

HUNGARIAN PHILOSOPHICAL REVIEW

VOL. 67. (2023/2)

The Journal of the Philosophical Committee
of the Hungarian Academy of Sciences

Teleology: Old Wine
in New Skins

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MICHAEL RUSE

Darwin and Design*

Let us recognize Darwin's great service to Natural Science in bringing back to it Teleology: so that, instead of Morphology *versus* Teleology, we shall have Morphology wedded to Teleology. (Gray 1874)

What you say about teleology pleases me especially, & I do not think anyone else has ever noticed the point. I have always said you were the man to hit the nail on the head. (Darwin, letter to Asa Gray June 5, 1874, DCP-LET-9483)

I. THE DESIGN ARGUMENT

The Argument from Design, or the Teleological Argument, is one of the oldest and best-known – often taken to be the most compelling – arguments for the existence of God (Ruse 2017). Not just God, but a God of Christianity, who is All-Powerful, All-Knowing, and All-Loving. It is to be found in Plato's *Phaedo*, the dialogue supposedly reporting on Socrates' last day on Earth. "One day I heard someone reading, as he said, from a book of Anaxagoras, and saying that it is Mind that directs and is the cause of everything. I was delighted with this cause, and it seemed to me to be good, in a way, that Mind should be the cause of all. I thought that if this were so, the directing Mind would direct everything and arrange each thing in the way that was best" (Cooper 1997. 97 c-d). So, now one has a guide to understanding and, as a bonus, a guide to discovery. "Then if one wished to know the cause of each thing, why it comes to be or perishes or exists, one had to find what the best way was for it to be, or to be acted upon,

* I want to acknowledge the two incredibly helpful (anonymous) readers of an earlier version of this paper. Thanks to them, the paper is much improved. In the course of a very long academic career (60 years), I have been touched again and again by the generosity my fellow philosophers have shown towards me, the care and attention put into their comments. As even I come to the end of a career, it is people like these who have made my life such a joy and meaningful. Thank you, all.

or to act.” Aristotle, Plato’s successor, did not have anything akin to the Christian God. His ultimate cause, the Unmoved Mover, spent its time doing the only thing open to a truly perfect being, contemplating its own perfection! It had no knowledge of the physical world, including us (Sedley 2008). Aristotle, however, followed Plato in seeing our world as deeply purposeful – the hand exists to grasp things, the rain exists in order to fertilize the ground. Meaning by “ultimate” reason *why* something happened and by “proximate” reason *how* something happened, for Plato, if the ultimate reason for the purpose was the Form of the Good, the proximate reason for him – and others including Aristotle and then the Christian’s – was that the world in some sense is an organism. Plato’s *Timaeus* was on this very topic, with the Designer being the “Demiurge,” aka the Form of the Good. First, that the Designer worked for the good. “Now surely it’s clear to all that it was the eternal model he looked at, for, of all the things that have come to be, our universe is the most beautiful, and of causes the craftsman is the most excellent. This, then, is how it has come to be: it is a work of craft, modeled after that which is changeless and is grasped by a rational account, that is, by wisdom” (Cooper 1997; *Timaeus* 29a). Plato does not regard this creation – the universe – to be some dead, lifeless entity. It is a living being with a soul. “Now why did he who framed this whole universe of becoming frame it? Let us state the reason why: He was good, and one who is good can never become jealous of anything” (29d-e). Clearly the God being himself good had to model things on the best, the Form of the Good. And this brings in intelligence. And so straight off we get a world soul. “Guided by this reasoning, he put intelligence in soul, and soul in body, and so he constructed the universe. He wanted to produce a piece of work that would be as excellent and supreme as its nature would allow. This, then, in keeping with our likely account, is how we must say divine providence brought our world into being as a truly living thing, endowed with soul and intelligence” (30b-c). Aristotle likewise bought into this picture of the world as an organism. He distinguished proximate causes or “motor” causes, those that make things happen, from final causes, the reason for things to happen. (Better known is Aristotle’s four-part division of causes: efficient, material, formal, and final. However, when dealing with organisms, he brews this down to a two-part division: proximate and final (Aristotle 1984 a, b).) In the case of the organism, for instance, the proximate cause is the rain bringing the seed to life. The final cause, the reason for the proximate cause, is the flowering plant attracting insects to fertilize it. Not having a designer, or Designer, in the sense of Plato, Aristotle inclined rather to see the whole world as alive, in some sense, within itself. Hence, there is a kind of vital force directing things towards perfection, that is the Unknown Mover (which in some sense is a perfect being). In more recent times, people spoke of an entelechy or *élan vital*.

