The New Biology

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THE CHRISTIAN'S DILEMMA: ORGANICISM OR MECHANISM?

by Michael Ruse

Abstract. Is organicism inherently Christian-friendly, and for that matter, is mechanism inherently religion nonfriendly? They have tended to be, but the story is much more complicated. The long history of the intertwined metaphors of nature taken as an organism, versus that of nature as a machine, reveals that both metaphors have flourished in the endeavors of philosophers, scientists, and persons of faith alike. Different kinds of Christians have been receptive to both organicist and mechanistic models, just as various kinds of nonreligious scientists have been receptive to both holistic and machine metaphors. Although, it is true, organicism has been generally more attractive to persons of faith than mechanism (and vice versa), an overview of the rich and varied history of allegiances to these metaphors—religious and nonreligious alike—shows that debate is much more interesting and complex. A brief inspection of conversation surrounding recent scientific discoveries shows that this debate between metaphors is still very much alive today.

Keywords: holism; mechanism; metaphor; organicism; reductionism

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If but some vengeful god would call to me
From up the sky, and laugh: "Thou suffering thing,
Know that thy sorrow is my ecstasy,
That thy love's loss is my hate's profiting!"
Then would I bear it, clench myself, and die,
Steeled by the sense of ire unmerited;
Half-eased in that a Powerfuller than I
Had willed and meted me the tears I shed.
But not so. How arrives it joy lies slain,
And why unblooms the best hope ever sown?
—Crass Casualty obstructs the sun and rain,
And dicing Time for gladness casts a moan . . . .
These purblind Doomsters had as readily strown
Blisses about my pilgrimage as pain.

–Thomas Hardy (Hardy 1994, 5)

The English poet and novelist Thomas Hardy was raised as a good, God-fearing Christian. But then, shortly after its appearance, he read Charles Darwin's *Origin of Species* and everything fell apart. His sonnet "Hap," written in 1866, tells it all. It isn't so much that God can be hurtful. This was no news to anyone who had read the Book of Job. It was rather that there is no God. Everything is chance with no meaning, no beginning, and no end. Instead of Divine Providence hovering over us, concerned with our well-being, even to the point of dying in agony on the Cross, we are at the mercy of those Purblind Doomsters.

Science and Religion

For 150 years since that awful decade, Christians have been trying to find an answer. Does Darwinian evolutionary theory spell the end of faith? Do the rest of the life sciences from the double helix to the computer-program-driven brain? Or, are there some responses that might be adequate, or at least promising? There are those, then and now, who simply reject any part of science that makes them religiously uncomfortable. Most prominently, these include the biblical literalists and the fundamentalists (Numbers 2006). But there are fellow travelers, particularly when it comes to human nature. Let us put these doubters of science to one side as not worthy of our attention (certainly not in *Zygon*, an organ dedicated to taking both science and religion seriously). What then are our options?

First, there are those who simply declare victory for their own position on the science and religion relationship and go home. A good example is the late-nineteenth-century High Anglican, Aubrey Moore. He wrote:

> Science had pushed the deist's God farther and farther away, and at the moment when it seemed as if He would be thrust out altogether, Darwinism appeared, and, under the guise of a foe, did the work of a friend. It has conferred upon philosophy and religion an inestimable benefit, by showing

> us that we must choose between two alternatives. Either God is everywhere present in nature, or He is nowhere. He cannot be here, and not there. He cannot delegate his power to demigods called "second causes." In nature everything must be His work or nothing. We must frankly return to the Christian view of direct Divine agency, the immanence of Divine power from end to end, the belief in a God in Whom not only we, but all things have their being, or we must banish him altogether. (Moore 1890, 73–74)

It is not, I think, that Moore would deny that aspects of Christianity (such as Genesis, taken literally) cannot clash with science, but that there are ways, stretching back to Augustine, of dealing with this (McMullin 1985). Moore would say that truth cannot be opposed to truth, so the essence of Christianity and the essence of science cannot conflict and might indeed be expected to support each other.

Second, there are those who want to supplement science in nonnaturalistic ways in order to achieve harmony. This was the move of Darwin's American supporter Asa Gray (1876), who argued for a kind of theistic evolution, where God adds direction through new genetic variations leading to evolution. Arguably, Intelligent Design Theorists are today's best representatives of this approach (Johnson 1991; Behe 1996; Dembski 1998). Although he thinks me unfair (not being particularly keen on equating theistic evolution with Intelligent Design), I would put Robert John Russell (2008) in this camp too. He wants to slip in God's direction under the radar of quantum uncertainty, but ultimately he is at one with Asa Gray in invoking a hands-on God.[1]

Third, there are those who think that science and religion are indeed uneasy bedfellows (as with the first position), but also think that one cannot bring God into the causal picture either (as those taking the second position hold)—at least not at the level of science. In contrast, the third approach is to argue that science is never just a matter of describing and explaining objective facts that are clear to and shared by all. To the contrary, science requires interpretation and sometimes there are alternative interpretations available. Some of these alternatives are more religion-friendly than others and, all things being equal, the idea is that it is legitimate to use religious conviction to steer one's choice of scientific alternatives, which rebounds to support that conviction. For all he was fond of quoting Moore, this was very much the position of the Templeton prize winner Arthur Peacocke (1993). Specifically in the context of Darwinism, it is also the position of fellow Oxonion and Anglican priest Keith Ward (1996).

It is the third position that I want to explore a little further, and to this end I ask for more details on such supposed alternatives. It is hardly a matter of dispute to say that the division between mechanism/reductionism and holism/organicism is at the core of the differences here. The issue is not over the claim that the world is law-bound and that it is the task of science

to dig these laws out and to connect them up into theories. Everyone—other than antediluvians like Alvin Plantinga (2011)—accepts that. The issue, instead, is over the appropriate, or better, the correct scientific "root metaphor," to use a term beloved of linguists and students of rhetoric, and those in related fields.

What is the underlying world picture that one should have in science? Should it be that the world is a machine, or should it be that the world is an organism? It is as simple—and complex—as that. Go machine and you are a "mechanist/reductionist." Go organism and you are a "holist/organicist." Sometimes "emergentist" is added to the second option, to set oneself against "reductionism" in the first option. To complete the case, one appends the additional claim that holism/organicism is more religion-friendly. On the surface, then, one would think that a religion-friendly approach to science ought to promote a holistic/organicist view of science and downplay or reject a mechanist/reductionist view. That way, one can truly have one's cake and eat it too.

But is this true? As a prolegomenon to an answer let me do what one should do in cases like these: turn to history. What does that teach us? Let us see.

