Durham and London, Duke University Press, 2007.

terminate and uniform but that obey mathematical principles. Quantum mechanics, on the other hand, asks us to re-conceive matter as agitated, as endowed with "agency," as "radiatingly active," as a "restlessly circuitous cyclicity." Quantum mechanics suggests that there is a kind of "sense" proper to matter, that matter is not merely the meaningful host of sense that can be made. Sense literally means both meaning and direction; through the optics of quantum mechanics, matter appears to embody a kind of corrupted meaning that is not invariant and autonomous but biased, impure, and inevitably subject to inclinations and declinations.

Science's relation to matter and materialism has always been ambiguous; early materialisms, like Democritus's atomism in antiquity, were just as much a moral philosophy as a natural one (proto-physics). This ambiguity results, we can easily understand, from matter being what can be learned to be controlled through mechanic cunning, through *technē*, while it is at the same time what must be suspected—anticipated—always to host "more" than what one can attend to. Matter, hence, cannot be trusted. From a materialist point of view, the only reasonable relation to matter seems to be one of "forcing." Algebra itself, usually thought of as the mathematics that facilitates the

adjustment of balances within its formulaic form (algebra is always expressed in equations, i.e., in speculatively setting equal what is not exhaustively known, what entails "unknowns"), was introduced by Al-Khwarizmi not only as the art of a re-constructive "completion" of a lost equivalence but also as the art of "forcing" in the sense of "compelling," literally a driving together in one place—this is an aspect that is often neglected in mathematical history books.[5] Algebraic formulae, of which it is assumed that they are fully *determinate*, are what we have come to call "laws" of nature—building a deductive system of such laws is what Newton famously achieved with his *Natural Philosophy According to Mathematical Principles*.[6] On the other hand, algebraic formulae of which it is assumed that they are fully *determinable* (rather than determinate) are what we have come to call "principles," and we tend to attribute them to chemistry rather than physics. What I want to ask is this: how is it that of the two

5 Cf. *The Oxford Encyclopedia of Philosophy, Science, and Technology in Islam*, Vol. 1, ed. by Ibrahim Kalin, Oxford University Press, 2014, p.24 : "The Meaning of Algebra. The two important terms related to algebra are al-jabr and al-muqabala. AI-Khwarizmi did not explicitly define these terms, and he was not always consistent. The literal meanings of al-jabr are 'completion, restoration, setting back in place' or 'forcing, compelling.' ... The literal meanings of al-muqabala include 'comparison,' 'matching,' and 'balancing.'"

6 Isaac Newton, *Natural Philosophy According to Mathematical Principles*, trans. by Andrew Motte, London, 1729 [1687].

arguably most abstract and amazing "workshops" of nature, those of nuclear physics on the one hand and organic chemistry (which revolves all-around working with photosynthesis) on the other, only one, that of nuclear fission, has widely troubled philosophical discourses throughout the twentieth century. The other, photosynthesis, must be said to have been mastered in terms no less stunning than the latter but with much less excitement, astonishment, and awe.

Mathematics of Percolation and Concepts that are Capital

In short, I want to situate photosynthesis as the dual in a pair with nuclear fission. I want to regard both as principles in the geometric sense of polar coordinates: that is, I want to conceive a space with them that is temporal and has direction and heads towards it, but that also changes this direction while doing so. Both natural principles literally "treat" solar light as a physical multitude. Both head, and in that sense, capitalize on nature, albeit in different ways. I want to do this with an analogy. While the splitting (and perhaps soon fusing) processes of nuclear physics produce light with matter, photosynthesis incorporates light through materiality. For both poles of such coordination, it is as

if the "passivity" that matter has classically been ascribed reveals itself as active and inchoative, as a strangely circular "conditionality" dynamics for whose "passive-activity" (or "active-passivity") contemporary mathematics gives us the beautiful term of "percolation" for better grasping what appears to go on here. The mathematics of percolation addresses a "condition" that is what it is (a condition) only insofar as it is "lacking." A memorable formula we can hold on to: percolative conditions facilitate a "seeping-through" like liquid seeps through sieves or like a riverbed does through the ground it traverses. Such conditions lack, and it is through lack that they leave traces.

