

# On the Place of Life in the Cosmos: Whitehead's Philosophy of Organism & Contemporary Theoretical Biology

By Matthew T. Segall  
California Institute of Integral Studies  
San Francisco, CA

“A philosophic outlook is the very foundation of thought and of life. The sort of ideas we attend to, and the sort of ideas which we push into the negligible background, govern our hopes, our fears, our control of behavior. As we think, we live. This is why the assemblage of philosophic ideas is more than a specialist study. It moulds our type of civilization”  
—Whitehead<sup>1</sup>

“The doctrine I am maintaining is that neither physical nature nor life can be understood unless we fuse them together as essential factors in the composition of ‘really real’ things whose interconnections and individual characters constitute the universe.”  
—Whitehead<sup>2</sup>

“We must conceive the Divine Eros as the active entertainment of all ideals, with the urge to their finite realization, each in its due season. Thus a process must be inherent in God's nature, whereby [God's] infinity is acquiring realization.”  
—Whitehead<sup>3</sup>

“To dismiss love as the biologic basis of social life, as also the ethical implications of love, would be to turn our back on a history as living beings that is more than 3.5 billion years old. We may resist the notion of love in a scientific reflection because we fear for the objectivity of our rational approach. Yet...such fear is unfounded. Love is a biological dynamic with deep roots. It is an emotion that defines in the organism as a dynamic structural pattern, a stepping stone to interactions that may lead to the operational coherences of social life.”  
—Maturana and Varela<sup>4</sup>

## Introduction

The time has come for a radical re-imagination of life's place in the cosmos. This chapter aims to contribute in some small way to that effort by bringing Alfred North Whitehead's philosophy of

---

<sup>1</sup> *Modes of Thought*, 63.

<sup>2</sup> *Modes of Thought*, 150.

<sup>3</sup> *Adventures of Ideas*, 277.

<sup>4</sup> *The Tree of Knowledge* (Shambhala, 1992), 247.

organism into conversation with contemporary theoretical biology. It attempts, with Whitehead's help, to reframe scientific naturalism's typical answer to the question "What is life?" (i.e., that life is something physical or mechanical), not by disputing that physics and biology are ultimately inseparable, but by foregrounding the equally relevant question, "What is the physical world?," and arguing that a coherent answer must be formulated in relational and organic rather than objective and mechanistic terms. A radical re-imagining of the place of life in the cosmos has become necessary because scientific materialism has proven itself incapable of adequately accounting for the existence of living organisms. Whitehead's process-relational panpsychism is shown to be one of the best alternative ontologies available for the task.

Though the chapter to follow engages specifically with the autopoietic paradigm within theoretical biology,<sup>5</sup> the Whiteheadian mode of thought guiding the inquiry presupposes that an adequate understanding of life requires properly situating its study not only in relation to physics and chemistry, but also in relation to psychology, anthropology, and indeed, theology. The universe, Whitehead recognized, does not come neatly packaged into the disciplinary silos of the modern research university. In addition to the transdisciplinary and cosmological scope of his organic realism, Whitehead also recognized the need for what today is referred to as a *participatory* approach to studying life's place in the cosmos.<sup>6</sup> Arran Gare summarizes this approach in the simplest terms possible: "scientists must see themselves as part of the world they are striving to understand."<sup>7</sup> This may seem like an unremarkable claim, but the objectifying methods of modern science, now second nature for many biologists, violently conflict with what should be common sense. Whitehead defined metaphysics as "an analysis of the obvious," claiming that "it requires a very unusual mind" to undertake such an inquiry.<sup>8</sup> The thinkers brought into conversation with Whitehead in what follows, including Friedrich Schelling, Hans Jonas, Francisco Varela, Evan Thompson, and Robert Rosen, were all unusual enough to share with him the recognition of this obvious and for that very reason often neglected fact: We human knowers are participants within the cosmic process we are studying, co-creators who are actively enriching or retarding the ongoing evolutionary adventure of cosmogenesis. What there is to be known is reciprocally bound up with the way that we attempt to know it. According to Varela and Maturana, ignoring this intimate connection isolates the human knower from the living world he or she is attempting to know, as though some "pure knowledge" were sought in a transcendental realm before or beyond our concrete experience of embodied action

---

<sup>5</sup> See especially Hans Jonas' *The Phenomenon of Life: Toward a Philosophical Biology* (Northwestern, 1966), Maturana and Varela's *Autopoiesis and Cognition: The Realization of the Living* (Reidel, 1980), Varela, , Eleanor Rosch, and Evan Thompson's *The Embodied Mind: Cognitive Science and Human Experience* (MIT, 1991), and Thompson's *Mind in Life: Biology, Phenomenology, and the Sciences of Mind* (Harvard, 2010).

<sup>6</sup> See Jorge Ferrer's *Revisioning Transpersonal Theory* (SUNY, 2001) or *Participation and the Mystery* (SUNY, 2017). See also Ferrer and Jacob Sherman, eds., *The Participatory Turn* (SUNY, 2008).

<sup>7</sup> Arran Gare, "Approaches to the Question 'What is Life?': Reconciling Theoretical Biology with Philosophical Biology" (2008), *Cosmos and History* Vol 4, No 1-2.

<sup>8</sup> *Science and the Modern World*, 5.

in Nature: “to disregard the identity between cognition and action, not to see that knowing is doing...is not to see human beings as living entities.”<sup>9</sup>

It is not only in biology, psychology, and anthropology that researchers must become attuned to the enactive influence of their own methodologies and epistemic attitudes on the objects of their study. The same attunement is required in physics and in theology. This chapter thus argues that a proper understanding of the place of life in the cosmos requires a way of studying Nature and even God that places ourselves *within* what we are trying to study (i.e., an *endophysics* and an *endotheology*). In Whitehead’s cosmology, even God lacks a “God’s eye view.” “There is an essence to the universe,” Whitehead says, “which forbids relationships beyond itself, as a violation of its rationality.”<sup>10</sup> To *rationaly* study the cosmos, then, is not to study it “objectively,” as if from outside, but rather to study it *relationally*. We embodied minds find ourselves always *in media res*, “in a buzzing world, amid a democracy of fellow creatures.”<sup>11</sup> There is, in Maturana and Varela’s words, an “unbroken coincidence of our being, our doing, and our knowing,” such that “every act of knowing brings forth a world” and “everything we do is a structural dance in the choreography of coexistence...*We have only the world that we bring forth with others, and only love helps us bring it forth.*”<sup>12</sup>