The Weaving of the Organic and Mechanistic Metaphors—A History

If you lived about a thousand years before Christ, especially if you were a farmer or a fisher or someone living mainly outdoors, meaning that you lived where there was the possibility of agriculture or fishing (and not in the middle of a desert), there was no big secret about the nature of the world in which you lived (Ruse 2013). It was—and *obviously* so—in some important sense living, an organism, be that in the sense of Mother Earth, or in the Hebrew view of the creative principle, viz. Woman Wisdom, as given in Proverbs. There are the seasons of birth, flourishing, harvesting, and then slow decay and death, with the hope of renewal in the future. The land gave forth its sustenance, there were living rivers and fens and ponds, and above all the oceans. Life grew on it, and we lived and reproduced. When you dug into the ground there were minerals and metals. Everything needed to survive and flourish was provided naturally, and in this sense, organically. The Earth gave up its bounty, feeding and housing, and giving unto its children (Merchant 1980).

It is little wonder therefore that, especially in Greece—the (Western) home of philosophy and science and of so much culture—the organic model or metaphor was taken as basic and incorporated into the systems of the greatest thinkers. Digging back historically for the roots of this philosophy, one can find Parmenides' famous thesis: "[What exists] is now, all at once, one and continuous . . . Nor is it divisible, since it is all alike;

nor is there any more or less of it in one place which might prevent it from holding together, but all is full of what is" (Curd 2011, B 8.5–6, b8.22–24).

For Plato, it was a given that the world—the whole universe in fact—is a living being with its own life force or "soul." He tied this in with his famous ontology, the theory of Ideas or Forms (Cooper 1997). Plato said that this world of ours is but half existence, sandwiched between absolute nothingness and a world of eternal, unchanging rationality that includes the objects of mathematics and ideal entities, the Forms, on which everything in this world is modeled ("participates"). Tying all together in the ideal world is the Form of the Good from which all else stems. Showing his debt to the school of Pythagoras (a school that not only saw numbers as infusing all reality but also were nigh Sun worshippers), Plato argued that the Good in the rational world is analogous to the Sun in this world of experience, since it is from this celestial being that all else stems, tying all together. It is the Sun that obviously gives and sustains life, as equivalently does the Form of the Good in the rational world. Plato was therefore an "organicist"—seeing the organic model as basic or the root metaphor. And he was also a "holist"—seeing all as connected and making sense only if things are considered as parts of the whole.

Plato's student Aristotle was also an organicist, although perhaps not as much of a holist as Plato (Barnes 1984). He, like his teacher, saw the organic metaphor as the key to understanding nature—not just the organisms, but also the physical world of planets and suns, of rocks and rivers and oceans, and so forth. Indeed, the phrase: "The whole is more than the sum of its parts" comes from Aristotle (*Metaphysics* 1045a, in Barnes 1984, 1650). Famously, Aristotle was a teleologist, arguing that everything—and most especially organisms—has to be understood in terms of ends, of "final causes." There is perhaps no logical connection between holism and final-cause thinking, but as a matter of fact the two tend to go together, bound by (or subsumed beneath) the metaphor of the world (or its parts) as an organism (as organisms). One thinks in terms of a body that is integrated, that is organized, that is growing or developing, and that must be understood in terms of its ends or goals rather than just in terms of the prior causal factors ("proximate causes").[2]

However, Aristotle pulled back from thinking of the world (the Earth, or perhaps, as for Plato, the whole universe) as one functioning organism, a kind of world soul. For Plato this is to be identified in some way with the Form of the Good, and while it is not a deity as such, nor is it to be worshiped, it is a kind of overall principle of Being or of life. Indeed, in the *Timaeus*, where he introduces the idea of a world soul, Plato does think in terms of an active designer, the Demiurge.

> Now it wasn't permitted (nor is it now) that one who is supremely good should do anything but what is best. Accordingly, the god reasoned and concluded that in the realm of things that are naturally visible no unintelligent thing could be as a whole better than anything which does possess intelligence as a whole, and he further concluded that it is impossible for anything to come to possess intelligence apart from soul. Guided by this reasoning he put intelligence in soul, and soul in body and so he constructed the universe. (*Timaeus* 30b-c, in Cooper 1997, 1236)

Aristotle had his god-like beings, including the central one from which all else stems. However, it could not be a world soul in Plato's sense because, above all else, world souls are concerned with the welfare of the beings within, the parts of the whole. Just as the Sun exists for our benefit, to warm us and provide food and sustenance. For Aristotle, as for Plato, the ultimate entity—the Form of the Good (Plato), the Unmoved Mover (Aristotle)—had to be perfect, which meant it could only do what perfect beings do. And what perfect beings do, argued Aristotle, is contemplate perfection, namely, themselves! Aristotle's Unmoved Mover probably has no knowledge of the physical world, including us (Sedley 2008). Not much holism there!

Holistic or not, as is well known the organic model was incredibly important and powerful for 2,000 years, right down through the Middle Ages until the time of the Renaissance—let us say until about the beginning of the sixteenth century, also of course the time of the Protestant Reformation. By that time, people were starting to build machines, especially clocks. It was almost inevitable that people would start to think of the world in terms of machines, since the most elaborate clocks (to be found in churches, as in Strasbourg) often involved models of the universe with the sun and the planets going through their motions. One now had a new root metaphor: that of the world as a machine. In a word—mechanism! With this came not so much the denial of souls or consciousness or life spirits, but certainly their expulsion from the physical world, often for many from the world of meaningful science. René Descartes was the point man here (Garber 1992). He divided the basic materials of existence and substance, into two—*res extensa*, extended things, and *res cogitans*, thinking things. Chairs and table, and (notoriously) animals, are *res extensa*. Angels are *res cogitans*. We humans are uniquely both. The point is that the physical world of science is nothing but matter in motion, as in a machine.