But how do we think of such "sieves" in terms other than those of "form"—since the concept of "form" gains its rigor only from being considered as the active other to passively-passive matter? We have forgotten that "condition" comes from *condicere*" to speak with, talk together, agree upon."[7] And we tend to forget that contemporary physics is a physics for which there is not only *universality*, literally a turning towards a unifying one, but there is also a strange kind of *conversation* going on, a discrete circling together that lacks central direc-

7 Online Etymology Dictionary, "Condition (n.)," https://www.etymonline.com/search?q=conditio, (accessed May 28, 2019).

tion, that revolves around an empty center: contemporary physics is one whose quantities are not magnitudes of inert matter but countable measures (quantums) of unsettled order-relations, that is of "information": everything, insofar as we can treat it in terms of physics as a science, is engaged in the manifold activity of sending, receiving, storing, and processing information.[8] Physics that treats the natural conversations that take place and go in the alloys of these two polar coordinates is still a domain governed by laws. But the placeholder of the voice that speaks decisively is never really a "neutral" one; it is not only feminist philosophers, such as Simone Weil in *Gravity and Grace*, who have tirelessly been seeking to expose this for many decades. The promise that a philosophical conception of photosynthesis as a principle holds is that of coming to terms with the androgynous, with the "hermaphrodite," or, as the etymological dictionary also holds it, the "womanish" nature of a cosmic and conversing universe. The nature of the universe is receptive and fertile as well as determinative and decisive. In a-cosmist cultures, life and things are

8 Michel Serres, "Information and Thinking," in *Philosophy after Nature*, ed. by Rick Dolphijn and Rosi Braidotti, London, Bloomsbury, 2017c, pp.13–20.

bound to be ignored—they appear unreasonable, unfounded, and irrational.

What I want to suggest is that such a strange condition, a condition that results from percolation—one that is what it is (a condition) only insofar as it is "lacking"—brings to the fore again, with regard to reasoning, the dimension of speech next to that of writing. For speech, too, as for the "filters" we seek to name properly, it is constitutive that it lacks what it renders present. It is also characteristically and actively receptive and restless, formulaic rather than formal, spectral (in the sense of optical instruments) rather than representative or expressive. From a communicational physics point of view (an information -theoretic one, not an ontological or an epistemological one), it is indeed as if photosynthesis can be regarded as a kind of natural speech: such a physics puts us face -to -face with an androgynous and talkative, but no less determinative and decisive kind of nature. But at the same time, the very fact that organic chemistry (as well as photovoltaics and semi-conductor technology) are capable of technically *reproducing* processes that involve photosynthesis points out that such a kind of "speech" cannot be attributed with the main characteristic for which we usually value (or discredit) speech vis-à-vis its stated forms, that is, in relation to writing:

even if communicational physics presents us with a kind of natural speech, this speech can evidently not count as immediate expression or un-mediated articulation; otherwise it could not be explicitly formulated, and it could not be refined through ratiocination and fabrication.

The mathematics of percolation affords us with the ability to address rigorously and, mediated by its (symbolic) instruments (its formulations, the spectra, and its forms of analysis), also with exactness, a strange kind of condition in which matter actively lacks, as we said. This condition is better called a "conditionality." As such, I want to suggest it needs not only to be regarded as hermaphroditic and androgynous but also to be addressed in terms of a lawfulness whose statements are captured in what we might perhaps best call "capital concepts."