Of course, living four hundred years before Jesus, neither Plato nor Aristotle were Christians. But Plato’s “Mind” or God was the Form of the Good, the

source of all knowledge and that which is of value. Christians, particularly the greatest theologian of all, St Augustine, identified this Form with their God, noting that as for the Christian God, the Form of the Good was not merely all powerful and knowing, as well as all good, but outside the physical world – eternal and never changing. Note that the organism is not to be identified with the Creator/Designer. That would be unacceptable pantheism. The organism is the result of the efforts of the Creator/Designer, as in Genesis One. (“In the beginning God created the heaven and the earth” 1:1). With this organic metaphor as background, the Christians took up the argument from design with fervor. St Thomas Aquinas gave the classic exposition. Note that, although he was much influenced by Aristotle’s thinking on final causes – bodies “act for an end” – ultimately, he, as a Christian, is forced back to a kind of Platonic Great Designer in the Sky.

The fifth way is taken from the governance of the world. We see that things which lack intelligence, such as natural bodies, act for an end, and this is evident from their acting always, or nearly always, in the same way, so as to obtain the best result. Hence it is plain that not fortuitously, but designedly, do they achieve their end. Now whatever lacks intelligence cannot move towards an end, unless it be directed by some being endowed with knowledge and intelligence; as the arrow is shot to its mark by the archer. Therefore some intelligent being exists by whom all natural things are directed to their end; and this being we call God. (Aquinas 1981, *Summa Theologiae* Ia.q2.a3)

Generations of undergraduates, who have read Aquinas only in extracts such as this, come away with the belief that this is the end of things. Not true! As a Christian, Aquinas always thought faith took precedence over reason, as used in the Fifth Way. Jesus made that very clear. Remember the encounter with the disciple Thomas who doubted that Jesus had been resurrected.

Then he said to Thomas, “Put your finger here; see my hands. Reach out your hand and put it into my side. Stop doubting and believe.”

Thomas said to him, “My Lord and my God!”

Then Jesus told him, “Because you have seen me, you have believed; blessed are those who have not seen and yet have believed.” (John 20: 27-29)

Aquinas pointed out that, without the supremacy of faith, the lazy and the ignorant would never get to know God (Ruse 2019). But the overall tenor was certainly that reason and evidence are high on the list of things acceptable to God and that, therefore, the organicist approach to understanding, of the world and of God, was very well taken.

II. CHANGING ROOT METAPHORS

What changed this? The three Rs! *Renaissance, Reformation, Revolution*. The *Renaissance*, going back to the wisdom of the Ancients, soon showed that not everyone was enamored by design. The Roman poet Lucretius, putting into verse older beliefs of the atomists and others, gave a vivid alternative picture.

At that time the earth tried to create many monsters
 with weird appearance and anatomy –
 androgynous, of neither one sex nor the other but somewhere in between;
 some footless, or handless;
 many even without mouths, or without eyes and blind;
 some with their limbs stuck together all along their body,
 and thus disabled from doing harm or obtaining anything they needed.
 These and other monsters the earth created.
 But to no avail, since nature prohibited their development.
 They were unable to reach the goal of their maturity,
 to find sustenance or to copulate. (Sedley 2007. 150–153; *De rerum natura* V 837-848)

At first, nothing works, it is all a dysfunctional mess. Then, given infinite time, there is functional success.

First, the fierce and savage lion species
 has been protected by its courage, foxes by cunning, deer by speed of flight. But as for
 the light-sleeping minds of dogs, with their faithful heart,
 and every kind born of the seed of beasts of burden,
 and along with them the wool-bearing flocks and the horned tribes,
 they have all been entrusted to the care of the human race... (V 862-867)

No design. Just chance and lots of time. Even if this seems implausible at first, it lodges in the mind and is worrisome.