### **What is Life: Unique Anomaly or Universal Principle?**

With the founding of the modern secular research university, biologists came for the most part to approach life as an object of neutral scientific investigation. Further, under the political and economic conditions of late capitalism, theoretical understanding has itself largely taken a backseat to instrumental manipulation with an eye toward corporate profits, military applications, or both. But now that the existential threat of planetary ecological collapse has dawned on our species, the study of life can no longer remain a merely theoretical endeavor. It must also become an ethical and spiritual concern of central importance to everything we do. Modern humans are technologically transforming the planet at every measurable scale, forever altering the complex feedback loops that integrate geological, chemical, meteorological, and biological processes into a self-organizing Gaian ecosphere. Our species now finds itself in a tragically ironic situation: humans, originally creatures of Earth, have constructed a second Nature, an artificial Earth that we mistakenly believed made first Nature passive before our political and economic projects. Moderns assumed first Nature would patiently endure modern technological progress, but alas, we are witnessing “Gaia’s revenge” (as James Lovelock refers to it<sup>13</sup>): our presumed status as creators is being rudely revoked as we realize we are just as vulnerable to extinction as any other creature on Earth.

---

<sup>9</sup> *The Tree of Knowledge*, 248

<sup>10</sup> *Process and Reality*, 4

<sup>11</sup> *Process and Reality*, 50.

<sup>12</sup> *The Tree of Life: The Biological Roots of Human Cognition* by Humberto Maturana and Francisco Varela (Shambala, 1998), 25-26.

<sup>13</sup> See *The Revenge of Gaia* (Penguin, 2007).

A properly cosmological and participatory study of the organic realm is now a matter of life and death, something that still requires plenty of careful theorization, but which can no longer be approached in a disinterested or objective way (if it ever truly could be). The question, “What is life?” is a rather recent invention in the history of humanity’s inquiries into the nature of things. Jonas argued that the inverse question, “What is death?” preceded it by many millennia.<sup>14</sup> Primal (i.e., non-modern) peoples perceived the blooming, buzzing world around them as incontrovertibly animated or ensouled. They felt embedded within a generative cycle wherein *death* surely received its due, but as an *interval* between life and rebirth, rather than as life’s complete and utter annihilation. Jonas thus claims that “animism,” the perception that the world is alive, is really the most natural view.<sup>15</sup> “To the extent that life is accepted as the primary state of things, death looms as the disturbing mystery. Hence the *problem* of death is probably the first to deserve this name in the history of thought.”<sup>16</sup> All culture—all religion, art, science, and technology, and indeed our very humanity—is arguably the result of our becoming conscious of and responding to the problem of death. Our sense of who we are as human beings and the driving force of all our meaning-making endeavors may be rooted in a desire to overcome the contradiction of death by somehow integrating it into the more primary process of life. Every human society, primal or modern, to the extent that it remains viable finds some cultural means of integrating death back into the life process.

Archaeological anthropologists know for sure they are dealing with human remains when they find them buried in graves. Ethologists have observed primates, elephants, giraffes, whales, birds, and other species engaging in behaviors that can only be described as mourning their dead, so this behavior cannot be said to be entirely unique to *Homo sapiens*. Even so, the acute awareness of death, and its ritual elaboration, has undoubtedly intensified with our species. Burying the dead so as to ceremonially prepare them for passage to an afterlife of some kind appears to be an essential feature of our species.<sup>17</sup> Jonas describes the paradox by which the anomaly of death stood out for the primal panpsychist imagination:

This is the paradox: precisely the importance of the tombs in the beginnings of mankind, the power of the death motif in the beginnings of human thought, testify to the greater power of the universal life motif as their sustaining ground.<sup>18</sup>

It was only after the Copernican Revolution, according to Jonas, that the “proportional place of life in the scheme of things” began to be questioned.<sup>19</sup> Prior to this cosmological displacement of the

---

<sup>14</sup> See *The Phenomenon of Life: Toward a Philosophical Biology* (Northwestern, 2007), 8.

<sup>15</sup> *The Phenomenon of Life*, 7.

<sup>16</sup> *The Phenomenon of Life*, 8.

<sup>17</sup> See Marc Bekoff’s essay “Grief in Animals” in *Psychology Today* (October 2009): <https://www.psychologytoday.com/us/blog/animal-emotions/200910/grief-in-animals-its-arrogant-think-were-the-only-animals-who-mourn>

<sup>18</sup> *The Phenomenon of Life*, 9.

<sup>19</sup> *The Phenomenon of Life*, 8.

living Earth from the center of things, it had never occurred to human beings “that life might be a side issue in the universe,” rather than “its pervading rule.”<sup>20</sup> Galileo, Descartes, and Newton wielded the weapons of mathematical analysis to vanquish the core intuition of non-modern cosmology—an indwelling World-Soul—thus ushering in a new world view, that of the clockwork universe designed by a transcendent demiurge. To the modern question, “What is life?” came the modern answer: life is a machine (whether designed by God, as early moderns assumed, or by Darwinian Nature, as late moderns prefer).

The modern mechanistic world-picture is rooted in a Faustian bargain, that whereas religious worship of God had apparently failed to defeat death, technological mastery of Nature may yet succeed. The anthropologist Ernest Becker famously argued that all human culture is ultimately in service to an elaborate “immortality project.”<sup>21</sup> While pre-modern societies had religious means of achieving a sort of symbolic immortality, modern societies have replaced appeals to God with science and technology, which are, we are told by Ray Kurzweil and the Transhumanists, on the verge of providing us with *real* immortality. For Becker, both theologically and technologically oriented societies are driven by the same denial of death. Pre-moderns sought the shelter of the Church and the grace of the Mass to grant them some taste of transcendence, while moderns dream of terraforming Mars or, less grandiosely, surf Amazon.com where, through a miracle akin to transubstantiation, they turn mere data into consumable goods. The “thoughtless Prometheanism” of modern techno-capitalism is for Becker only a turbocharged version of the premodern “immortality project” rooted in the same “rage against our impotence, a defiance of our animal condition, our pathetic creaturely limitations.”<sup>22</sup>

Several hundred years after the Scientific Revolution, with the emergence of the Anthropocene—a perspective on our planet that is perhaps even more consequential than Copernicus’ revolution—moderns are being forced to consider Jonas’ problem anew. In the philosopher Clive Hamilton’s terms, the Anthropocene marks the discovery of a new phenomenon hitherto unknown to science:

the appearance of this new object, the Earth System, has ontological meaning. It invites us to think about the Earth in a new way, an Earth in which it is possible for humankind to participate directly in its evolution by influencing the constantly changing processes that constitute it. It therefore brings out the conception of a joint human-earth story.<sup>23</sup>

It is no coincidence that just as we find ourselves entering the 6th great mass extinction event in Earth’s history, one which may claim our own species as one of its victims, philosophers are once

---

<sup>20</sup> *The Phenomenon of Life*, 8-9.