Quantum Literacy: Nature "Speaks" in Saying Nothing-in-particular

Capital concepts are conductive rather than delineating concepts. They are hosting what they conceive rather than deciding what belongs to what. The unit to measure their form, as well as their materiality, is a restless unit in circulation. Capital concepts are concepts that don't grasp; they erect. Their manner of conception is decisive but does

not happen according to principles. They conceive not through outlining and separating but through accommodating and facilitating as channels do in communication technology. They are also not symbolic concepts that would unify different things. Rather, we can think of them as actively accommodating what they are to conceive by letting it get away. Capital concepts don't capture; they offer. They are reasonable but without making sense. This is because abstractly considered, they can make any sense, while on the other hand, if they are looked at concretely, they are concepts that can no longer be considered capital; they are principled then and have turned into administrated heritage. We indeed need to say of capital concepts that they lack direction (sense), *but they do count*; they "lack" direction (sense) actively, "percolatively," by collecting all that can be considered as absent. Capital concepts host what they conceive rather than deciding what belongs to what—attempting to account exhaustively for what they are capable of "hosting" is as impossible as accounting exhaustively for all that can be realized, over time, with a certain sum of money.

To put it in yet another way, capital concepts are concepts that "grow" not only in terms of extension (inflate or deflate) but also in terms of "age." They

are concepts that grow old. But this also means that they can be born. What they conceive is neither a deficient nor a full meaning: they have meaning, very many meanings, and a big plentitude of meaning; what they conceive is the *very* of the many and the *bigness* of the plenty. Capital concepts conceive sense only insofar as they lack it. They are abundantly full of meaning but *bare* of sense. Bursting with the meaning that they host, they do not make any sense as long as they do not spend themselves. In this sense, capital concepts can be said to be of "solar" multitude. They grow old, mature, and make sense only if they are receptive to one precise directionality: to exhaust themselves in actively conceiving all that they are capable of hosting. Capital concepts can be cruel hosts, just like concepts that classify can be cruel.

Reasoning, in terms of capital concepts, does not try to get things right. At the table of a natural, androgynous intellect,[9] the hosting reason seeks to complement whatever direction his guests might take with an inverse path to this direction; reason that wants nothing but never to cease being a host will want to keep things open. It needs to lose direction. It needs to let go of what it accommodates. In other words, capital concepts incorporate intellec-

9 Virginia Woolf, *A Room of One's Own,* London, Hogarth Press, 1935.

tually what it means to lack a body. They are nothing on their own except their generic in-existence. A capital concept is one of uttermost generality; it is like a sun that tries to collect all it has to spend. At that same time, capital concepts are concepts only insofar as they are parsed (partitioned) into the scales of a never properly lasting minutesimality that inheres to and inhabits the massive passing of time in spaces of polar coordination. They are concepts that need to be sounded. For they matter in what they are saying, not despite, but in that they are, precisely, attempting not ever to say anything in particular. But this they do actively.

Let's recapitulate: a capital concept is never at rest; it is a concept only in that it is restless, and it is restless only in that it lacks. In a passively-active mode of crediting, it lacks its own content in a great amount of actively-passive manners. Photosynthesis, I want to suggest, is to be addressed as just such a capital concept—capital hence not in the sense that it would be divine, sacrosanct, or in any other moral and/or ideological way "superior." But still, to begin speaking about photosynthesis as a concept in this manner entails coming to terms with "hypostatization" (or "reification," if one prefers). Let's look more closely at what photosynthesis does when it says nothing in particular.

A Metaphysics of Mixtures
that Lacks a Proper Notion of Conception

For roughly one hundred years now, organic chemistry and electro-engineering sciences have developed a more and more patent understanding of how to mimic technically one of the most amazing principles according to which nature sustains itself: a process that converts sunlight, water, and carbon dioxide into an atmosphere in which it is possible for life forms to *breath* (carbohydrates and oxygen). As Wikipedia clarifies, we refer to photosynthesis almost only in terms of property and use-value as fuels: "the term, artificial photosynthesis, is commonly used to refer to any scheme for capturing and storing the energy from sunlight in the chemical bonds of a fuel."[10] This reduction to the categories of production and work regarding how we think about photosynthesis is inadequate. Plants not only alter their milieu—their ecological niches—they change the world at large. The understanding of photosynthesis as a natural process has brought us an utterly transformed view of how to think about climate and the atmosphere: the air that we breathe is not merely a geological or min-

10 Wikipedia. "Photosynthesis." https://en.wikipedia.org/wiki/Photosynthesis (accessed August 24, 2018).

eral reality; it is, again, *literally* composed of as well as generated through the breath of other beings.