The *Reformation*, with its emphasis on *sola scriptura*, obviously downplayed reason in favor of faith. Luther even went so far as to refer to reason as a “whore”! There were some responses. Some passages of the Bible seem best interpreted in terms of design. There was King David’s contribution, the opening of Psalm 19: “The heavens declare the glory of God; and the firmament sheweth his handiwork.” Saint Paul also rushed briefly over the idea: “For the invisible things of him from the creation of the world are clearly seen, being understood by the things that are made, even his eternal power and Godhead; so that they are without excuse” (Romans 1:20). But this is indeed slim pickens given the overall length and scope of Holy Scripture. Another, more sociological response, was that of the English. The second half of the sixteenth century saw the long

reign of Elizabeth the First, and – much desired after the short reign of Bloody Mary, who tried to enforce Catholicism on her reluctant subjects – the consolidation of Britain as a Protestant nation. England’s initial break from Rome was done more for political than theological reasons. Henry wanted to divorce his Catholic wife so he could marry Anne Boleyn on the hope of getting a male heir. When the Pope refused, Henry picked up his country and went home – less metaphorically, took Britain out of the Catholic realm and into the Protestant. Truly, then, *sola scriptura* never had the hold on the English that it had on the Protestant countries of Europe. (Scotland also, given the influence of the Calvin follower, John Knox.) Something theologically distinctive and convincing was needed for the English, and the gap was filled with a distinctively English form of natural theology, one that emphasized the analogy between nature and the many efficient machines that the English were now inventing and using (Ruse 2003).

Overall, however, notwithstanding the English, *sola scriptura* was a strong clarification call. And this fit nicely with the (Scientific) *Revolution*, usually dated from 1543 and the publication of Copernicus’ heliocentric picture of the universe – *De Revolutionibus Orbium Coelestium*¹ – to 1687 and the publication of Newton’s causal theory, *Philosophiae Naturalis Principia Mathematica*.² As historians stress, above all the revolution was one of change of metaphors, from the already-encountered “world as an organism,” to the newcomer: “world as a machine.”

At all times there used to be a strong tendency among physicists, particularly in England, to form as concrete a picture as possible of the physical reality behind the phenomena, the not directly perceptible cause of that which can be perceived by the senses; they were always looking for hidden mechanisms, and in so doing supposed, without being concerned about this assumption, that these would be essentially the same kind as the simple instruments which men had used from time immemorial to relieve their work,... (Dijksterhuis 1961. 497)

Robert Boyle (1627–1691), physicist and philosopher, was explicit: the world 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 1686. 12-13). The world now was seen simply as a contraption, governed by eternal, unchanging

¹ https://en.wikipedia.org/wiki/De_revolutionibus_orbium_coelestium

² <http://www.gutenberg.org/ebooks/28233>

laws, simply going through the motions, without rhyme or reason. Of course, you might say that machines have purposes. A guillotine is hardly for slicing tomatoes. But within the context of science, this part of the metaphor was dropped. There were to be no ends, no final causes, things that the philosopher Francis Bacon likened to Vestal Virgins, beautiful but barren. And this means that the world is value free. It is just dead substance in motion, and any values we find are values we ascribe to it. The heart has no value as such, but value in the sense that we humans think it of value (because of its results). To the organicist, it is just silly to say the heart has no intrinsic value. Of course, it does – value to be found out there in the world. Value put there by a benevolent Creator (Plato), or part of the very fabric of the world (Aristotle). Since the root metaphor is the organism, the world is usually seen as developing, increasing in value. Few, if any organicists, would pull back from the inference that we humans are of the greatest value. The mechanist would undoubtedly agree with this conclusion; but, think the value we put on humans is the value we put on humans, not something we find ready-made (Ruse 2021).

III. THE PROBLEM OF ORGANISMS

Mechanism triumphant! There was however a rather large fly in the ointment. Organisms. The traditional argument from design covers both the organic and the inorganic. The hand exists in order to grasp; the rain exists in order to fertilize. But it had always been recognized that the appearance of design is far less in the inorganic than the organic. This said, Aristotle was not naive. He was fully aware that it is at times proper to speak of things as being accidental or contingent. He didn't think that an eclipse of the moon is necessarily for any great purpose. Is this just an exception to final cause thinking? Not really. The eclipse as eclipse is not a substance. Heavenly beings move in circles because that is the perfect figure and so that is part of their nature. But the effects are not substances and so not necessarily explicable in terms of final cause. "Nor does matter belong to those things which exist by nature but are not substances; their substratum is the substance. E.g. what is the cause of eclipse? What is its matter? There is none; the moon is that which suffers eclipse. What is the moving cause which extinguished the light? The earth. The final cause perhaps does not exist" (Barnes 1984, 1649; *Metaphysics*, 1044b8–b12). Whatever. No one felt much worry about dropping final cause talk about the inorganic world. Organisms were different. They apparently continued to demand final-cause talk. The eye really is for seeing! The eye exists in order to see. The final cause of the eye is sight.