<sup>21</sup> See *The Denial of Death* (The Free Press, 1975).

<sup>22</sup> *The Denial of Death*, 85.

<sup>23</sup> *Defiant Earth: The Fate of Humans in the Anthropocene* (Allen & Unwin, 2017), 21.

again beginning to take the ontological prospects of panpsychism seriously.<sup>24</sup> Jonas was familiar with the Whiteheadian variety of panpsychism, and so reminded his readers that taking such an ontology seriously does not mean setting aside centuries of modern scientific inquiry by returning to Aristotelian metaphysics.<sup>25</sup> Whitehead was led to articulate his philosophy of organism in the early 20th century because physics itself had outgrown the old mechanical world-picture (e.g., no more “simple location” in absolute space, no more “nature at an instant” in durationless time, no more “laws” of physics imposed from eternity, etc.). Unfortunately, many biologists continue to conceive of the object of their study as a rare anomaly within the physical universe, a universe otherwise empty of value, devoid of purpose, and governed by fixed, externally imposed laws. Organisms, while exceedingly complicated, are thus thought to be ultimately reducible to their simpler component parts. They appear to be animate agencies, but in reality organisms are just another lucky combination of atoms falling in the void (or genes filtered by fitness gradients), orphans of Monod’s chance and necessity.<sup>26</sup> Biologists are wary of letting go of mechanical metaphors, as to do so puts them at risk of being dismissed by their colleagues as unscientific Romantics. But I would ask my scientific colleagues, perhaps already tempted to dismiss the panpsychist cosmology here on offer, to provide me with even a single example of a scientific theory that does explanatory work without invoking metaphor. Quantum and relativistic phenomena are notoriously difficult to explain in common language (talk of “many worlds” and “bending” space notwithstanding), since they appear at first to do violence to our habitual ways of perceiving and conceiving of visible Nature. Many modern physicalists therefore prefer to treat them as purely mathematical theories. I ask my scientific colleagues again, what is the meaning of a mathematical formula without that most powerful of metaphorical symbols, “=,” to tie otherwise disconnected variables together?<sup>27</sup> Whitehead admitted that “the appeal to mechanism on behalf of biology was in its origin an appeal to the well-attested self-consistent physical concepts as expressing the basis of all natural phenomena”; “But,” he continues (writing in 1925), “at present there is no such system of concepts.”<sup>28</sup> Even Albert Einstein, in a letter written to nuclear physicist-turned-biologist Leo Szilard, admitted that it was in dealing with living things that he most felt the primitiveness of contemporary physics.<sup>29</sup> Robert Rosen refers to Einstein’s feeling about physics to amplify the feelings of another physicist-turned-biologist Erwin Schrödinger. Schrödinger’s hunch, elaborated in his famous essay *What is Life?* (1944), was that the study of organisms would teach us a *new physics*.<sup>30</sup> In Rosen’s terms, the old physics, that of mechanistic materialism, was not *generic* enough to account for living organisms. Organisms are not the contingent result of more general laws that physicists

---

<sup>24</sup> See for example *Panpsychism: Contemporary Perspectives* edited by Godehard Brüntrup, Ludwig Jaskolla (Oxford, 2017).

<sup>25</sup> *The Phenomenon of Life*, 2. Though of course there is plenty to be gained through a careful study of many of The Philosopher’s ideas, Whitehead decisively rejects Aristotle’s substance-quality ontology in favor of a process-relational alternative.

<sup>26</sup> See Jacques Monod’s *Chance and Necessity: An Essay on the Natural Philosophy of Modern Biology* (Knopf, 1971).

<sup>27</sup> See *Science in Action* by Bruno Latour (Harvard, 1987), 237ff.

<sup>28</sup> *Science and the Modern World*, 97.

<sup>29</sup> Quoted in *Essays on Life Itself* by Robert Rosen (Columbia University Press, 1999), 7.

<sup>30</sup> *Essays on Life Itself*, 9.

have already explained; rather, they “are indications that these laws themselves are profoundly incomplete”:

The universe described by these laws is an extremely impoverished, nongeneric one, and one in which life cannot exist. In short, far from being a special case of these laws, and reducible to them, biology provides the most spectacular examples of their inadequacy. The alternative is not vitalism, but rather a more generic view of the scientific world itself, in which it is the mechanistic laws that are the special cases.<sup>31</sup>

Rosen’s theoretical biology, when allied with Whitehead’s process philosophy, re-establishes a place for the organism not only in biological science, which has contented itself too long with mechanical models, but in physics, too. Rosen’s theory of life’s place in the cosmos hearkens back to the intuition of another kindred thinker, Schelling:

the particular successions of causes and effects (that delude us with the appearance of mechanism) disappear as infinitely small straight lines in the universal curvature of the organism in which the world itself persists.<sup>32</sup>

### **Toward an Organic Cosmology**

Schelling, who Gare has described as a process philosopher rather than an idealist,<sup>33</sup> developed his organic *Naturphilosophie* in the wake of Kant’s transcendental critique of dogmatic metaphysics. Organism, for thinkers like Schelling, Whitehead, and Rosen, is not to be understood as a special kind of entity contingently emergent from an otherwise inorganic physical world. Organism, instead, is a universal speculative principle characterizing Nature at both micro- and macrocosmic scales.<sup>34</sup> Organism functions as a mediating concept integrating the modern dualisms of such seeming opposites as process vs. substance, identity vs. relationality, and body vs. mind. In Kant’s *Critique of Judgment* (1790), the dualism between Nature and freedom running throughout his critical philosophy approached but did not finally achieve resolution in the idea of organism. Unlike merely mechanical Nature, which Kant argued could be understood according to efficient causes alone, living Nature displays a recursive form of organization that remains inscrutable without the imputation of formal and final causality. A living organism is an incarnating idea working to maintain the rule of the whole over the parts (in this way, organisms are analogous to Reason itself). Kant famously argued that mechanistic physics could never in principle explain the internal possibility of organic, that is, *self-organizing*, beings:

---

<sup>31</sup> *Essays on Life itself*, 33-34.