This, at least, is the fascinating view that the agricultural engineer and philosopher Emanuele Coccia, in his book *La vie des plantes: Une métaphysique du mélange* (*The Life of Plants: A Metaphysics of Mixtures*), familiarizes his readers with.[11] It is foremost with the evolution of plants, he maintains, that "life defines itself as a kind of circulation of liveliness" and brings forth what he calls "the disparateness of life's forms" that manifests in the distinction of kinds and kingdoms for different forms of life.[12] As his metaphysics of mixtures suggests, plants reintroduce a re-conception of the great theme of the *Scala Natura*, the Great Chain of Being, but one that is stripped from any linearly progressing notion of ascension or progress. There are many scales in such an approach to the disparateness of life's

11 Emanuele Coccia, *La vie des Plantes: Une Métaphysique du Mélange*, Paris, Payot & Rivage, 2016. In recent years, we have witnessed a growing philosophical interest in plant life, cf., for example Richard Mabey, *The Cabaret of Plants Botany and the Imagination*, London, Profile Books, 2015; Michael Mader, *Plant-Thinking: A Philosophy of Vegetal Life*, New York, Columbia University Press, 2013; Luce Irigaray and Michael Marder, *Through Vegetal Being*, New York, Columbia University Press, 2016.

12 Emanuele Coccia, *Die Wurzeln der Welt: Eine Philosophie der Pflanzen*, trans. by Elsbeth Ranke, Munich, Carl Hanser, 2018 [2016], kindle edition. loc. 124. Here and throughout my own translations to English.

forms; they are not one. And the paths they bridge, as we will see, literally between heaven and earth, are numerous and must also be regarded as paths that facilitate ways downwards and lead upwards. Any association of the top of the Scala Natura with divine dignity and superior worthiness loses its rational ground (its reason). Understanding more about the process of photosynthesis appears like a giant atmospheric laboratory for transforming solar energy into biomass. Plants "destroy the topological hierarchy which appears to rule the cosmos."[13] They show us "that life manifests a break within the asymmetry between container and contained. As soon as there is life, what contains comes to rest within what it contains (is itself being contained by it) and vice versa."[14]

From his botanical point of view, the image of such a "resting" is a strong one: plant life dies of too much oxygen in its milieu. It feeds on carbon dioxide, while higher forms of life die of too much carbon dioxide in their milieu while feeding on oxygen. It was only with the spreading of vascular plants across the surface of the Earth that the planet's atmosphere for different life forms grew more differentially stable: with the plants going ashore,

13 Ibid., loc. 124.
14 Ibid.

the face of the planet has substantially been transformed, plants have absorbed massive amounts of carbon dioxide, and oxygen was released into the planet's atmosphere. When plants left the oceans for the shores, when they multiplied and began to populate the earth, they facilitated the production of matter and organic composites in such amounts that higher forms of life could develop more complicated compositions of life forms. Animals absorb the energy they need to survive due to the existence of plants. With them, and by them, the Earth produces its atmosphere and lets the beings that populate its surface *breathe*: "The life of plants is a current cosmogony, the ongoing genesis of our cosmos."[15] In Hesiodic ductus, according to Coccia, "botanics ought to call inhuman material gods all those forms of life that are capable of photosynthesis."[16] To him, they are "domesticated titans" who "need to use no violence to found and facilitate new worlds."[17] From a certain point of view, Coccia writes, plants have never left the seas. Rather, they have brought their fluidity to where it had not been before: "They have turned the universe into an immense atmospheric ocean, and they have brought

15 Ibid., loc. 124.
16 Ibid.
17 Ibid.

maritime habits to all beings."[18] He continues: "Photosynthesis is but the cosmic process of liquidating the universe, a movement through which the world emerges as a fluidum: it lets the world breathe, and it holds the world in a state of dynamic tenseness."[19] He elaborates that the paradigm of such mutual entanglement was called breath (pneuma) already in antiquity. "Aspiration, breathing, indeed means exactly this experience: what contains us, air, turns into what is being contained within us, and the other way around, what is contained in us turns into what contains us. To breathe means to delve into a milieu which percolates us as much as we percolate it."[20]

