

Cosmogenetic Labour in the Crisis of the Anthropocene

Introduction

According to Charles Taylor, the modern consciousness no longer sees “human beings as playing a role in a larger cosmic order or divine history.”¹ Indeed, to an unabashedly modern perspective, the idea that humanity might play a role in the universe is usually interpreted as a sign of spiritual weakness, existential cowardice. In the words of Carl Sagan, it betrays “a failure of nerve before the Universe – its grandeur and magnificence, but especially its indifference.”² Sagan, echoing a common interpretation of the scientific worldview, explicitly contrasts the “reassuring fables” of philosophy and religion to “an understanding of our actual circumstances”³: we are an insignificant creature, inhabiting a speck of dust, floating somewhere in an endless, merciless night.

This paper offers a radical critique of this position. I argue that modern science has not proven human life to be meaningless; instead, this is an interpretation of scientific discoveries that was forged in the conflict between science and medieval Christianity, an interpretation that not only is no longer viable given the latest discoveries, but that has now become positively detrimental to the flourishing of our species and of life itself. In short, when the modern consciousness rejected the worldview of medieval Christianity, it experienced this as the passage from a coherent cosmos into an infinite void, and it interpreted this experience as the passage from superstition to knowledge, illusion to truth, childhood to maturity. However, just because the scientific discoveries of one particular time period destroyed one particular culture’s ability to believe what it had once believed does not mean that the discoveries of a later time period could not lead to radically different conclusions. This, I argue, is precisely what has occurred.

Science now reveals nature, which we once thought to be the changeless and eternal frame within which the vagaries of human life took place, to be a historically unfolding process. It now appears that nature manifests a property of negative entropy, negentropy or complexification, a tendency to develop from simple entities into more complex entities, with the concomitant tendency to develop from more homogenous states to ever greater arrays of diversity. Thus, the undifferentiated cloud of hydrogen and helium gas that emerged shortly following the Big Bang was transformed into the periodic table of 92 distinct elements, which in turn coalesced into planets upon which 21 of these elements began to combine in ever more complex ways, as the process of biological evolution that has most recently given rise to ourselves. Within a universal negentropic trajectory, within a four billion year explosion of complexity across the surface of the earth, humanity has emerged as a new kind of temporal

1 Charles Taylor, *Sources of the Self* (Cambridge Massachusetts: Harvard University Press, 1989), 13.

2 Sagan, *Pale Blue Dot* (New York: Random House, 1994), 50-51.

3 Carl Sagan, *Pale Blue Dot*, 49.

development: our social organizations get larger and more complex across history; our technology advances from the stone arrowhead to the predator drone, the papyrus scroll to the microprocessor, the fire to the thermonuclear furnace. In the wake of this dramatic transformation in the way we see nature, it seems inauthentic to insist on a stubborn dichotomy between the way nature develops forms and the way humanity does. In the words of cultural historian Pierre Hadot, it might make more sense to see human technique as “a mere special case of the original and fundamental art of nature”⁴ – or to put the same point in more provocative language: “For the human brain, which is a piece of nature, to invent myths or forms is simply to carry out the fundamental gesture of Nature as she invents forms.”⁵

We are currently living in the midst of an unprecedented ecological crisis, a crisis that modern civilization seems utterly unable to come to grips with. In *God in Creation*, German theologian Jürgen Moltmann writes *a propos* the current calamity: “If the common catastrophe of human beings and the earth is still to be avertible at all, then it is certainly only by synchronizing human history and the history of nature.”⁶ This sentence gives the initial impetus to this project: how does human history fit into the history of the universe? I will begin by presenting the way this relationship is commonly understood by ecological philosophy, which I will suggest gives rise to a paradox that cannot be solved within the terms of current ecological thought. Instead, I argue that the proper way to understand the relationship between humanity and nature requires a massive intellectual shift, akin in scope to the upheaval that modernity imposed upon the worldview that came before it.