<sup>32</sup> *On the World Soul*, trans. Iain Hamilton Grant, *Collapse: Philosophical Research and Development* VI, 70.

<sup>33</sup> “From Kant to Schelling to Process Metaphysics” in *Cosmos and History*, Vol 7, no. 2, 2011.

<sup>34</sup> Whitehead, *Process and Reality*, 128-129, 215.

So certain is this that we may boldly state that it is absurd...to hope that perhaps some day another Newton might arise who would explain to us, in terms of natural laws...how even a mere blade of grass is produced (the 'Newton of the leaf').<sup>35</sup>

Kant was in the end unable to overcome the epistemological dualism between conceptually determined phenomena and unknowable noumena that shaped his transcendental method. He thus applied organism merely as a regulative principle of human judgment, unwilling to posit it as constitutive of Nature itself. He thought applying the concept in a constitutive way would require genius of a scientific sort, which he regarded as impossible. Only artists could attain the status of genius, according to Kant. Artists create art through intuitively participating in the creative formation of organic Nature, expressing wholeness without having to assemble it out of separate parts. In contrast, the reflective and objectifying mind of the modern scientist, transcendently cut off from the living organization of the natural world, can only study and conceptually describe organisms piecemeal as though they were inanimate mechanisms.

Schelling followed the spiritual potential if not the dead letter of Kant's third critique by articulating an intuitive science capable of knowing organism as constitutive of Nature. According to Schelling, "the less merely reflective [that is, objectifying] thought we give Nature, the more comprehensibly it speaks to us."<sup>36</sup> Schelling re-imagined Kant's *Critique of Judgment* as a new inauguration of the transcendental method, releasing philosophy from the dualistic determinations and duties of pure and practical reason by rooting it instead in the aesthetic feelings of living processes. Philosophy, for Schelling, became "nature itself philosophizing/*autophysis philosophia*."<sup>37</sup> Rather than the categories of transcendental logic, Schelling affirmed living Nature as *a priori*. His question was no longer "What must mind be such that knowledge of phenomenal Nature is possible?," but "What must actual Nature be for a knowing mind to have emerged from it?" Toward the end of his life, despite his own best efforts, Schelling had to admit that *feeling*, "the so-called *inner* sense of the emotions and the changes that take place within ourselves...*still very much needs a critique*."<sup>38</sup> Whitehead's philosophy of organism took up Schelling's task: "to construct a critique of pure feeling, in the philosophical position in which Kant put his *Critique of Pure Reason*."<sup>39</sup> The few pages Kant devotes to this in his "Transcendental Aesthetic" are, according to Whitehead, a deformed fragment of what should have been his primary topic.

There is an intimate connection between Whitehead's critique of feeling and the construction of an organic or panpsychist cosmology. Though the essence of life cannot be known in a logically

---

<sup>35</sup> Quoted by Rosen, *Essays on Life Itself*, 35.

<sup>36</sup> *Ideas for a Philosophy of Nature* (SUNY, 1988), 35.

<sup>37</sup> Quoted in Iain Hamilton Grant, *Philosophies of Nature After Schelling* (Continuum, 2006), 188.

<sup>38</sup> *Grounding of Positive Philosophy* by Schelling (SUNY, 2007), 168.

<sup>39</sup> *Process and Reality*, 113.



determinate way (i.e., in what Rosen refers to as a Turing-machine simulable way<sup>40</sup>), it can be *felt* intuitively in our own experience of being alive, of being a living organism among other living organisms. In his earliest writings on the philosophy of Nature (1797), Schelling wrote:

So long as I myself am identical with Nature, I understand what a living Nature is as well as I understand my own life...As soon, however, as I separate myself, and with me everything ideal from Nature, nothing remains to me but a dead object, and I cease to comprehend how a life outside me can be possible.<sup>41</sup>

The modern mechanistic world-picture, which physics itself has outgrown, nonetheless continues to shape the imaginative background of contemporary biology. Biological organisms are understood to be reducible to their mechanical parts, as though living things are not actually *alive*, but rather amount to little more than highly improbable chemical reactions. From Rosen's perspective, the collapse of mechanistic cosmology means we must dispense with the idea that

the gradient from simplicity to complexity is only a matter of accretion of simple, context-independent parts, and the analysis of more complex systems is merely a matter of inverting the accretions that produced them.<sup>42</sup>

Instead, following Whitehead, we must reverse the process typical of reductionistic explanation by construing the evolutionarily earlier forms of physical organization by analogy to the later biological forms.<sup>43</sup> There is now a new physics of irreversible, non-equilibrium processes allowing biologists to re-imagine organisms, not as dead machines, nor as machines imbued with an immaterial "vital force," but as entirely natural, thermodynamically open, historically emergent, and irreducibly complex energetic events.<sup>44</sup> It turns out that such self-organizing energetic events pervade the physical universe at every scale. Atoms, stars, and galaxies are such events, as are bacteria, sequoias, and salmon. This scale-free conception of self-organization is a consequence of Rosen's argument that complex self-organization is a generic and not specific feature of the universe. To be "complex" is not just to be "complicated," but, in Rosen's terms, to be noncomputable or nonsimulable.<sup>45</sup> While models may help us abstractly grasp some of the ingredients involved, there is something spontaneous and unpredictable going on in truly *complex* self-organizing processes. Of course, most contemporary theoretical biologists, including complex systems theorists, are not yet ready to admit enjoyment, purpose, or divine Eros into our most fundamental description of the goings-on of the universe. They remain tied to a model-centric mode of thought that seeks to explain organic life by

---

<sup>40</sup> *Essays on Life Itself* by Robert Rosen, 268.

<sup>41</sup> *Ideas for a Philosophy of Nature* (Cambridge University Press, 1988), 36.

<sup>42</sup> *Essays on Life Itself*, 36.

<sup>43</sup> *The Function of Reason* by Whitehead (The Free Press, 1929), 15.

<sup>44</sup> See *The End of Certainty* by Ilya Prigogine and Isabelle Stengers (The Free Press, 1996), 3.