Anyone following through the history of holism needs to take account of the Scientific Revolution, and the seeming triumph of mechanistic-reductionistic talk over the organicist vision of the ancients. Robert Boyle, the Irish aristocrat and seminal chemist, summed it all up, saying that the difference between the supporters of the organic model (Aristotelians) as compared to the machine model (which he favored) is as follows:

> [The Aristotelians] seem to imagine the world to be after the nature of a puppet, whose contrivance indeed may be very artificial, but yet is such that almost every particular motion the artificer is fain (by drawing sometimes one wire or string, sometimes another) to guide, and oftentimes overrule, the actions of the engine, whereas, according to us, it is like a rare clock, such as may be that at Strasbourg, where all things are so skillfully contrived that the engine being once set a-moving, all things proceed according to the artificer's first design, and the motions of the little statues that as such hours perform these or those motions do not require (like those of puppets) the peculiar interposing of the artificer or any intelligent agent employed by him, but perform their functions on particular occasions by virtue of the general and primitive contrivance of the whole engine. (Boyle [1688]1966, 13)

And so it goes. Apparently in the more than 400 years since Boyle was writing we have seen one triumph of one machine model after another—a triumph which usually if not always involves "reductionism," meaning explaining the natural world in terms of ever-smaller particles of matter, molecules, then atoms, then electrons, and protons. This is where Charles Darwin's theory of evolution through natural selection fits in, because it seems to be, above all, an exercise in mechanistic science (Richards and Ruse 2016). One is regarding organisms as machines that go through the motions, some winning and some losing, but taken in themselves no value or anything like that is added or to be found.[3] It is as if such a machine were some entirely neutral arrangement of cogs of levers, and the sense that values might inhere in it like thinking one's pocket watch were somehow a moral device. While it is not entirely obvious why mechanism should logically exclude values, this seems to have been taken as part of the mechanism package deal. Then, as the theory developed, being given a foundation of genetics—first Mendelian and then molecular—it became not just more mechanistic but ever-more reductionistic. Small is beautiful. Even smaller is even more beautiful.

Yet, the organic metaphor was never replaced completely. Boyle himself recognized that, while the machine metaphor works nicely in the inorganic world, the world of plants and animals needs a holistic perspective, relating objects to their ends or goals. The eye and the hand are more than just matter in endless motion. One classic statement of this observation is to be found in the writings of John Stuart Mill:

> All organised bodies are composed of parts, similar to those composing inorganic nature, and which have even themselves existed in an inorganic state; but the phenomena of life, which result from the juxtaposition of those parts in a certain manner, bear no analogy to any of the effects which would be produced by the action of the component substances considered as mere physical agents. To whatever degree we might imagine our knowledge of the properties of the several ingredients of a living body to be extended and perfected, it is certain that no mere summing up of the separate actions

> of those elements will ever amount to the action of the living body itself. (Mill [1843]1974, Bk.III, Ch.6, §1)

A more recent, still valuable discussion is to be found in the work by the South African statesman, Jan Smuts, *Holism and Evolution* (1926). It is to him that we owe the characterization of "holism."

> In all the previous cases of wholes, we have nowhere been able to argue from the parts of the whole. Compared to its parts, the whole constituted by them is something quite different, something creatively new, as we have seen. Creative evolution synthesises from the parts a new entity not only different from them, but quite transcending them. That is the essence of a whole. It is always transcendent to its parts, and its character cannot be inferred from the characters of its parts. (Smuts 1926, 367)

Although this work, much praised by Einstein, was ostensibly on evolution and how ever greater wholes are produced, it was primarily reflective of his driving political philosophy, wanting to unite the very different parts of his own country and, more broadly, in support of worldwide organizations like the British Commonwealth and ultimately the United Nations.

It is often thought, particularly given the enthusiasm of people like John Stuart Mill, that holism/organicism/emergentism is a philosophy of the left, of tender-minded people as opposed to tough-minded people. In the words of William James: "The tough think of the tender as sentimentalists and soft-heads. The tender feel the tough to be unrefined, callous, or brutal" (James 1907). Anne Harrington's *Reenchanted Science: Holism in German Culture from Wilhelm II to Hitler* (1999) shows that this is an illusion. A favorite metaphor of the National Socialists was of the state as an organism, threatened by parasites, the Jews.

> All in all, the National Socialistic conception of state and culture is that of an organic whole. As an organic whole, the völkish state is more than the sum of its parts, and indeed, because these parts, called individuals, are fitted together to make a higher unity, within which they in turn become capable of a higher level of life achievement, while also enjoying an enhanced sense of security. The individual is bound to this sort of freedom through the fulfillment of his duty in the service of the whole. (Harrington 1996, 176, quoting Karl Zimmerman, 1933, *Die geistigen Grundlagen des Nationalsozialismus*)

It is also false that the philosophy of holism is necessarily linked with, or without, religious beliefs. Many Christians, for instance, the early-twentieth-century ecologist at the University of Chicago and life-long Quaker, Warder Clyde Allee, in his *Principles of Animal Ecology* (Allee et al. 1949), were very much drawn to the philosophy. Evangelicals tend to be far more wary, thinking that it is the route to nature worship (see Ruse 2013). Some atheists, for instance, Edward O. Wilson, in his *The Diversity of Life* (1992), are drawn to the philosophy. Others, Richard Dawkins, for

example, in his *The Extended Phenotype* (1982), are far less sympathetic. As we shall see throughout, the relationship between faith and holism is complex. However, this is not to say that the philosophy does not enter into people's thinking on topics like religion as well as science and related issues.

In the Anglophone world, with the coming of genetics, and then of molecular biology, it looked as if reductionism-mechanism had triumphed. Richard Dawkins's *The Selfish Gene* (1976) seemed to be the triumphant apotheosis of that philosophy. But, once again, the rival organicist philosophy proved a sturdy plant. In the world of evolution, the eminent population geneticist Sewall Wright (who for many years worshipped with the Unitarians) was always sympathetic to holism—see "Evolution in Mendelian Populations" (1931); also Michael Ruse, *Monad to Man: The Concept of Progress in Evolutionary Biology* (1996). A few years later, a number of Marxist scholars, notably Richard Lewontin at Harvard, argued for a more holistic philosophy, first in their more scientific works like *The Genetic Basis of Evolutionary Change* (Lewontin 1974), and then in more general writings like *Biology as Ideology: The Doctrine of DNA* (Lewontin 1991). In paleontology, Stephen Jay Gould (left-wing but almost certainly not Marxist) argued at length for a more Germanic, organicist view of organisms, first in a massive historical overview, *Ontogeny and Phylogeny* (1977), and then in numerous more scientifically directed publications, like "Darwinism and the Expansion of Evolutionary Theory" (1982).

Most interestingly, and very pertinent here, there has been significant debate about the workings of the main Darwinian mechanism of evolution, natural selection. Like Darwin, most of today's evolutionists think that selection works exclusively or primarily at the level of the individual—nature red in tooth and claw (Richards and Ruse 2016). But from the beginning there was always a significant minority that claimed that selection can work at the level of the group (and it is only because of this that we can get genuine altruism, it is argued, particularly at the human level). David Sloan Wilson has been a pioneer in this respect, and this view was espoused in his book *Darwin's Cathedral* (2002), and he has been joined for the past twenty years by the philosopher Elliott Sober. Noteworthy was their *Unto Others: The Evolution and Psychology of Unselfish Behavior* (Sober and Wilson 1998).