Let this be adequate forewarning for what I am about to say: we need to stop seeing the earth as the absolute boundary to expansion of life in the universe; instead, we need to see human technology as an extension of life’s capacity to organize matter and energy, a new way for life to create membranes that define an interior from an exterior, which could allow the explosion of life to transcend the atmosphere and infuse the matter of the extraterrestrial void with living form. In other words, as the cell is defined by its phospholipid bi-layer, as our own multicellular bodies are defined by the fractal folds of our skin, our digestive tract, our nasal passages the open up to the cavity of our lungs, so do our clothes and the walls of a nuclear submarine represent extensions of the same logic, new ways for life to distinguish between an interior and an exterior. These extensions give the living explosion the potential to produce complex entities capable of surviving and reproducing in sources of matter and energy beyond the earth’s atmosphere. Thus, much as our own bodies represent ocean ecosystems contained within a membrane on the desiccated continents, so should space stations and rocket ships be seen as earth ecosystems

4 Pierre Hadot, *The Veil of Isis*, trans. Michael Chase (Cambridge Mass.: Harvard University Press, 2006), 23.

5 Pierre Hadot, *The Veil of Isis*, 218.

6 Jürgen Moltmann, *God in Creation*, trans. Margaret Kohl (Minneapolis: Fortress Press, 1993), 137-38.

contained within technological membranes, inhabiting the unutterably hostile environment of the void. These technological entities are not the blithe extension of the hubristic attempt to conquer nature, but are instead the first steps in the radical evolution of life itself, in line with the same logic that allowed life to expand from the hydrothermal vents on the ocean floors, into the oceans, then onto the land. Along these lines, when Deep Ecology argues that human beings have a moral duty to protect “the planet and its richness and diversity of life *for its own sake*,”⁷ we must interpret this imperative as manifesting two separate yet equally important actions: first, as the maxim is currently understood, to protect the life that currently exists within the atmosphere of the earth; second, as has yet to be acknowledged, to expand the biosphere into the solar system at large. I argue that this vision, which I call “expansive ecology,” is ultimately the best way to understand ourselves and our technology in the context of the ecological crisis – with the oddness of the vision as proportional to the oddness of our contemporary condition, which has already shattered so many of our traditional conceptual structures.

The Paradox of Humanity and Gaia

James Lovelock, progenitor of the Gaia hypothesis whereby the entire earth is seen as a single integrated living organism, expresses two opposing visions of how humanity fits into this larger entity, and the tension between these visions is indicative of the limits of contemporary ecological thought in general. According to the first view, the human place in Gaia can only be expressed in terms of the natural symbiosis between animal and plant, the gas exchange between carbon dioxide and oxygen that has underpinned the biosphere for the last few billion years:

I am often asked, ‘What is our place in Gaia?’ To answer we need to look back a long time ago in human history to when we were an animal, a primate, living within Gaia and different from other species only in unimportant ways. Our role then was like theirs, to recycle carbon and other elements.⁸

Once the human animal evolved into modern *Homo Sapiens*, perhaps “the first animals consciously to modify the environment for their own benefit,”⁹ we diverged from this basic animal role in the biosphere. The consequences of this divergence have been getting steadily worse over the last two or three million years, bringing us today to edge of the precipice, an apocalyptic ecological calamity.

It is important to note that, contrary to the views of a group Lovelock dismisses as “the innocent among the urban intelligentsia” who “talk of early humans as living in harmony with

⁷ Naess, “The Three Great Movements,” in *The Ecology of Wisdom*, edited by Alan Drengson and Bill Devall (Berkeley: Counterpoint, 2008) 100. Italics in original.

⁸ James Lovelock, *The Revenge of Gaia* (New York: Penguin Books, 2006), 143.

⁹ Lovelock, *The Revenge of Gaia*, 143.

the natural world,”¹⁰ this view sees early *Homo Sapiens* as equally reckless and irresponsible as we are, only on a much less egregious scale. Lovelock cites the example of the aboriginal Australians, whose “method of clearing forests by fire may have destroyed the natural forests of the Australian continent as surely as do modern men with chainsaws.”¹¹ This echoes the argument of Harvard biologist Edward Wilson, who describes the human migration across the globe as a wave of mass extinction, ending most recently on New Zealand, where an entire genus of large flightless birds was wiped out only a century after the island’s colonization by the Maori in the late 13th century. Based on such examples, Wilson dubs *Homo Sapiens* “the serial killer of the biosphere,”¹² a wave of death inundating the world, with modern humanity simply carrying the destruction forward with post-industrial speed.