<sup>45</sup> *Essays on Life Itself*, 17, 37.

reducing it to a set of efficient causes that is mathematically formalizable and thus in principle computable.<sup>46</sup>

As we've seen, Whitehead rejects modern science's erasure of final causality from both biological and physical Nature. Putting telos back into physis doesn't mean attributing human-like deliberative consciousness to electrons and protons, but there is a more generic form of nonconscious experiential capacity, some germ of mentality or urge of life that lies dormant even in the least complex modes of existence. Following Whitehead's analogical reversal of the typical form of evolutionary explanation, if biological organisms are alive, then ontological coherence requires that physical and chemical events also be understood as already somehow lively:

Science is taking on a new aspect which is neither purely physical, nor purely biological. It is becoming the study of organisms. Biology is the study of the larger organisms; whereas physics is the study of the smaller organisms.<sup>47</sup>

Organisms at every scale, whether particle, astrophysical, or biological, are precariously poised on thermodynamic gradients, surfing inner depths of feeling and lured by erotic potencies toward ever-more intense modes of existence. While there are still special differences between biological and physical modes of self-organization, these are differences in degree and not in kind. Organisms at every level are generated via purposeful self-organizing processes that are irreducible to their supposedly blind and inert components *because there can be no components that are not also self-organizing processes in their own right*: it is organisms all the way down. We might then say that ecology—or the study of organisms and their co-evolutionary dynamics—should replace physics as the most generic science.<sup>48</sup>

### **Whither Panpsychism?**

Whitehead's organic realism is not without its critics, even among those who sympathize with major aspects of his project. For example, in the Introduction to their co-edited book *Everything Flows: Towards a Processual Philosophy of Biology*, John Dupré and Daniel Nicholson's acknowledge Whitehead's import role in the development of process thought but then go on to claim his work is a "liability" best avoided by serious philosophers of biology: "the panpsychist foundations of Whitehead's system, not to mention its theological character, are hard to reconcile with the naturalistic perspective."<sup>49</sup> On the contrary, the argument of the present chapter is that a coherent naturalistic perspective on biology in fact requires panpsychism. For his part, Jonas—despite stating that Whitehead's philosophy of organism remains the only reasonable alternative open to naturalism "after the loss of the transcendental counterpole provided by dualistic metaphysics, in whose shelter

---

<sup>46</sup> See "Beyond Systems Theoretical Explanations of an Organism's Becoming: A Process Philosophical Approach" by Spyridon Koutroufinis in *Life and Process: Towards a New Biophilosophy* (edited by Koutroufinis) (de Gruyter: 2014).

<sup>47</sup> *Science and the Modern World*, 150.

<sup>48</sup> Call this a "general ecology" or "panecology" to distinguish it from the already defined and developed special science of biological ecology.

<sup>49</sup> *Everything Flows* (Cambridge University Press, 2018), 7.

alone an unadulterated ‘materialism’ in physics was rationally possible”—nonetheless remained concerned that Whitehead’s panpsychism left no room for the reality of death because of its denial of “the deep anxiety of biological existence” and preference for “a story of intrinsically secured success.”<sup>50</sup> Contrary to Jonas, Whitehead’s metaphysics is not just another elaborate denial of death. Whitehead’s panpsychism, on his own account, “is entirely neutral on the question of immortality,” understood in its traditional Christian sense as a personal afterlife.<sup>51</sup> His account of the ontogeny of individual biological organisms fully acknowledges that such complex forms of organization are fragile and dependent upon the “patience” of their environment for their enduring stability.<sup>52</sup> Whitehead doesn’t simply establish *life* as the foundation of existence; rather, his dipolar account of process in terms of subjective immediacy and superjective immortality could be described as affirming the *life-death-rebirth cycle* itself as the central cosmic mystery.

This life-death-rebirth mystery is affirmed by most primal world views, as well as in Vedic and Buddhist traditions. The Judeo-Christian tradition is rather unique in its denial of any form of rebirth, though there are exceptions (e.g., Origen and Rudolf Steiner). Thompson makes the following comparison of panpsychist conceptions of creaturely death to Buddhist conceptions of death:

Panpsychism implies that, as an entirely natural matter of fact, aspects or elements of consciousness—not creature consciousness but more primitive or basal, constituent forms of consciousness—remain present after biological death. Indeed, the idea that creature consciousness at death undergoes a kind of phenomenal dissolution into constituent phenomenal elements—an idea central to Indian and Tibetan Buddhist conceptions of the dying process—may make more sense from a panpsychist perspective than from a neurophysicalist one.<sup>53</sup>

In this sense, Jonas’ fascination with Heidegger’s existential phenomenology is not misplaced: Dasein’s being-toward-death is indeed constitutive of our humanness. Death opens us into the heart of Being. Whitehead’s unapologetic return to metaphysics is not necessarily in conflict with Heidegger’s turn toward *Existenz*, since he engages in philosophical speculation not in order to master or cover over death, as ontotheology does, but instead to seek some reconciliation between life and death via a coherent account of their integration in and as creative process, or what he termed “concrecence.” Whitehead analyzed an actual occasion’s concrecence into three cumulative phases of feeling: first, the creative intensity of many objectively given past actualities initiates a new actual occasion or throb of experience; second, this occasion seeks its own form of aesthetic satisfaction in an immediately enjoyed presentation of the objective manifold by unifying this

---

<sup>50</sup> *The Phenomenon of Life* by Jonas, 96.

<sup>51</sup> *Religion in the Making*, 107.

<sup>52</sup> *Science and the Modern World*, 119.