Coccia maintains that it is not enough to recognize, as the Aristotelian tradition did, that reason is the *locus formarum*, the domain of forms. Reason is not merely the repository of all forms which the world can accommodate. For reason is, at the same time, *causa formalis and causa efficiens*.[21] Coccia

18 Ibid., loc. 431.

19 Ibid.

20 Ibid., loc. 124.

21 Ibid., loc. 190. Coccia speaks here, somewhat irritatingly, of a "formale Wirkursache," a "formal and efficient cause"; if I understand correctly, he wants to say that the Aristotelian *causa formalis* and the *causa efficiens* are to be regarded as merged into a mixed causality, according to which reason, from a metaphysical point of view, cannot possibly be addressed as "pure" because it is always already "impure" but still distinguishable into formal and effective aspects. Coccia

wants to combine these two Aristotelian notions without reducing them to a novel "one." According to his metaphysics of mixtures, reason can, therefore, never be thought of as pure, but neither does the distinction conflate into an indistinguishable soup. As we will see, reason, according to his plant philosophy, is one that is, and always will be, *amphibolic*, adapted to aspire its realization in several milieus. What is perhaps the most important aspect of Coccia's treatise on photosynthesis is the idea that understanding more about plant life can teach us about a certain amphibolic duplicity:

> It is as if plants are leading two lives: one in the air, bathing in light and immersed, made of visibility

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describes a "formally efficient cause" that needs to be regarded at the same time, and with the same legitimacy, as an "efficiently formal cause." The reference passage in the German edition goes (my own translation): "It is not enough to recognize, as the Aristotelian tradition did, that reason is the place of forms (*locus formarum*), the stock of all the forms that the world can accommodate. For it is at the same time also reason's own formal and efficient cause [*ihre formale Wirkursache*]. If there is a reason, then it is only one that defines the engendering of each single form of which the world is composed. A seed, on the other hand, is the exact opposite of the simple, virtual existence of a form, with which it is often confused." ("Es genügt nicht anzuerkennen, wie es die aristotelische Tradition getan hat, dass die Vernunft der Ort der Formen ist (locus formarum), das Lager all der Formen, die die Welt beherbergen kann. Zugleich ist sie nämlich ihre formale Wirkursache. Wenn es eine Vernunft gibt, dann nur die, welche die Erzeugung jeder einzelnen Form definiert, aus denen die Welt sich zusammensetzt. Umgekehrt ist ein Samen exakt das Gegenteil der einfachen virtuellen Existenz einer Form, mit der er häufig verwechselt wird.")

> and intensive interaction with other plant- and animal life of any size, and the other chthonic, mineral, subliminal, ontologically nocturnal, engraved into the lithic body of the planet, in synergetic communication with all existent life forms that populate it.[22]

These two lives of plants are not alternatives and do not mutually exclude one another. They are "the essence of one and the same individual, which unites in its body and in its experience earth and sky, stone and light, water and sun. … Already in the body of the plant all is contained in all: the sky is in the earth, earth is being pushed towards the sky, air turns body and extension, extension is but an atmospheric workshop."[23] To Coccia, plants are cosmic mediators; they are ontological amphibians that "link up milieus, spaces," that "exhibit how the relation between organism and milieu cannot be thought about in exclusive terms … but need[s] to be considered in inclusive terms."[24]

Coccia's account is poetically beautiful and timely in the interest it pursues: namely to think of plant life as manifesting "a break within the asymmetry between container and contained."[25]

22 Ibid., loc. 981.
23 Ibid.
24 Ibid.
25 Ibid., loc. 124.

But if indeed photosynthesis is the cosmic process of liquidating the universe, a movement through which the world emerges as a *fluidum*, then a philosophical conception of photosynthesis, if it wants (as is my interest in this chapter) to orientate itself in terms that are equipollent (not alternative) to the positivity of scientific accounts, cannot be content with stating that photosynthesis is what "lets the world breathe," and what "holds the world in a state of dynamic tenseness"[26]: it needs to reflect on the nature and the manner of such a conception too.