From the foregoing perspective, the first of Lovelock’s two accounts, humanity appears as something like an “unnatural” species, inevitably devastating the biological world within which it lives. In *The Vanishing Face of Gaia*, Lovelock makes the point much clearer, arguing that when we first began to use fire, we “broke the rules of Gaia”¹³ and became a disease to the Earth. However, even though “we became Earth's infection [...] when we first used fire and tools purposefully,”¹⁴ it was not “until about two hundred years ago that the long incubation period ended and the Industrial Revolution began.”¹⁵ In other words, the time of human cultural development is seen as entirely opposed to the cyclical time of the natural world, human history as a disease in violation of the eternal laws of life itself.

Alongside this perspective, however, we also find the following thought:

Through Gaia I see science and technology as traits possessed by humans that have the potential for great good and great harm. Because we are part of, and not separate from Gaia, our intelligence is a new capacity and strength for her as well as a new danger.¹⁶

10 Lovelock, *The Revenge of Gaia*, 144.

11 Lovelock, *The Revenge of Gaia*, 144.

12 Edward O. Wilson, *The Future of Life* (New York: Alfred A. Knopf, 2002), 94.

13 James Lovelock, *The Vanishing Face of Gaia* (New York: Basic Books, 2009), 232.

14 Lovelock, *The Vanishing Face of Gaia*, 233.

15 Lovelock, *The Vanishing Face of Gaia*, 233.

16 Lovelock, *The Revenge of Gaia*, 144-45.

Here, Lovelock no longer sees the gradual development of human culture and technology as a falling away from “our proper place in Gaia”; instead, our gradual yet incessant descent towards ecological Armageddon is itself a kind of natural process, the first giddy emergence of a new kind of life into the balanced cycles of the biosphere. By this second view, our disruption of Gaia is Gaia’s disruption of herself. What the first view sees as the conflict between the linear development of human history and the infinite cycles of nature, the second view sees as a conflict inherent in nature itself, between the evolution of radical novelty and the balanced perpetuation of the same.

The tension between these two visions emerges in Lovelock’s thought for two reasons: first, Lovelock has not made any distinction between the concept of “Gaia” and the concept of “life,” reifying the biosphere as coeval with life itself; second, while Lovelock has intellectually understood that nature has a history, he has not yet integrated this history into his understanding. If he did so, he would see that the current biosphere, with its symbiosis between plants and animals, represents a historically evolved solution to the oxygen holocaust of 2.4 billion years ago. As such, what Lovelock takes to be the eternal “nature” of life itself – the symbiotic interaction of plants and animals – should rather be seen as a historical epoch in the unfolding of life within the universe, a phase that was preceded by an anaerobic stage, and which might be thought of as succeeded by a technological phase. If this is the case, however, then we must consider in what ways technology is a continuation of the logic of the Gaian phase in living evolution, and in what ways it represents something radically new.

Technology and the Biosphere

Timothy Taylor opens his book *Artificial Ape* with the following question:

There are seven species of great ape on the planet. Six of them live in nature. One cannot live without artificial aid. Humans would die without tools, clothes, fire, shelter. So how [...] did we ever manage to evolve in the first place?¹⁷

The answer, of course, is that the biological human evolved, over the last two or three million years, within a steadily complexifying membrane of artifacts and techniques, and that it is only in within this “technological membrane” that we can account for our biological form. Our huge brains, our dexterous hands, our upright stance, our ability to speak – these distinct characteristics of our biology could only evolve in the context of a new kind of evolution, whereby the relationship between the environment and the fragile naked body, the outside and the inside, was mediated by artifacts to an ever greater degree: in Taylor’s words, “not only did we make these necessary objects, but, within a framework of some 2 or 3 million years, the

¹⁷ Timothy Taylor, *The Artificial Ape: How Technology Changed the Course of Human Evolution* (New York: Palgrave, 2010), 1.

objects have physically and mentally shaped us”¹⁸; “Without the fabricated objects of technology, [...] we could never have actually evolved.” In light of this, Taylor calls us “a new, symbiotic form of life,”¹⁹ a new kind of organism that can only survive within an enormous mesh of techniques and artifacts.