Paradoxically, when the definitive work on the evolution of human social behavior, *Sociobiology: The New Synthesis*, by Edward O. Wilson first appeared in 1975, the critics (notably Lewontin and Gould) accused him of being ultra-reductionistic (see Allen et al. 1975). A more careful reading would show that this is not necessarily so, and in more recent years Wilson (working with Davide Sloan Wilson) has come out emphatically for a group selection approach to evolution (see Wilson and Wilson 2007). Historically, one can link Edward O. Wilson back to a powerful group of emergentists at Harvard, working at the beginning of the twentieth

century, including William Morton Wheeler the ant specialist (*Emergent Evolution and the Social*, 1927); Walter B. Cannon the physiologist (*The Wisdom of the Body*, 1931); and Lawrence J. Henderson the biochemist (*The Fitness of the Environment*, 1913).

Henderson wrote enthusiastically of final-cause thinking, arguing that "our new teleology cannot have originated in or through mechanism, but that it is a necessary and preestablished associate of mechanism" (Henderson 1913, 308). Wheeler wrote that "we can only regard the organismal character of the colony as a whole as an expression of the fact that it is not equivalent to the sum of its individuals but represents a different and at present inexplicable 'emergent level'" (Wheeler 1928, 24). Population geneticist Sewall Wright, a graduate student at Harvard at the beginning of the twentieth century, also owed major intellectual debts to this circle. Later, in Chicago, Wright was enthusiastically pushing selection as working at the group level, and the ecologists (notably Warder Clyde Allee and Alfred Emerson) were going flat out to promote holism.

> In essence, emergent evolution emphasizes the basic necessity for the study of wholes, as contrasted to the study of parts, and adds a certain dignity to synthetic sciences. Biology is the study of the properties of whole systems as well as of parts, and ecology, among the various subsciences of biology tends to be holistic in its approach. . . . The existence of complex internal adaptation between parts of an organism or population, with division of labour and integration within the whole system, is explicable only through the action of selection upon whole units from the lowest to the highest. Mostly, these integrated levels would not exist as entities unless selection acted upon each whole system. (Allee et al. 1949, 693)

Ecology and environmental issues generally have always attracted those with emergentist leanings. This is hardly surprising because, as historian Gregory Mitman (1992) has documented, ecology does push one toward thinking at the macro, even the mega level. Historical factors are also significant. On the one hand, much ecological thinking has been rooted in the "balance of nature" doctrine (Egerton 1973). Although this had pagan origins, it was taken over by Christian thinkers and pushed one to think holistically.

In America, Herbert Spencer was a major thinker on this issue. Many think that Spencer was the ultimate reductionist, with the "survival of the fittest" being his most famous term. Yet Spencer's writings on the state as an organism were very influential (see Richards 1987), especially with the Harvard holists and then later, as the University of Chicago grew and flourished.

Later ecological thinkers, much influenced by G. Evelyn Hutchinson (1948), were more inclined toward mechanistic thinking. Work on feedback systems in the Second World War were significant here—but some of Hutchinson's most important followers, notably the Odum brothers, were

to the contrary, much inclined toward holistic thinking (Odum 1969). In many cases, this was tied in with a sympathy for the brainchild of the English scientist James Lovelock, the Gaia hypothesis, that is, the idea of the Earth as an organism. It is noteworthy that Lovelock's great supporter Lynn Margulis (1993) was always deeply committed to symbiosis, and to *autopoiesis*.

> An autopoietic machine is a machine organized (defined as a unity) as a network of processes of production (transformation and destruction) of components which: (i) through their interactions and transformations continuously regenerate and realize the network of processes (relations) that produced them; and (ii) constitute it (the machine) as a concrete unity in space in which they (the components) exist by specifying the topological domain of its realization as such a network. (Maturana and Varela 1980, 78–79)

It is amusing that the Gaia hypothesis is disliked equally by Richard Dawkins (1982), who thinks it insufficiently reductionistic, and Evangelical Christians, who think it deifies the Creation (Van Dyke et al. 1996). And so, despite the idea that mechanism is clear victor in the debate with holism, history shows us that both worldviews can be found among the most prominent scientists and philosophers.

Such an overview must give some mention to the study of development. From the time of Aristotle, development has lent itself to emergent interpretations—whole organisms seem to emerge nigh miraculously from apparently undifferentiated matter. The *Naturphilosophen* (the German Romantics) were particularly interested in this, and embryology became a science of great significance. As Richards notes in his book on Ernst Haeckel (2008), development was embedded in Haeckel's thinking, and not the least because of his championing of the so-called biogenetic law: ontogeny recapitulates phylogeny. Yet, in the twentieth century with the coming of genetics, development rather fell by the wayside as organisms were treated rather like sausage machines—genes in at one end, organisms emerging at the other end. Even embryologists, like Gavin de Beer (1940), behaved this way a little. However, some pushed the significance of embryology in a major way, linking it to a more organicist view of life. Noteworthy were the already mentioned paleontologist Stephen Jay Gould, and most particularly the physician-turned-biologist Stuart Kauffman (1993). Both of these scientists felt that an emergentist philosophy was needed for a full understanding of the natural world.

Then came molecular biology and with it major insights into the functioning of genes—from DNA to RNA, from RNA to amino acids, from amino acids to proteins, and on so up the chain. It was soon obvious (and if it was not obvious then major projects like the Human Genome Project

made it obvious) that growth is a matter of organization as much as materials, and an emergentist approach was made nigh mandatory. This was made clear by the scientists themselves, for instance, Sean Carroll in *Endless Forms Most Beautiful: The New Science of Evo Devo* (2005), and in those reflecting on the science, for instance, Scott Gilbert in "The Generation of Novelty: The Province of Developmental Biology" (2006).

Various perspectives tied this thinking to emergentist areas elsewhere in science, for instance, in the Templeton-supported *Complexity and the Arrow of Time*, edited by Charles Lineweaver, Paul Davies, and Michael Ruse (2013). This is ongoing cutting-edge science and clearly debates about the tough-minded science of reductionism and mechanism, and the tender-headed science of emergentism, holism, and organicism, are only just beginning.

So where does this leave us? Few would deny that in science today, especially in the biological sciences, mechanism/reductionism/teleology-excluding work remains the dominant paradigm. And it can rightly point to great successes, including above all the Watson-Crick model of the double helix and the huge amount of work and understanding to which that led. However, there still remains a vigorous minority camp that thinks there is life yet, and much need of, the insights yielded by the organic metaphor.