Faced with this problem, Robert Boyle played the philosophical equivalent of the three-card trick. He distinguished between acknowledging the use of final causes qua science and the inference qua theology from final causes to a

designing god. First: “In the bodies of animals it is oftentimes allowable for a naturalist, from the manifest and apposite uses of the parts, to collect some of the particular ends, to which nature destined them. And in some cases, we may, from the known natures, as well as from the structure, of the parts, ground probable conjectures (both affirmative and negative) about the particular offices of the parts” (Boyle 1688. 18). Then, the science finished, one can switch to 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. 19). From a study in the realm of science, of what Boyle would call “contrivance,” to an inference about design – or rather Design – in the realm of theology.

Organisms were booted out of science into the realm of religion. A solution, but hardly a satisfactory solution, for all that, over the next century or more, some good biological science was done thanks to this uneasy compromise. Naturalistic mechanistic thinking in the physical sciences. Religion-entwined organismic thinking in the biological sciences. As a result of this, the argument from design for the existence of God continued to flourish, particularly in Britain, dependent as its religion was on natural theology. (The state-sponsored Anglican religion. By the middle of the eighteenth century, more faith-centered religions were starting to appear in numbers. The Methodists particularly.) It is little surprise then that the classic exposition of the argument should appear at the beginning of the nineteenth century – Archdeacon Paley’s *Natural Theology*.

In crossing a heath, suppose I pitched my foot against a stone, and were asked how the stone came to be there; I might possibly answer, that, for any thing I knew to the contrary, it had lain there for ever: nor would it perhaps be very easy to show the absurdity of this answer. But suppose I had found a watch upon the ground, and it should be inquired how the watch happened to be in that place; I should hardly think of the answer which I had before given, that, for any thing I knew, the watch might have always been there. (Paley 1802. 1)

The watch shows organization, marks of design. The stone does not. Shall we simply say that the watch just happened? “Or shall it, instead of this, all at once turn us round to an opposite conclusion, viz. that no art or skill whatever has been concerned in the business, although all other evidences of art and skill remain as they were, and this last and supreme piece of art be now added to the rest? Can this be maintained without absurdity? Yet this is atheism” (13-14). Paley continues:

This is atheism: for every indication of contrivance, every manifestation of design, which existed in the watch, exists in the works of nature; with the difference, on the side of nature, of being greater and more, and that in a degree which exceeds all

computation. I mean that the contrivances of nature surpass the contrivances of art, in the complexity, subtlety, and curiosity of the mechanism; and still more, if possible, do they go beyond them in number and variety; yet, in a multitude of cases, are not less evidently mechanical, not less evidently contrivances, not less evidently accommodated to their end, or suited to their office, than are the most perfect productions of human ingenuity.

I know no better method of introducing so large a subject, than that of comparing a single thing with a single thing; an eye, for example, with a telescope. As far as the examination of the instrument goes, there is precisely the same proof that the eye was made for vision, as there is that the telescope was made for assisting it. They are made upon the same principles; both being adjusted to the laws by which the transmission and refraction of rays of light are regulated. (14-15)

The watch is designed. The eye is just like the watch. Hence the eye is designed. Or rather, Designed – by God!

IV. HUME AND KANT

There had been earlier criticisms of the argument, but ultimately these had not succeeded. Apparently devastating were some of the arguments of David Hume, in his *Dialogues Concerning Natural Religion*, published some twenty years earlier than Paley's *Natural Theology*. He showed that the traditional argument from design – the argument of Plato and Augustine and Aquinas – is riddled with problems. On the one hand, who is to say that there is only one designer, and who moreover is to say that this designer got things right straight off? Our experience of complex entities is that usually this is a group effort, drawing on the experience of many attempts, sometimes failures, sometimes successes, in the past. “But were this world ever so perfect a production, it must still remain uncertain, whether all the excellences of the work can justly be ascribed to the workman. If we survey a ship, what an exalted idea must we form of the ingenuity of the carpenter who framed so complicated, useful, and beautiful a machine? And what surprise must we feel, when we find him a stupid mechanic, who imitated others, and copied an art, which, through a long succession of ages, after multiplied trials, mistakes, corrections, deliberations, and controversies, had been gradually improving?” (Hume 1779. 77). And was it just one workman? “And what shadow of an argument . . . can you produce, from your hypothesis, to prove the unity of the Deity? A great number of men join in building a house or ship, in rearing a city, in framing a commonwealth; why may not several deities combine in contriving and framing a world?” The trouble is, of course, that you are reading in your conclusion – a unique, all-powerful deity – right into your premises and then thinking that you have discovered or proved something.