Taylor’s argument entails more than simply pointing out that humanity could only have evolved within the membrane of technology it projects around itself, and can only survive within this membrane. His argument is ontological: “the realm of material artifacts brings a new kind of patterning and new kinds of variation into the world.”²⁰ Taylor therefore divides reality up into three systems: non-living matter, governed by the laws of physics and chemistry; living matter, governed by biology and what Taylor dubs “the algebra of life”²¹; and finally, technological matter, which only comes into reality with the presence of human beings. Extrapolating from Taylor’s own discussions, we can consider technology as an extension of the logic of biological systems in three significant senses.

Philosopher Evan Thompson’s defines life as the capacity of a metabolic system to sustain a distinction between an inside and an outside:

A cell is spatially formed by a semipermeable membrane, which establishes a boundary between the inside of the cell and the outside environment. [...] thanks to its metabolic network, it continually replaces the components that are being destroyed, including the membrane, and thus continually re-creates the difference between itself and everything else.²²

Technology can be seen as a new development of this basic logic, a new way for living entities to define and regulate the passage of matter and energy across a membrane defining an interior from its exterior. We normally think of our skin as forming the outer layer of our bodies, but this is not exactly true: the digestive tract can be seen as a fold of our outer membrane that we only allow food and water to contact; the respiratory tract, similarly, can be seen as that segment of our outer membrane that we only allow air to contact. Our multicellular bodies control what aspects of the external environment interact with what aspects of its surface by folding into caves and only allowing certain aspects of the external world through, a three dimensional volume

18 Taylor, *The Artificial Ape*, 7.

19 Taylor, *The Artificial Ape*, 198.

20 Taylor, *The Artificial Ape*, 194.

21 Taylor, *The Artificial Ape*, 4.

22 Evan Thompson, *Mind in Life: Biology, Phenomenology, and the Sciences of Mind* (London: Harvard University Press, 2007), 98-99.

formed through the fractal folding of a two dimensional surface. Technological evolution, by contrast, consists in the imposition of new kinds of insides and outsides onto the outside environment itself: the clothing that creates a space of warmth around our outer skin, the walls of our houses, the walls of cities or the borders of countries. Technology, as a new capacity for living systems to define interior from exterior, creates the interior within which biological human evolution has taken place, and the extension of biological humanity to every ecosystem of the planet should be seen as the extension of this technologically mediated inside, with the entire earth now enveloped in one massive technological membrane.

The second sense whereby technology extends the logic of biology can be seen by considering the different types of matter being taken up by biological entities as opposed to techno-biological symbionts such as ourselves. In the words of Krafft Ehrlicke, “the biospheric life system recycles only about 18 elements [...]. We are a life system that employs 92 elements.”²³ In other words, if biological life can imbue complex form into around 18 elements, and the biosphere consists in an infinite loop whereby the same elements are constantly recycled from one generation to the next, techno-biological life is capable of imbuing form into all 92 elements, using the entire periodic table to support and maintain its metabolism. Drawing again on the words of Ehrlicke, a living system that requires all 92 elements “cannot recycle them through the terrestrial environment without changing it totally and abolishing the biosphere.” In other words, when a techno-biological symbiont such as ourselves emerges into the biosphere, and as it begins to use all 92 elements to transform the external environment into a technologically mediated interior environment, it is inevitable that this process give rise to an ecological catastrophe, as the waste products from the new technological metabolism invade and corrupt the healthy cycles of the Gaian phase of biospheric evolution.

Finally, we can see technology as a potential extension of life’s macrocosmic explosion across the universe. We are, of course, accustomed to seeing the surface of the earth as the absolute and final extent of life’s macrocosmic growth. However, we can now see that life has in fact grown to cover the entire earth over the course of a historical process, starting in the periphery of hydrothermal vents on the ocean floor, expanding into the oceans, and finally imbuing the matter of the entire earth with complex form. While the extension of the human-technology symbiont across the entire planet has instigated a terrible ecological crisis, the added capacity of this new kind of life could potentially allow the explosion to flow over the barrier that has been blocking its further growth for the last five hundred million years. Indeed, as is already implicit in Ehrlicke’s description of technology as metabolizing the entire periodic table, the only possible way for a technological symbiont to exist healthily within the biosphere would be by expanding the biosphere beyond the womb of the atmosphere. Seeing this properly entails moving from Lovelock’s first interpretation of ourselves and the ecological crisis – humanity as breaking the rules of Gaia and becoming a disease to the earth – to a modified version of his

23 Krafft Ehrlicke, “The Heritage of Apollo,” in *Krafft Ehrlicke’s Extraterrestrial Imperative*, ed. Marsha Freeman (Burlington, Ontario: Apogee Books, 2008), 228.

second interpretation: humanity as manifesting an entirely new mode of living organization that has instigated a revolutionary crisis in the history of life, a crisis that can only be resolved if life expands itself from a geological to a cosmological process.