Organicism as Religion-Friendly

With but the barest bones of this history laid out, we can see at once that religion becomes relevant. The organic model seems to be inherently religion-friendly—one might even say, Christian-religion-friendly. It was almost to be expected that the great intellects of Christianity's early years, the Church Fathers, would find Plato's Form of the Good congenial. As Augustine argued forcibly, the Form of the Good begs to be interpreted in terms of the Christian Godhead—eternal, creator not created, concerned with the good of all, especially of humans, and so forth. Moreover it was not long before enterprising thinkers were interpreting world souls in Christian terms. Take the Trinity, the doctrine that "that the Father, and the Son, and the Holy Spirit [Ghost] intimate a divine unity of one and the same substance in an indivisible equality; and therefore that they are not three Gods, but one God" (Augustine 2002, 3–4). Before Augustine, the fourth-century Christian Calcidius suggested that the Demiurge, the Creator, is God the Father. The Good that gives rise to the Forms from which the Creator works and models the world is God the Son. And rounding things out, the world spirit that pervades all physical reality is God the Holy Ghost.

Moreover, we find that for all of the triumph of the machine model or metaphor in the so-called Scientific Revolution, it is far from the case

that the organic model lost its appeal to Christian believers. Before the Revolution was over—usually marked by the arrival and triumph of Newtonian mechanics—there were those who were pushing the organic model in a Christian spirit. Notably the Cambridge Platonists never gave up that world vision. Henry More, their leader, always argued that spirit exists even if matter does not. He wrote:

> A substance incorporeal, but without Sense and Animadversion, pervading the whole matter of the universe, and exercising a plastical power therein according to the sundry predispositions and occasions in the parts it works upon, raising such Phaenomena in the World, by directing the parts of the Matter and their Motions, as cannot be resolved into meer Mechanical powers. (More 1987, 450)

It is not a matter of arguing that this Earth of ours is an organism as such, but that in some sense the whole of the universe is living. Thus, was More able to evade that appalling Cartesian consequence that animals have no soul or spirit. Everything does!

Then came the end of the eighteenth century and the rise of the Romantic movement, particularly in Germany (Richards 2003). The poet Goethe notoriously took on Newtonian physics, arguing for a very different vision of color, one that was nonreductionistic, having no truck with corpuscles and the like. He also argued strongly for a view of nature that was organic and holistic, claiming (particularly in his writings on the *Urpflanze*, and on the vertebrate theory of the brain) that we see similarities and connections between parts of the body—the skull is made of modified vertebrae—and between organisms of different types that have a shared archetype. He was not alone in thinking this way. Perhaps, like the philosopher Friedrich Schelling, you have to be a twenty-five-year-old Romantic to appreciate stuff like the following, but the general point is clear:

> *Things-in-themselves* are therefore the Ideas in the eternal act of cognition, and since ideas in the absolute are themselves in turn one Idea, so all things, likewise, are truly and intrinsically one essence, namely that of pure absoluteness in the form of subject-object identification, and even then in appearance, where absolute unity becomes objective is only through particular for, for example, through individual actual things, all difference between these is still not essential or qualitative, but merely an inessential and quantitative difference, resting on the degree of embodiment of the infinite into the finite. (Schelling 1988, 49)

It is no surprise to learn Schelling had written a 60-page paper on the *Timaeus*. What is a surprise is to learn that he did it at the age of 16!

The enthusiasm for the organic/holistic continues down to the present. The Canadian-born biologist Brian Goodwin (2001) was totally Platonic—almost Pythagorean—in his approach to the living world. Take

phyllotaxis, the patterns shown by many flowers and fruits in the plant world (for instance, the spirals of the sunflower or the twisting lines shown by pine cones). Goodwin seized upon the mathematics of the case. The ways of growth force the components into certain familiar grids or lattices, and these in turn are amenable to fairly simple mathematical analysis. The plants in question produce their parts from the center and then push out as they grow. In a sunflower, for instance, one gets one seed, and then another, and then another—thus producing the genetic spiral. As the seeds line up, one by one, new lines or patterns emerge (the most noticeable spirals are known as parastichies). The seeds running along any particular spiral, numbering them in the order they were produced, exhibit fixed patterns. The numbers from the crisscrossing parastichies have a formula. The differences between the seeds going the one way (clockwise) and those going the other way (anticlockwise), follow the sequence: 0, 1, 1, 2, 3, 5, 8, 13, and so on. This is the formula worked out by the thirteenth-century Italian mathematician Leonardo Fibonacci, who tried to calculate the number of descendants in any generation from an initial couple of breeding rabbits.

Pushing the discussion, Goodwin noted that the vulgar fraction series formed by dividing successive members of the Fibonacci series homes in on 0.618, which in turn is what the ancient Greeks called the Golden Mean. As it happens, you can get the Golden Mean out of circles also, if you divide up the perimeter properly. This gives you a major angle of 137.5 degrees, which (and if you are not yet convinced you will be now!) is just the angle on the genetic spiral that divides successive leaves or parts. "So plants with spiral phyllotaxis tend to locate successive leaves at an angle that divides the circle of the meristem in the proportion of the Golden Mean. Plants seem to know a lot about harmonious properties and architectural principles" (Goodwin 2001, 127). Here we see clearly that Goodwin was a Platonist in his enthusiasm for numerology just as the Platonists were organicists to the *n*th degree.

Goodwin spent his final years associated with Schumacher College—an institution offering the chance to do a graduate degree promising to take you "into a profound personal transformative learning journey helping you to join a growing group of international alumni contributing positively to ecological, economic, and social change." On its webpage we find the following:

> Western science is dominated by 'reductionism'—the idea that natural phenomena can be fully explained in terms of their component parts. Although it is a useful tool in certain circumstances, reductionism as a world view is incomplete and can be dangerous on its own since it suggests that by analysing the 'mechanical' workings of nature we can fully predict and manipulate it entirely for our own benefit. . . . Holistic Science integrates the useful aspects of reductionism and mainstream science by developing

> a more comprehensive basis for seeing and knowing. At the heart of this is Goethe's rigorous and systematic way of involving the imagination in an appreciation of nature's qualities, complexity and intrinsic value. Holistic thinking is stimulated by exercises using phenomenology and in tackling challenges related to physics, earth system science, ecology, evolutionary biology, organisational development and health studies. Since 1998, when the programme was pioneered at Schumacher College, it has developed a coherent methodology of holistic enquiry, providing a rigorous and ethical framework for a mature science.

Another graduate degree is offered in "Ecology and Spirituality," something that includes the courses "Heavenly Discourses" and "Sacred Geography."