And yet, this said – and much more – in the end Hume equivocates. He may be a believer. And then again, he may not be.

That the works of Nature bear a great analogy to the productions of art, is evident; and according to all the rules of good reasoning, we ought to infer, if we argue at all concerning them, that their causes have a proportional analogy. But as there are also considerable differences, we have reason to suppose a proportional difference in the causes; and in particular, ought to attribute a much higher degree of power and energy to the supreme cause, than any we have ever observed in mankind. Here then the existence of a DEITY is plainly ascertained by reason: and if we make it a question, whether, on account of these analogies, we can properly call him a mind or intelligence, notwithstanding the vast difference which may reasonably be supposed between him and human minds; what is this but a mere verbal controversy? (130)

General opinion, with which I concur, is that Hume is a classic case of someone caught on the problem of “inference to the best explanation.” You have a number of options and you must choose the best. Usually, you do this by eliminating the least satisfactory, until you have only one left standing. Sherlock Holmes gives the classic statement. “When you have eliminated all which is impossible, then whatever remains, however improbable, must be the truth.” The trouble is that organisms do seem as if designed. It is impossible that they not be. So, improbable though it may be, there must be something to the God hypothesis. You must eliminate all those that make no reference to a Designer of some sort.

Immanuel Kant, in his third Critique, *The Critique of Judgement*, had a somewhat different take on things. As a good Newtonian, he was convinced that the world is ruled by unbroken law. The proper root metaphor for understanding is the machine metaphor. Yet, there is in organisms the undeniable appearance of design. And you cannot really do biology without this assumption of design. You would not be able to ask about the use of anything. Hence, uneasily, Kant concluded that thoughts of final cause had to be allowed, but they were purely heuristic and not part of the real science.

The concept of a thing as in itself a natural end is therefore not a constitutive concept of the understanding or of reason, but it can still be a regulative concept for the reflecting power of judgment, for guiding research into objects of this kind and thinking over their highest ground in accordance with a remote analogy with our own causality in accordance with ends; not, of course, for the sake of knowledge of nature or of its original ground, but rather for the sake of the very same practical faculty of reason in us in analogy with which we consider the cause of that purposiveness. (Kant 1790. 247)

An answer, if not a terribly satisfactory answer. Perhaps out of frustration at the thin solution he offered, Kant showed that sometimes he was more human than

ethereal philosopher, by turning bitterly on the source of this frustration, biology. You want to make the life sciences equal to the physical sciences? Good luck! “[W]e can boldly say that it would be absurd for humans even to make such an attempt or to hope that there may yet arise a Newton who could make comprehensible even the generation of a blade of grass according to natural laws that no intention has ordered; rather, we must absolutely deny this insight to human beings” (271).

V. PROBLEMS WITH DESIGN

We enter the nineteenth century and turn towards Darwin and his *Origin of Species* (Ruse 1999). As we do so, it is well to remember an important point made by Thomas Kuhn in his *The Structure of Scientific Revolutions* (1962). Few, if any, accept Kuhn’s extreme idealism, that when (what he calls) “paradigms” change, the world itself changes – the before and after paradigms are “incommensurable.” To the contrary, as we shall see fully in the Darwinian case, there is clearly much continuity between before and after paradigms. However, Kuhn is clearly right that revolutions don’t just happen. There must be reason for change and the most obvious reason is that the older paradigm is no longer functioning that well. It is coming apart with increasing visible problems and the virtue of the new paradigm is either that it can explain and hence eliminate the problems, or it can do an end run around the problems, so they are no longer so very pressing. We can think of the pre-Darwinian paradigm, not so much as “Creationism” in the sense of today’s American biblical literalists – six-day creation, six thousand years ago, Adam and Eve in the Garden of Eden in their birthday suits – but Creationism in the sense of the design-like nature of the organic world precludes an explanation in terms of unbroken law. Miracles, divine interventions in the natural order of things, are needed to create already-functioning organisms. In the words of the polymath, historian and philosopher of science William Whewell:

Geology and astronomy are, of themselves, incapable of giving us any distinct and satisfactory account of the origin of the universe, or of its parts. We need not wonder, then, at any particular instance of this incapacity; as for example, that of which we have been speaking, the impossibility of accounting by any natural means for the production of all the successive tribes of plants and animals which have peopled the world in the various stages of its progress, as geology teaches us. That they were, like our own animal and vegetable contemporaries, profoundly adapted to the condition in which they were placed, we have ample reason to believe; but when we inquire whence they came into this our world, geology is silent. The mystery of creation is not within the range of her legitimate territory; she says nothing, but she points upwards. (Whewell 1837/3. 587–588.)