Technology and the Ecological Crisis

Besides transforming the way we see life, this vision calls for a profound shift in the way we understand technology. In short, we must cease seeing technology as the contingent result of an imperial European civilization, necessarily reducing everything in reality to raw stuff to be rearranged towards the satisfaction of human desire. If Taylor is correct, then the roots of the current cataclysm go all the way back to our biological evolution:

We have never been wholly natural creatures, and we have evolved to be increasingly artificial. Even should we want it, escape from technology is no longer possible. [...] The ride we are now on may be unsustainable, or it may not; but there are many reasons for believing that we are incapable of getting off. Either we crash, or we continue our artificial ascent. There is no soft landing into a quieter and more balanced world that utopian souls often dream of.²⁴

The logic of this position has been developed in exquisite detail by Craig Dilworth, who describes the evolution of humanity within its membrane of artifacts as a continual extrapolation of “the vicious circle principle,” which now culminates in its inevitable crisis:

Humankind’s development consists in an accelerating movement from situations of scarcity, to technological innovation, to increased resource availability, to increased consumption, to population growth, to resource depletion, to scarcity once again, and so on.²⁵

Dilworth goes on to describe the workings of this principle in every aspect of human technological and biological development, from the taming of fire to the splitting of the atom. As a result of population pressure, we are forced to take advantage of resources that were previously too much trouble to bother with. This requires more work, and life becomes less pleasant. It also leads to a further increase in the human population, which causes the vicious circle to go around once again.

This is dismal picture is certainly describing something real: our current predicament is the necessary result of the emergence of a techno-biological symbiont into the substrate of the biosphere. However, it is a mistake to see this vicious circle principle as operating only on

24 Taylor, *The Artificial Ape*, 8.

25 Craig Dilworth, *Too Smart for our Own Good: The Ecological Predicament of Humankind* (New York: Cambridge University Press, 2010), 110.

human systems. In fact, what Dilworth calls the vicious circle principle applies to life itself, which constantly overgrows its conditions and then adapts to the crisis that this overgrowth instigates. The most telling example of this would be the emergence of photosynthesis, which led to an event that Carl Sagan has dubbed “the oxygen holocaust.”²⁶ In short, about 2.4 billion years ago, iron and stone in the earth’s crust ceased to be able to absorb the excess oxygen that new photosynthetic organisms were excreting. As it accumulated in the atmosphere, the new gas proved utterly toxic to contemporary forms of life – in the words of Sagan, if you were a bacteria alive at that time, “either you adapted to the oxygen, or you hid from it, or you died.”²⁷ The new biosphere that emerged after the crisis, however, was more secure than what had existed before: besides enabling far more efficient metabolic paths that would eventually develop into multicellular life, oxygen also wreathed the planet in an envelope of ozone, absorbing ultraviolet radiation and allowing life to grow up onto the surface of the oceans and the continents.

This event demonstrates life’s capacity for what Brian Swimme and Elisabet Sahtouris call “creativity in crisis,” with crises affording “unusual evolutionary opportunities to create novel solutions.”²⁸ It is only by passing through such crises that life has been capable of extending itself over the entire earth. It is in the context of these crisis, as opposed to the stable periods that follow them, that we should think about the synchronicity of human and natural time. In other words, the current debacle is not unprecedented; it is instead one in a long succession of dangerous transitions, crucibles through which life has had to pass to evolve to its current extent. Lovelock, therefore, should not say that humanity has broken the laws of life; he should rather say that we have broken the laws of one particular manifestation of life, with this breach in line the deeper laws of life and of the universe itself. In the words of Ehrlicke,

A dynamic equilibrium between biosphere and greater primordial environment had been reached and could readily be maintained. Why wasn’t it? Again, because life is negentropic, dynamic, and does not tolerate static, stagnant conditions, however paradisiac, because they are death.²⁹

The same point, expressed more poetically, can be found in the poetry of Goethe:

And to recreate the created,

26 Carl Sagan and Ann Druyan, *Shadows of Forgotten Ancestors*, (New York: Random House, 1992), 122.

27 Sagan and Druyan, *Shadows of Forgotten Ancestors*, 122.

28 Sidney Liebes, Elisabet Sahtouris, and Brian Swimme, *A Walk Through Time: from Stardust to Us* (Toronto: John Wiley & Sons, Inc., 1998) 27.