<sup>53</sup> “Response to Commentators on *Waking, Dreaming, Being*” *Philosophy East and West*, Volume 66, Number 3, July 2016, 989. <http://enlight.lib.ntu.edu.tw/FULLTEXT/JR-PHIL/phil567546.pdf>.

manifold into a unique novel subjective perspective on the universe; finally, the occasion, having achieved satisfaction of its subjective aim toward unity, perishes into superjective immortality, becoming another objective expression to be prehended in the concrescence of subsequent throbs of experience. This process, whereby “the many become one, and are increased by one,”<sup>54</sup> is iterated endlessly “to the crack of doom.”<sup>55</sup> It marks for Whitehead the primary miracle of creation, whereby the dry bones of the past are clothed again in the flesh of renewed purpose and zest for life.<sup>56</sup> It is the miracle whereby actual occasions perpetually perish “and yet live for evermore.”<sup>57</sup>

Whitehead’s metaphysical description of this mysterious cyclical and iterative process in terms of concrescence finds specific expression in the latest scientific research into the origins of biological life in the wet-dry cycling of geyser-fed thermal ponds, which may have kickstarted the natural selection of protocellular vesicles containing organic polymers.<sup>58</sup> This environment provided an ideal “shelter” for the complex chemistry necessary to sustain the far from equilibrium metabolism and interior experiential horizon characteristic of living organisms.<sup>59</sup> Compare Whitehead’s account of the phases of concrescence to David Deamer and Bruce Damer’s biochemical account of life’s origins in “pools of innovation”:

Each drying cycle...cause[s] lipid membranes of the vesicles to open, allowing polymers and nutrients to mix. On rewetting, the lipid membranes...reencapsulate different mixtures of polymers, each mixture representing a kind of natural experiment...[P]rotocells would then survive to pass on [their] polymer sets to the next generation, climbing an evolutionary ladder...[The] model resemble[s] a kind of chemical computer “booting up” the functions of life, starting with random “programs” written in the form of polymers. <sup>60</sup>

The “dry” phase in this model is akin to the “death” or superjective perishing phase of Whitehead’s cycle of concrescence, wherein RNA-like polymers are preserved and shared as a kind of memory awaiting rehydration, at which point another round of selection in the “life” phase begins again. Each wet-dry-wet cycle initiates another throb of experience that makes its contribution to the evolutionary advance into novelty. In Damer’s terms, this research into life’s origins is making clear

---

<sup>54</sup> Whitehead, *Process and Reality*, 21.

<sup>55</sup> *Process and Reality*, 228.

<sup>56</sup> Whitehead, *Process and Reality*, 85.

<sup>57</sup> Whitehead, *Process and Reality*, 351.

<sup>58</sup> See “Coupled Phases and Combinatorial Selection in Fluctuating Hydrothermal Pools: A Scenario to Guide Experimental Approaches to the Origin of Cellular Life” by Bruce Damer and David Deamer in *Life* (Issue 5, 2015). doi:10.3390/life50x000x. Further research is required to flesh out the resonances between Damer and Deamer’s new theory of the origin of life and Whitehead’s process ontology, but the initial connections are worth noting here.

<sup>59</sup> *Process & Reality*, 119

<sup>60</sup> “Life Springs” by Martin J. Van Kranendonk, David W. Deamer, and Tara Djokic in *Scientific American*, August 2017. Note that the “chemical computer” mentioned here is unlike the Turing-machine computation that Rosen felt was insufficient for capturing the complex self-organizing processes responsible for biological life.

that “the transition [from physics and chemistry] to [biological] life is a continuum,”<sup>61</sup> supporting the panpsychist hunch that there need be no ontological gap between physics and biology.

Note that while Whitehead's *ontological* account of concrescence does include a kind of “immortality,” this should not be confused with the distinct question of the post-mortem ontogeny of individual biological organisms. As mentioned above, Whitehead's philosophy of organism is decidedly neutral on the question of ontogenetic or individual immortality. An attenuated form of immortality that an individual can be said to possess is achieved through its participation in and contribution to the larger cosmic community or divine milieu which sheltering its experience.<sup>62</sup> In biochemical terms, the preservation and sharing of genetic memory also functions as a kind of phylogenetic or species-level immortality. Whitehead's metaphysical account of concrescence captures the essential importance of death or perishing in the creative process, thereby imaginatively generalizing Darwin's theory of biological evolution via natural selection such that it applies at all scales of cosmic evolution.<sup>63</sup>

It cannot be denied that Whitehead's philosophy of organism stands in stark contrast to the nihilism of some modern and much postmodern philosophy. For Whitehead, beauty is the teleology of the universe. The concrescence of each actual occasion is goaded toward beauty by an indwelling divine Eros. This Eros, also called the “primordial nature of God,” is inherited in the initial feelings of each occasion of experience. But because actual occasions are still self-creative, the divine Eros does not determine the direction of Nature's creative advance. Rather, by contributing to the initial phase of each concrescent occasion a graded envisagement of Creativity's infinite value-potential as relevant to its finite situation, the divine Eros lures occasions toward more intense actualizations of value-experience or beauty. Such actualizations are never assured, and any achievement of order is accomplished amidst a background of chaos that is forever threatening to shipwreck the whole endeavor. Whitehead rejects as fallacious the narrow religious conception of the universe as determined by some final order imposed by a transcendent and omnipotent God.<sup>64</sup>

---

<sup>61</sup> “A Field Trip to the Archean in Search of Darwin's Warm Little Pond” by Bruce Damer in *Life* (Issue 6, 2016). ; doi:10.3390/life6020021

<sup>62</sup> In the end, Whitehead and Jonas converge rather intimately on the question of the possibility and nature of immortality. Indeed, Jonas was deeply influenced by Whitehead's processual account of God's relationship to the world. See *The Life and Thought of Hans Jonas* by Christian Wiese [Brandeis, 2007], 126). Interested readers should compare the final pages of *The Phenomenon of Life* in the chapter “Immortality and the Modern Temper” to Whitehead's late essay “Immortality.”

<sup>63</sup> See *Physics of the World-Soul: Whitehead's Adventure in Cosmology* by Segall (Lulu, 2018), 57ff. <https://matthewsegall.files.wordpress.com/2019/01/physics-of-the-world-soul-third-edition-1.pdf>

<sup>64</sup> *Process and Reality*, 111.