How to Call the Subject of an Impersonal Voice by its Proper Name?

How exactly is this novel attention to photosynthesis not merely another return to what Jean-François Lyotard has called "a Great Narrative"? A novel language game that, ultimately, aspires to absorb and dominate other language games? A novel point of identification that is to inflate and swallow up, as so many others did before this one, a wealth of precious differences that exist in their own right? What Lyotard has called "a Great Narrative" counts to him as such mainly because it fails to accommodate an explicit stance of authorship. Great Narratives

26 Ibid., loc. 431.

come quasi-naturally, as if nobody, in particular, were speaking; as if no voice could be addressed as a subject that articulates what these narratives narrate, a voice that in its turn can be challenged and responded to: spoken with *dialectically*.

But what if we *could* address the quasi-domain in the terms of which such naturalness comes along with which a great narrative speaks? What if this domain need not be one of transparency, of "transparentism," as Jean-Yves Girard has recently called it?[27] What if this idea of capital concepts were indeed one of concepts in the sense that they could refer to a proper domain, a domain of their capitality, their house, their *oikos*, of such a natural economy: a domain to which belongs *all that is possible, anything at all, in every conceivable way*? Isn't this what philosophy has coined the word "universe" for: universality, as that which is not derivative of a particular root, tribe, territory, dominion, or culture?

A great narrative that would also accommodate explicitly the stance of the voice, of the subject that speaks, *apparently transparently so*, this would be a narrative that organizes the space of this domain, which articulates and builds its house—the container as well as the contained—of this natural

27 Jean-Yves Girard, *Le Fantôme de la Transparence*, Paris, Allia, 2016.

oikos. It would be a quasi-epic narrative that speaks about how this apparently transparently speaking voice can be addressed in the terms that are proper and adequate to its domain; let's call it the domain of the apparently transparent. It would be a quasi-epic narrative that teaches not only the story of its heroine but also instructs how this heroine came to be, as she speaks, the person who speaks with such natural ease and apparently transparent clarity. It would be a narrative that "clears" the absurd thickness of, say, James Joyce's *Ulysses,* like an egg white clears a tomato soup into a transparent, almost color-free liquid of extraordinarily intense taste. It would be a neutral clarity in an augmented spectrum of intensive qualification.

The heroine of such a quasi-epic story needs to have a name. But whose name? Whose sex? Whose genealogy? Which "nature"? Michel Serres has suggested organizing conceptions of such "clarified flavors" and of such "augmented neutralities" in what he calls *chronopedia*.[28] Serres proposes to turn from the Encyclopedia tradition as a means to organize knowledge to a manner that not only geometrizes the role of the circle in the encyclopedia but also temporalizes and materializes it. Serres's

28 Michel Serres, *The Incandescent*, trans. by Randolph Burks, London, Bloomsbury, 2018a [2003].

chronopedia implies a temporalization of geometry, which draws balances about and between the organization of knowledge in terms of *meteorological geometry*. I will come back to this shortly. As I understand it, this turn proposes, like Coccia's does, a capitalization—a totalization—of what can be learned. But unlike Coccia's, it facilitates tracking how such a capitalization proceeds.

Such a notion of the totalization of knowledge no longer equates light with insight in any simple and direct way; rather, it seeks the generalization of the natural source of light, the sun, such as to be able to treat it geometrically. Knowledge turns into a question of light's materiality—and "materiality" here means, strictly speaking, the amount of mass that is proper to light. Within the contemporary mass paradigm in quantum physics, light is not the opposite of material. Light is, in a fascinating way, at once continuous and yet discrete with and within what philosophy used to call "matter." In quantum physical terms, light, simply, is the *absence* of mass. The question at the core of the chronopedic thinking is thus: how to account for the absence of something genuine, something natural, in the sense of not acquired, without presuming the terms that characterize such genuineness that is "not-there"?