29 Ehrlicke, “Extraterrestrial Imperative: Why Mankind Must Colonize Space,” 256.

So it not struggle for rigidity –
Eternal, living activity is at work.
And what was not, will now become
Clear suns, colorful earths;
It must, in no cases, lie still.³⁰

The point here is that both the universe and the living explosion are fundamentally unstable processes, and that it is only by passing through periods of instability that new layers of organization become possible.

It is indubitably the case that we are passing through such a period right now, a period of crisis that began in principle a few million years ago, when the ancestors of our species first began to project a membrane of technology around their biological forms. The crisis began in earnest with the industrial revolution, when the explosive expansion of this technological membrane began to decimate the biological substrate upon which all earth-life depends. Now that we are aware of the cataclysm we are wreaking on the biological world, it is irresponsible to continue our pattern of exponential growth within the earth. However, if we allow this technological membrane to expand into the substrate of matter and energy that exists beyond the earth's atmosphere, an action that is now diametrically opposed to the flourishing of life would, by an almost Hegelian reversal, become entirely in harmony with the macrocosmic expansion of life across the universe.

Conclusion: Humanity within Universal Time

There is a movement underway in the science of geology to rename the current epoch from "Holocene," meaning "recent whole," to "Anthropocene," meaning "recent human." Wolfram Mauser defines the "Anthropocene" as marking "an era in which the human impact on the Earth System has become a recognizable force."³¹ For Eckart Ehlers and Thomas Krafft, it is "a potentially new geological era [...] dominated by the increasingly stronger and obviously lasting imprint of mankind on nature."³² Pulling this concept into a much broader temporal arena, we might ask a more substantial question: besides an increasing effect on the climate of the earth, what other "lasting imprints" is humanity having on nature? In this paper, I have argued that modern science now reveals nature to be a historical process, with humanity as a new stage in the

30 Johann Wolfgang von Goethe, "One and All," in *103 Great Poems*, edited by Stanley Appelbaum (Mineola, New York: Dover Publications, 1999), 195, translation slightly altered.

31 Wolfram Mauser, "Global Change Research in the Anthropocene: Introductory Remarks," in *Earth System Science in the Anthropocene*, ed. Eckart Ehlers and Thomas Krafft (New York: Springer, 2006), 3.

32 Eckart Ehlers and Thomas Krafft, "Managing Global Change: Earth System Science in the Anthropocene," in *Earth System Science in the Anthropocene*, 5.

slow evolution of the universe. This means that the Anthropocene, far from being an era in earth's geological history, should be seen as an era in the history of life and the history of the universe itself. More precisely, following Taylor, I have argued that humanity represents a new kind of life, a symbiont organism that can only survive within its technological membrane. This membrane extends the logic of the living explosion in three ways: first, as a new way for life to define interiors from an external environment; second, as a new capacity to organize the entire periodic table into more complex form; third, as a potential to expand life beyond the atmosphere. Seeing human history as an aspect of natural history, furthermore, entails interpreting the current crisis in terms of previous crises in life's evolutionary history, with the oxygen holocaust of 2.4 billion years ago as providing a paradigm example what is happening now: a new kind of living organization is emerging, with terrific consequences for the organization that already exists, but also with tremendous potentials for life as a whole. As moral human beings concerned with the future of life, it is imperative that we take this into account in our thinking about how we respond to this terrible crisis: while protecting the current biosphere as best we can from the continuing depredations wrought by modernity, as environmentalism currently argues for, we must also recognize that humanity is an integral part of the living explosion, carrying it forward in previously impossible directions. This, I would argue, is the "Cosmogenetic Labour" that we are called to, the role that we and only we can play in the 15 billion year evolution of reality: the cosmos, in short, is not complete; it is still in the process of its Genesis, still in the process of being born, and in the new age of this evolving universe, the Anthropocene, human beings can and should extend the beautiful difference of living form into the relative indifference of the relatively empty void.