Mechanism as Religion-Nonfriendly

For all this religious receptiveness to holist and organicist thinking, it seems that the machine metaphor is similarly religion-nonfriendly. Whatever the initial intentions of its progenitors were, it was not long before God was being pushed out. In a nice turn of phrase, the great historian of the Scientific Revolution Eduard Dijksterhuis wrote of God becoming a "retired engineer" (1961, 491). God may have built the machine, but before long His presence became unnecessary and an embarrassment. And so it went down through the years. Take Darwin, who started life almost as an evangelical—his enthusiasm for the abolition of slavery had to have some roots in his religious upbringing—intending to become an Anglican priest (Desmond and Moore 2009). Such sentiment passed, and for a while he stopped off at a kind of deism. Writing to his good friend, the American botanist Asa Gray, on May 22, 1860, just after the *Origin*, Darwin said: "I am inclined to look at everything as resulting from designed laws, with the details, whether good or bad, left to the working out of what we may call chance" (Darwin 1985, 8). Elaborating, he wrote: "I can see no reason, why a man, or other animal, may not have been aboriginally produced by . . . laws; and that all these laws may have been expressly designed by an omniscient Creator, who foresaw every future event & consequence" (Darwin 1985, 224).

But even that more constrained view passed, and by the time Darwin wrote the *Descent of Man*, ten years later, he was a committed agnostic, to the extent that he thought religion was all based on a mistake. Religion was all a matter of chance and confusion, similar to the "tendency in savages to imagine that natural objects and agencies are animated by spiritual or living essences" (Darwin 1871, 1). He saw this illustrated in the actions of his dog—a beast, Darwin tells us, who is "a full-grown and very sensible animal" (Darwin 1871, 67). Snoozing on the lawn, the dog was upset by a parasol moving in the wind. Going on the attack "every time that the parasol slightly moved, the dog growled fiercely and barked. He must, I

think, have reasoned to himself in a rapid and unconscious manner, that movement without any apparent cause indicated the presence of some strange living agent, and that no stranger had a right to be on his territory" (Darwin 1871, 67).

Moving down to the present, we know only too well where things stand. The world's most popular evolutionist is also the world's most prominent atheist. "The God of the Old Testament is arguably the most unpleasant character in all fiction: jealous and proud of it; a petty, unjust, unforgiving control-freak; a vindictive, bloodthirsty ethnic cleanser; a misogynistic, homophobic, racist, infanticidal, genocidal, filicidal, pestilential, megalomaniacal, sadomasochistic, capriciously malevolent bully" (Dawkins 2006, 1). Directly focusing in on science, the Nobel laureate Steven Weinberg writes: "The more the universe seems comprehensible, the more it also seems pointless" (Weinberg 1977, 154). Richard Dawkins agrees:

> In a universe of blind physical forces and genetic replication, some people are going to get hurt, other people are going to get lucky, and you won't find any rhyme or reason in it, nor any justice. The universe we observe has precisely the properties we should expect if there is, at bottom, no design, no purpose, no evil and no good, nothing but blind, pitiless indifference. As that unhappy poet A. E. Houseman put it:
>
> > For Nature, heartless, witless Nature
> > Will neither know nor care.
>
> DNA neither knows nor cares. DNA just is. And we dance to its music. (Dawkins 1995, 133)

Organicism: The Other Side

End of discussion? Not quite. The story is more complex and interesting than that. Starting on the organicist side, we must observe there has always been a very iffy relationship between the metaphor and Christianity. Even if you argue that the metaphor is religion-friendly, it is not necessarily Christian-religion-friendly. As today's evangelicals have spotted straight off, world souls—or as it is often known today, thanks to the proselytizing of chemist James Lovelock (1979), the Gaia hypothesis, elevates the world or the universe to something of value in itself, and the evangelicals do not much like this. This is from the Biology Department at Wheaton College, Billy Graham's alma mater:

> Scripture provides a logical value system. It establishes that the whole creation in general, and every part of it in particular, has a value given to it by God. This does not mean that the creation is inherently good or that it has the right to exist on its own merits, independent of God. Its goodness is derived from its Creator and so is a kind of "grace" goodness, freely given in love, not grudgingly merited by right. (Van Dyke et al. 1996, 53).

Likewise, the Lutherans: "The earth is very good. Neither demonic nor divine, neither meaningless nor sufficient unto itself, it receives its meaning and value from God" (Evangelical Lutheran Church in America [ELCA] 1996, 245). This means that one has got to be awfully careful about notions like the Gaia hypothesis. "Though the hypothesis itself can be considered reasonably scientific, it has spawned a host of ideas and philosophies which reach out to deify the earth" (Van Dyke et al. 1996, 139). This is idolatry. It would be unscriptural to worship the earth; "Creation worships the Creator" (ELCA 1996, 244).

The fact is that the organicist model opens itself at least as much to non-Christian thinking as it does to Christian thinking. The Romantics, for example, tended to think in terms of universal world spiritual forces, rather than something that created and cares about humankind. This is especially true of the American version, transcendentalism. Take one of many poems by Emily Dickinson.

> The Brain—is wider than the Sky—
> For—put them side by side—
> The one the other will contain
> With ease— and You—beside—
> The Brain is deeper than the sea—
> For—hold them—Blue to Blue—
> The one the other will absorb—
> As Sponges—Buckets—do—
> The Brain is just the weight of God—
> For—Heft them—Pound for Pound—
> And they will differ—if they do—
> As Syllable from Sound—
>
> (Dickinson 1960, 312–313—written about 1863)

Somehow the brain, the mind, is either part of God or coexistent with God, with the same scope as He. This strikes me as very holistic—the brain contains the sky, it absorbs the sea. But notice that God seems not to be offering much in the way of conscious contribution. We are the ones who make sense out of the underlying substratum, rather as a potter does with clay. Not terribly Christian here—nor would we expect it, given what Dickinson says about Christianity in some of her other poems (Ruse 2017).

If the Romantics and Transcendentalists are bad enough, wait until you get to the Pagans, who are today's most enthusiastic organicists. Wizard Oberon Zell-Ravenheart, prelate in his own creation (the Church of All Worlds), tells us that all life comes from an original cell. Hence, all life is not just related but is one. Indeed: "it is a biological fact (not a theory, not an opinion) that ALL LIFE ON EARTH COMPRISES ONE SINGLE LIVING ORGANISM! Literally, we are *all* 'One'" (Zell-Ravenheart 2009, 92). Continuing: "The blue whale and the redwood tree are not the largest

living organisms on Earth; the ENTIRE PLANETARY BIOSPHERE is." Individual organisms are the cells of Terrabios. The deserts and the forests and the prairies and the coral reefs (the "biomes") are the organs. "ALL the components of a biome are essential to its proper functioning, and each biome is essential to the proper functioning of Terrabios." With an impressive self-confidence (one that has a habit of popping up on these occasions—one thinks, for instance, of the Intelligent Design theorists), Zell assures us that we are in the presence of a discovery that overshadows Copernicus's championing of the heliocentric world system. Nothing beats out "the discovery that the entire Biosphere of the earth comprises a single living Organism. Blessed Be!" (Zell-Ravenheart 2009, 95).