The concepts of a chronopedia turn to light's intensities, qualities, and appearances—yet not via the path of negation. Such genuine absence can only be masked, and it can only be masked as a "rest"—it rests amidst any intellectual gesture that contrasts a postulated identity with its difference. We have been obsessed with the Cogito long enough, Serres maintains; we ought to think about thinking as we think about the weather. We should begin to say that *it thinks*, just like *it rains*. The voice that speaks in chronopedic terms is natural and generic, but it is the voice of a subject, too. Like the weather, it is natural, universal, and yet always locally situated. A genuine absence that can only be masked is the rest that remains when we try to anticipate and predict the weather, understood in the ancient tradition of the *meteora* as the sum of all measurable, and thus articulable, temporalities, durations, and seasons.

This anonymous third person singular, the "it" in "it thinks," needs to be addressed properly—and properly means, according to Serres, the inverse to its anonymity: the *anonymous* "without a name" must be addressed as an impersonal persona, by calling it with any name. The voice in great narratives needs to be addressed by its proper "anyname": Serres calls this the *panonyme*, a six-fold

name that is proper to the world itself: *Pantope* (all of its places), *Panchrone* (all of its durations), *Panurge* (the universal worker, instead of the demiurge, the public worker), *Panglosse* (all of the spoken tongues), *Pangnose* (all of knowledge), *Panthrope* (all sexes, instead of only man as in "Anthropos.")

In Greek mythology, Pan was the impersonation of nature, the guardian and multiplier of all things, literally "the nourisher"—moved by lust and living in the woods, with a hybrid half-human half-animal body: horns on his head and the legs of a goat. Pan is a god in a world of abundance, yet he is not only moved by lust but also animated by desire. The nymph Syrinx, well known for her beauty and chastity, hid from him in hollow water reeds, from which Pan invented the flute to express his longing for her. If we address the impersonal voice in great narratives as Pan, then we will not forget so easily that the "it" that "thinks" will always be haunted by what it desires and longs for but can never consume or own. The sounds of the world's longing—sounds that are as pleasing as dreadful—will always be on the verge of triggering panic, groundless fear, contagious in its spreading and so forceful that it dominates and prevents reasonable and logical thinking.

Panic means "all that pertains to Pan" (from the suffix -ic). The story goes that he would wander

peacefully through the woods, playing his flute and resting always at noontime. Pan would shout so loudly if disturbed in his sleep that all herds would stampede. Addressing the world with this six-fold proper name means not forgetting that the world needs to rest when the sun is high in the meridian: when the light is clearest. This is because authentic knowledge of the world, organized in a chronopedia rather than an encyclopedia, "overflows with results and intuitions."[29] It "sets up multiple reference points grouped into constellations with forms that are as disparate as those of scholarly disciplines. Thus, knowledge finds temporary truths whose luxuriously colored sparkle flickers and changes with the duration of the Great Story."[30] If there is something to my initial interest, namely to begin thinking of quantum literacy in terms of photosynthesis, then to the degree that one is literate—the more one knows about it (and hence is alienated from it as something that would happen naturally and uniformly)[31]—the more one would have to think of oneself not as a star but as a planet:

29 Michel Serres, "Information and Thinking," In *Philosophy after Nature*, ed. by Rick Dolphijn and Rosi Braidotti, London, Bloomsbury, 2017c, pp.17–18.

30 Ibid.

31 An interesting affirmation of such intellectual alienation has recently been adopted by Laboria Cubronics's *Xenofeminism Manifesto*, http://www.laboriacuboniks.net (accessed February 23, 2022).

for the only lights that do not tremble emanate from planets without an original brilliance and that, as I said, behave like mirrors. Magnificent, but modest enough to be reduced to the punctual … great in size but wavering in doubt and questioning, those truth-stars stand out against the enormous black background of non-knowledge, that is empty without limitations or full of yet unexplored galaxies: things still to be understood and to be grasped.[32]

32 Michel Serres, "Information and Thinking," pp.17–18.