Despite its open-ended evolutionary character, Jonas,<sup>65</sup> Varela,<sup>66</sup> and Thompson<sup>67</sup> do not go as far as affirming the cosmogenetic teleology of Whitehead's panpsychism. They restrict the scope of teleology to biological phenomena, arguing for a kind of immanent purposiveness at work at least in the self-production and sense-making of individual living organisms down to the level of single cells. Self-production or autopoiesis is said to differentiate an organism from an "indifferent physicochemical" environment, while sense-making turns this environment into a world of "biological significance."<sup>68</sup> They allow teleology entrance into Nature only through the emergent centers of "concern" wherein biological organisms "affirm and reaffirm [themselves] in the face of not-being."<sup>69</sup>

The autopoietic paradigm thus goes further than Kant in affirming immanent teleology as constitutive of at least biological organisms, but nonetheless opposes the "otherwise neutral events" of external physics and chemistry governed by deterministic laws to the "internal norms" established by these organisms.<sup>70</sup> Biological organisms, as sense-making, self-producing beings, are not posited as by any means exempt from the laws by which science understands the physical world, but nonetheless they are thought to add something special not found in or entailed by these laws. From Thompson's perspective, the new sciences of complexity, unavailable in Kant's day, allow contemporary theoretical biologists to grasp this extra something in a more rational, scientific way.<sup>71</sup>

Thompson (a former student of Varela's) has followed one line of the post-Kantian tradition's development through Husserl to its culmination in Merleau-Ponty's embodied phenomenology. He also draws on Jonas' discussion of biological space and time, which is in effect an evolutionary extension of Kant's Transcendental Aesthetic beyond the human to include the subjectivity of all biological organisms. Whitehead, on the other hand, tried to go back to Kant and invert his founding principles. As was mentioned earlier, Whitehead's process-relational ontology constructs a critique of pure feeling as a replacement for Kant's critique of pure Reason. Something very similar ended up happening within the Kantian tradition itself, not just via Schelling, but via Merleau-Ponty, whose late ontology of the flesh could be described as a transition from Kantian disembodied Reason as epistemologically foundational (with ontology bracketed) to embodied feeling as the ground of knowledge and existence. It could be that Schelling, Whitehead, and the embodied

---

<sup>65</sup> See *The Phenomenon of Life*.

<sup>66</sup> See "Life After Kant: Natural Purposes and the Autopoietic Foundations of Biological Individuality" in *Phenomenology and the Cognitive Sciences 1* (Kluwer, 2002).

<sup>67</sup> See *Mind in Life*.

<sup>68</sup> Thompson, *Mind in Life* (Harvard, 2007), 153.

<sup>69</sup> *Mind in Life*, 153.

<sup>70</sup> *Mind in Life*, 152-153.

<sup>71</sup> *Mind in Life*, 129.

phenomenologists end up converging in the end.<sup>72</sup> Even so, Thompson remains suspicious of claims that the relations between even the most microscopic physical events are somehow experiential. He worries that this sort of speculative claim overshoots the transcendental limitations Kant placed on human knowing.<sup>73</sup> From Whitehead's perspective, Kant prematurely limited our intuitive capacity to participate in Nature's inner life.<sup>74</sup> Whitehead, perhaps with Kant or his inheritors in mind, rejected the philosophical tradition which has it that "there are set limitations for human experience, to be discovered in a blue-print preserved in some Institute of Technology."<sup>75</sup> He grants the usual limitations set by the social habits that happen to be dominant in each epoch, and by the difficulty of verbally expressing, and thus recalling or communicating, unusual experiences; but in principle he cannot "discern any reason, apart from dogmatic assumption, why any factor in the universe should not be manifest in some flash of human consciousness."<sup>76</sup> After all, though difficult, the main task of philosophy is precisely that of translating into language what such flashes of insight reveal about the nature of the penumbral background encompassing our normal consciousness. In this way, philosophy strives to increase the generality of our metaphysical categories beyond their applicability to the tables and tea cups of our everyday experience. Hidden in ordinary experience, Whitehead continues:

there is always the dim background from which we derive and to which we return. We are not enjoying a limited dolls' house of clear and distinct things, secluded from all ambiguity. In the darkness beyond there ever looms the vague mass which is the universe begetting us.<sup>77</sup>

The normally dim background enveloping our embodied experience, that which our sensitive membranes are supposed to put us in touch with, is evidently not a mere neutral "not-being." Whitehead beseeches us not to be too quick to artificially limit our capacity to experience the deeper causal vectors animating the cosmic whole from which we derive and to which we return.

Despite its tendency to impose such limits, there remains much that is of value in the transcendental orientation, particularly when it has been transformed into embodied phenomenology. Thompson's approach invites reductionistic naturalists to become more reflexive about how their objective way of knowing brings forth a specific, limited domain of significance, a domain wherein only the mechanical aspects of living phenomena are detectable, and wherein all value, meaning, and purpose

---

<sup>72</sup> See William Hamrick and Jan Van der Veken's *Nature and Logos: A Whiteheadian Key to Merleau-Ponty's Fundamental Thought* (2011) argues as much.

<sup>73</sup> Blog exchange on July 16, 2013: <https://footnotes2plato.com/2013/07/16/phenomenology-and-ontology-merleau-ponty-whitehead-and-the-flesh-of-the-world/>

<sup>74</sup> Even Kant, in his last writings before death (published as the *Opus Postumum*), acknowledged that we do have intuitive access to the interiority of nature, since we ourselves, as natural beings, experience it directly in our own interiority. Kant's late re-consideration of the limitations his earlier critiques had placed on knowledge may have been a result of Schelling's influence.

<sup>75</sup> *Essays in Science and Philosophy*, "Analysis of Meaning," 134

<sup>76</sup> *Essays in Science and Philosophy*, "Analysis of Meaning," 134-135.

<sup>77</sup> *Essays in Science and Philosophy*, "Analysis of Meaning," 132.

evaporates from view. By epistemically ruling out a “feeling for the organism”<sup>78</sup> as unscientific, mechanistic biologists become numb to the physical purposes at work within the living processes of Nature. If, as Thompson puts it, “empathy is a precondition of our comprehension of the vital order,” where empathy means the “spontaneous and involuntary resonance of two living bodies with each other,”<sup>79</sup> then knowing the living interiority of Nature requires coming to aesthetically resonate with it, to sense it, or sense *with* it, from the inside out. Whitehead, like Schelling, arrived at his organic realism by inverting Kant’s transcendental idealism so that intuitive feeling and aesthesis come to ground conceptual reflection and Reason.<sup>80</sup> “The reaction of our own nature to the general aspect of life in the universe”<sup>81</sup> is thus the primary experiential datum of and epistemological justification for Whitehead’s metaphysics.