This is all rather humorous and puts one in mind of middle-class folk who wear uncomfortable sandals and eat homegrown vegetables and like nothing more than an afternoon of polyamory—"consensual and responsible nonmonogamy"—which sounds like as much hard work as celibacy, although probably more fun.

There is a darker underbelly. Some of history's most enthusiastic organicist/holist supporters have been people with overall philosophies and intentions of the vilest kind. As we have seen above, no one was keener on the metaphysics of the organism than the National Socialists. I am not now trying to tar organicism/holism for all time with the worst of all possible political systems. Anything but. Rather I am simply suggesting that connections between root metaphors and religions and philosophies are rarely simple or of one kind.

Mechanism: The Other Side

The same ambiguity proves true when we turn to the other side of the coin, the machine metaphor, mechanism. The fact is that the mechanism came in precisely because people thought the organic metaphor did not and could not give full respect to Christian ideas.

> No Christian could ultimately escape the implications of the fact that Aristotle's cosmos knew no Jehovah. Christianity taught him to see it as a divine artifact, rather than as a self-contained organism. The universe was subject to God's laws; its regularities and harmonies were divinely planned, its uniformity was a result of providential design. The ultimate mystery resided in God rather than in Nature, which could thus, by successive steps, be seen not as a self-sufficient Whole, but as a divinely organized machine in which was transacted the unique drama of the Fall and Redemption. If an omnipresent God was all spirit, it was the more easy to think of the physical universe as all matter; the intelligences, spirits and Forms of Aristotle were first debased, and then abandoned as unnecessary in a universe which contained nothing but God, human souls and matter. (Hall 1954, xvi–xvii)

It is true that, as we have seen, God then tended to get pushed out, but he didn't have to go. The Intelligent Design theorist Phillip Johnson

(1995) argues that metaphysical naturalism (explaining through law) is the slippery slope to metaphysical naturalism (denying God), but that it does not necessarily have to be so. In the twentieth century, two of the most important evolutionists—Ronald Fisher and Theodosius Dobzhansky—were both committed Christians, and others like Sewall Wright were fellow travelers in their ways (Ruse 1996).

We should now return to the topic of final cause or teleology. A key part of the organic metaphor is that organic parts are seen to have functions—the eye is to see, the hand is to grasp. And, from Plato on this has been at the heart of the argument from design. The world seems as if it is designed, because it is in fact designed. This is a lynch pin of Christian theology. "It is rational, from the manifest fitness of some things to cosmical or animal ends or uses, to infer, that they were framed or ordained in reference thereunto by an intelligent and designing agent" (Boyle [1688]1966, 428). Yet the fascinating thing is that, for all that Dawkins (1986) argues that, after Darwin, it was possible to be "an intellectually fulfilled atheist," in many respects the machine metaphor is kinder to the theist's argument than the organic metaphor.

One side to the equation is that Darwinism accepts fully the design-like nature of organisms. It just sets out to explain them naturalistically.

> Can the principle of selection, which we have seen is so potent in the hands of man, apply in nature? I think we shall see that it can act most effectually. Let it be borne in mind in what an endless number of strange peculiarities our domestic productions, and, in a lesser degree, those under nature, vary; and how strong the hereditary tendency is. Under domestication, it may be truly said that the whole organisation becomes in some degree plastic. Let it be borne in mind how infinitely complex and close-fitting are the mutual relations of all organic beings to each other and to their physical conditions of life. Can it, then, be thought improbable, seeing that variations useful to man have undoubtedly occurred, that other variations useful in some way to each being in the great and complex battle of life, should sometimes occur in the course of thousands of generations? If such do occur, can we doubt (remembering that many more individuals are born than can possibly survive) that individuals having any advantage, however slight, over others, would have the best chance of surviving and of procreating their kind? On the other hand, we may feel sure that any variation in the least degree injurious would be rigidly destroyed. This preservation of favourable variations and the rejection of injurious variations, I call Natural Selection. (Darwin 1859, 80–81)

It is not just change that Darwin is explaining, but change in the direction of adaptive function—because the eye is for seeing and the hand is for grasping, humans survived and reproduced more efficiently than their competitors. It is true that after Darwin you may not need to invoke God and in any case even if a believer you may feel that you are doing more to illustrate God's actions rather than proving his existence, but the point

is that you are making adaptations, final causes, central. And that should comfort the Christian.

The other side to the equation is that the organicist metaphor, especially through its connections with Platonism, often downplays selection and functional design. The emphasis is on archetypes and the like, which have no direct function and hence direct connection to God. Brian Goodwin, in his discussion of phyllotaxis, made it very clear that he was moving away from adaptation and natural selection. Likewise, he highlights something called the Beloussov-Zhabotinsky reaction. When organic and inorganic liquids are placed on a flat plane (as in a Petri dish) they go through a kind of ring-making exercise that moves out concentrically to the edges. These are very much the kind of movements that one sees in nature itself, particularly the slime molds who behave this way when food gets scarce. As the amoebas go through their movements, leading ultimately to union and then to fruiting and the production of more amoebas, their paths are exactly that found in the Beloussov-Zhabotinsky reaction. The molecules involved in the two cases are quite different, but obviously the feedback systems are parallel. And it is all a question of the way in which nature itself has powers of organization. Defining a field as "the behavior of a dynamic system that is extended in space," Goodwin concludes:

> A new dimension to fields is emerging from the study of chemical systems such as the Beloussov-Zhabotinsky reaction and the similarity of its spatial patterns to those of living systems. This is the emphasis on self-organization, the capacity of these fields to generate patterns spontaneously without any specific instructions telling them what to do, as in a genetic program. These systems produce something out of nothing. . . . There is no plan, no blueprint, no instructions about the pattern that emerges. What exists in the field is a set of relationships among the components of the system such that the dynamically stable state into which it goes naturally—what mathematicians call the generic (typical) state of the field—has spatial and temporal pattern. (Goodwin 2001, 51–52)

For Goodwin, the take-home message is clear. No plan! No blueprint! No God!

Finally, let it be noted first that not every believer today is against mechanism and reduction. Take the very trendy argument for God's existence based on the so-called "Strong Anthropic Principle" (Barrow and Tipler 1986). The key idea here is that the universe had to be "fine-tuned" to get life going at all and sustain it. The various constants that govern the laws of nature could not be chosen at random, but had to be very exact within incredibly narrow limits. "There exists one possible Universe 'designed' with the goal of generating and sustaining 'observers'" (Barrow and Tipler 1986, 22). In other words, the lack of randomness implies a designer of some sort. What constants are we thinking of? Gravity for a beginning. It is 10^{39} times weaker than electromagnetism. This is just as well, for if gravity

had only been 10^{33} times weaker than electromagnetism, the suns of the universe would be a billion times less big and burn a million times faster. Analogously, the nuclear weak force is 10^{28} times weaker than gravity. If it had been slightly weaker, the hydrogen of the universe would have been converted to helium, and that would have meant no water. Life as we know it would not be possible (Barrow and Tipler 1986, 336).

As it happens, I am not very keen on this argument. It strikes me as saying something too much like: "Think of a number. Double it. The answer you want is a half." But that is neither here nor there. My point now is that this is an argument that buys in absolutely and completely to mechanism and reductionism. We are talking about unbroken law. We are talking about the system working like a machine. And we are talking about the very small particles that go into this.

Conversely, let me point out that you can be totally and completely committed to mechanism and reductionism and yet be totally holistic in some ways. No one could be more in the mechanism/reductionism camp than Richard Dawkins. This is the man who popularized the selfish-gene concept. Yet, in his *The Extended Phenotype* he is prepared to spin stories about genes actually affecting what happens on other continents. Here is his "thought experiment:"

> Swallows return, each year, to exactly the same nest. It follows that an ectoparasite, waiting dormant in a swallow's nest in England, can expect to see the very same swallow both before and after the swallow's journey to Africa. If the parasite could engineer some change in the swallow's behaviour in Africa, it might indeed reap the consequences on the swallow's return to England. Suppose, for instance, that the parasite needs a rare trace element which is not found in England, but which occurs in the fat of a particular African fly. Swallows normally have no preference for this fly, but the parasite, by injecting a drug into the swallow before it leaves for Africa, so changes its dietary preferences as to increase the likelihood of its eating specimens of this fly. When the swallow returns to England, its body contains enough of the trace element to benefit the individual parasite (or its children) waiting in the original nest, benefit them at the expense of rivals within the parasite species. (Dawkins 1982, 234)

Dawkins doubts that something of this ilk is very likely but he allows that "in circumstances such as these" he would "speak of a gene in one continent as having phenotypic expression in another continent" (Dawkins 1982, 234). It seems to me that you could not get much more holistic than this, while in another sense it is selfish-gene thinking all the way through.

Conclusion

So what do we conclude? I certainly do not see everything collapsing into a hopeless tangle. Collect together the findings. First, we have two root metaphors, organicism and mechanism. Nothing has been said that

absolutely refutes one or the other. There have been no knockdown arguments of that kind. Second, this is not to say that everything is equal or that everything is subjective. We judge good science by its success in satisfying what are known as "epistemic values"—consistency, coherent, predictive fertility, unificatory power (consilience), and more (Ruse 1996). There is a simple reason why, in the biological world, so many practitioners are mechanist/reductionists. It works! People are not ideologically committed to Dawkinsian selfish-genism because they are indifferent to their neighbors and hate foreigners. The fact is that when dealing with such organisms as social insects, thinking about selfish-gene strategies leads to far more confirmed predictions than thinking about lovey-dovey holistic strategies. No one denies the possibility of the second kind of strategy. Most even think that there might be circumstances when it would actually work. It is just that normally this is not the way of nature. End of argument.

Third, you cannot responsibly adopt one position because you find it theologically acceptable and reject the other simply because it goes against your faith. You have to go with what works. If a position does not work, then the fact that you merely happen to believe in it is irrelevant. And in any case, simply labeling one position more Christian than the other is problematic. Would Calvinists be more inclined to go for a mechanistic position because it fits better with God's total sovereignty and working through law? Would Methodists be more inclined to go for an organicist position because it fits better with their Arminian "God giving us genuine choices outside the bounds of law"?

Yet, it is unquestionably open to the person of religion to ask about the implications of science for their faith commitments, and to worry if the science seems to go flatly against these commitments. In such cases, it is acceptable to ask if the science is definitive, or if an alternative root metaphor would lead to greater harmony. One cannot just change the science to get one's ends, but one can ask what kind of science would be needed, and if such science is plausible. After all, if the history of science teaches us anything, it is that science rarely, if ever, has the definitive answer. Who dare say that, after what Einstein did to Newton?

So in a way, I am really quite optimistic. But in case you end up feeling too happy let me remind you of the elephant in the room—*consciousness* (Ruse 2010). I do not see how mechanism can even scratch at the problem, because in a way it has ruled out a solution in advance. You have matter and you have mind. Two different things, and hence why should one explain the other?

But I am not sure that organicism fares much better here. What has a turnip to tell us about a philosopher? Even if you think that there is something special to life—something I personally am inclined to reject—it does not seem to me to solve the problem of consciousness. Prince

Charles may talk to his plants, but in the real world they do not talk back. I am not quite sure what the answer is to consciousness. If I did, I would be preparing for my Nobel citation rather than writing this article. But whether there is an answer or not—and if there is not that in itself is surely interesting and exciting—I would think there is reason for the Christian to feel that the conversation is not yet over and that thinking about metaphors may lead us into some very significant new areas of reason and faith and their possible interactions.

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Notes

1. There is a difference between Intelligent Designers and traditional theistic evolutionists like Asa Gray. The former tend to have a conservative evangelical political agenda that drives them—antiabortion and so forth—that is not necessarily true of traditional theistic evolutionists.
2. A broader overview, picking up on Greek thought and bringing the discussion down to modern times, is found in Michael Ruse, *The Gaia Hypothesis: Science on a Pagan Planet* (2013). Good discussions of pertinent aspects of Greek thought can be found (at the more classical and historical level) in David Sedley's *Creationism and its Critics in Antiquity* (2008), and (at a more philosophical level) in James Lennox's *Aristotle's Philosophy of Biology* (2001).
3. This is built into the Cartesian distinction between *res extensa* and *res cogitans*. Machines are purely *res extensa* and the whole point of *res extensa* is that there is nothing associated with consciousness to be found. Values are totally things in *res cogitans*. Of course, the whole point of Romanticism is to change this kind of thinking. The world in itself has value.

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