Thompson agrees that a more generic view of nature than the mechanical one is possible. In his more recent work, he has pursued a post-physicalist, non-dualist perspective, arguing that “physical being and experiential being imply each other [and] derive from something that is neutral between them.”<sup>82</sup> He explicitly leaves the door open to panpsychism and neutral monism and suggests they may have advantages over neurophysicalist reductionism.<sup>83</sup> The term “neutral monism” was first coined by Bertrand Russell and fleshed out by William James in the early 20th century, but it has a longer philosophical pedigree going back to Spinoza.<sup>84</sup> This stream of thought had an important influence on Whitehead’s philosophical development. James’ notion of a “pure experience” from out of which subject and object or mind and matter emerge and constellate themselves into more or less stable patterns of perceptual habit is very close to Whitehead’s panpsychism (which David Ray Griffin renamed “panexperientialism”<sup>85</sup>). But how can something “neutral” give birth to a self-organizing cosmos generative of biological or psychological individuals? It is this problem that led Whitehead to generalize the insights of James’ radically empirical psychology (which has much in common with embodied phenomenology) into a panpsychist cosmology. If experience goes all the way down, the challenge is to find some description general enough to avoid anthropomorphism but vectored and telic enough to still count as experiential. Whitehead threads the needle with his concept of *prehension*. Processes of physical prehensionality, where memory and anticipation are present already in germ, thus become the evolutionary precursors of both biological intentionality

---

<sup>78</sup> *Mind in Life*, 165 (referring to Evelyn Fox Keller’s biography of biologist Barbara McClintock, *A Feeling for the Organism* [1984]).

<sup>79</sup> *Mind in Life*, 165.

<sup>80</sup> I referred to this Schellingian-Whiteheadian reversal as “descendental” philosophy in my dissertation, *Cosmotheanthropic Imagination in the Post-Kantian Process Philosophy of Schelling and Whitehead* (2016).

<sup>81</sup> *Essays in Science and Philosophy*, “Immortality,” 102.

<sup>82</sup> *Waking, Dreaming, Being: Self and Consciousness in Neuroscience, Medication, and Philosophy* (Columbia, 2015), 105.

<sup>83</sup> Thompson, “Response to Commentators on *Waking, Dreaming, Being*,” *Philosophy East and West*, Volume 66, Number 3, July 2016, 989. <http://enlight.lib.ntu.edu.tw/FULLTEXT/JR-PHIL/phil567546.pdf>

<sup>84</sup> Stubenberg, Leopold, “Neutral Monism”, *The Stanford Encyclopedia of Philosophy* (Fall 2018 Edition), Edward N. Zalta (ed.). <https://plato.stanford.edu/archives/fall2018/entries/neutral-monism/>

<sup>85</sup> *Unsnarling the World-Knot: Consciousness, Freedom, and the Mind-Body Problem* (University of California, 1998), 78.



(e.g., the decision-making of motile bacteria in a concentration gradient<sup>86</sup>) and conscious reflection (e.g., theoretical biologists pondering the essence of life).<sup>87</sup> There is thus no neutral reality: for Whitehead, to be real is already to be the realization of some modicum of value, as “aesthetic attainment is interwoven in the texture of realization.”<sup>88</sup>

### Placing Life Back in the Cosmos

As has been shown, there are clear epistemological and ethical parallels between Whitehead’s philosophy of organism and the new paradigm of theoretical biology put forward by thinkers like Schelling, Rosen, Jonas, Varela, and Thompson. There are also important differences regarding physical ontology, panpsychism, and the proper scope of teleology. A potential benefit of bringing these thinkers into conversation with Whitehead is that it may lure those who are already skeptical of mechanistic materialism’s ability to adequately account for life into the more constructive project of imagining a viable cosmological alternative. If living organization is taken seriously and given its proper place in the cosmos as ontologically generic, then our scientific conception of the universe requires a thorough re-imagining. Organism must replace mechanism as the root image or archetypal analogy guiding the scientific investigation of Nature. Epistemologically, feeling (in the more generic, Whiteheadian sense) must be granted an enhanced status as our primary mode of relation to the life of the cosmos, such that a *rational* cosmology comes to mean the same thing as a *relational* one.

Whitehead’s elevation of the importance of feeling and aesthetics for epistemology and ontology is an invitation to consider the scientific image of the physical world anew. Is the universe really just an accidental and anesthetic mechanism, the result of blindly colliding particles obeying the fixed laws of a mathematical algorithm? As we’ve seen, Whitehead offered a radically unorthodox alternative: “The teleology of the Universe is directed to the production of Beauty.”<sup>89</sup> The universe is a living, self-making work of art. Unlike most artworks, the universe’s teleological self-production is not the handiwork of a cosmotheoros or divine craftsman standing above and beyond an objectified world. Whitehead’s process-relational ontology is also an invitation to reconsider the Cartesian-Newtonian theological image of God, an image that was extremely influential in the initial formation of the modern scientific worldview.<sup>90</sup> In other words, re-thinking the ontological status of the physical world known to science in organic and relational terms also means re-thinking our image of divine creativity in such terms. Whitehead’s God is a *life*, not a disincarnate intellect that created the world

---

<sup>86</sup> For more on biological intentionality, see “The creative power of the individual memory and the species-specific memory in the development of living beings” by Gernot G. Falkner and “EcoEvoDevo, Epigenetic and Whitehead’s Concept of Organism. Overcoming the Bifurcation of Matter and Mind in Nature” by Regine Kather, both in this volume.

<sup>87</sup> For more on the difference between prehensionality and intentionality, see my dissertation *Cosmotheanthropic Imagination in the Post-Kantian Process Philosophy of Schelling and Whitehead* (2016), 143.

<sup>88</sup> Whitehead, *Science and the Modern World*, 94.

<sup>89</sup> Whitehead, *Adventures of Ideas*, 265.

<sup>90</sup> For more on the evolution of religion and of the God-image, see my essay “Religion in Human and Cosmic Evolution: Whitehead’s Alternative Vision” in *Unprecedented Evolution: Continuities and Discontinuities Between Human and Animal Life* edited by Spyridon Koutroufinis (Claremont, CA: Process Century Press, forthcoming 2019).

by fiat. Whitehead's living God celebrates and suffers through the ongoing death-rebirth mystery of cosmogenesis with all incarnate beings. God is immanent and omnipresent as an initial Eros infecting each and every actual occasion of experience with a uniquely relevant goad toward just that beauty which is realizable for it in its given situation.

These are the sorts of thoughts that Whitehead's panpsychist cosmology allows us to think. While mechanistic materialism has failed to account for the existence of biological and psychological modes of existence, or has dismissed them as peripheral anomalies in an otherwise entropic and purposeless world, Whitehead's philosophy of organism welcomes us back as creative participants into a universe worth living in.