But what if – quite independently of Darwin – the organic world is nothing like as design-like as these Creationists suppose? If someone, Charles Darwin, is going to offer an evolutionary account of the organic world, then the assumption is going to be that blind law can explain organisms in their entirety. If it cannot do this, because of the design-like nature of organisms, then evolution – the “Evolutionism” paradigm – is impossible. Obviously, at one level, the evolutionist like Darwin is going to have to explain that blind law can do the job. However, if there is no job to be done, then the evolutionist can win by default, as it were. No barriers.

As it happens, this fear of the Creationists is only too well placed. Even by the 1830s, people like Whewell were coming to realize that there are important aspects of organisms – not just ephemeral by-products – that seem to have no direct purpose (Whewell 1837; Ruse 1977). Aspects for which final-cause explanations simply seem neither needed nor appropriate. Most obvious were what, in the next decade, the anatomist Richard Owen (1849) was to call “homologies,” the isomorphisms between organisms of very different species. The paradigm example is of the vertebrate forelimb. Very different organisms have the bone order and structure of their forelimbs – forelimbs where the uses are very different – in parallel. The arm of humans is used for grasping; the forelimb of the horse, for running; the wing of the bird for flying; the flipper of the porpoise for swimming; and more. There seems no purposeful reason for any of this.

This problem, as you might say, is internal to biology. Then for a worry more external to biology, by the 1850s, a decade before the *Origin* was published, Whewell started to fret about extraterrestrials. In an anonymously authored book, *The Plurality of Worlds* (1853), Whewell posed the question of whether we humans are unique. Or, if there are many planets through the universe that carry living beings, including living human-like beings? Why was Whewell worried about this? Quite simply because his revealed religion – the religion of faith and the Bible – was under threat from his natural religion – the religion of reason. The evidence of design, of which he made so much in his stand against evolution, works only if you see design out there. The less evidence of design, the less reason to invoke non-law bound causes. This rather suggests then that we should find purpose – final causes – everywhere. Meaning not only on our planet but throughout the universe. And the only point of other planets, the only possible purpose of them, is to support life. Hence, we expect to find life teeming everywhere. More than this, there is not much point in life if it does not lead, whether by evolutionary forces or otherwise, to intelligent beings of some form. But then comes the question of their relationship to the Creator. A multitude of Creators is hardly plausible. Unfortunately, if we do have intelligent beings elsewhere, this opens the possibility of their falling into sin as have we humans. Which means that God, presumably in the form of Jesus, has to come down to their planets in order to save them. We end with the theologically absurd

– absurd and obnoxious – conclusion that perhaps Jesus is being crucified on Friday– every Friday – somewhere in the universe, to save souls. An implication like this must be stopped, and the obvious way is to argue that, despite universal purpose, the existence of non-inhabited worlds, apparently pointless worlds, is nevertheless highly plausible.

In the course of his argument, Whewell brought several lines of fire to bear. Thus, he argued at some length that the geological record shows that, for much of the life of this Earth of ours, there was either no life or no intelligent life. Hence, concluded Whewell, there was no point to this world for much of its existence, at least, not in the sense of being designed for organisms in general and humans in particular. In a somewhat analogous manner, Whewell also pointed out that many aspects of organisms show no point, in the sense of being of any benefit to them. Thus, the nipples on the male are hardly of any value to anyone. Similarly, Whewell cited the homologous forms of the skeletons of man and sparrows, which hardly do anyone or anything very much good. And, in a passage anticipating Charles Darwin's discussion of the struggle for existence in the *Origin of Species*, Whewell drew attention to the fact that most organisms seem to have little point anyway, because they die before maturity: "to work in vain, in the sense of producing means of life which are not used, embryos which are never vivified, germs which are not developed, is so far from being contrary to the usual proceedings of nature, that it is an operation which is constantly going on, in every part of nature" (Whewell 1853. 248).

There were other arguments brought to bear on the case. God does not always work for direct organic benefit, but for other ends such as similarity, symmetry, and beauty. Hence, analogous structures (homologies) in different organisms exist "for the sake of similarity" (248). Similarly, the different hexagonal forms of snowflakes have no end but symmetry and beauty. And in addition to supplying different ends for God, Whewell made much play of a version of the Design Argument which he called the "Argument from Law." Even though we may see no direct ends, "the existence of Laws of Nature, governing and producing the phenomena of the universe, makes manifest to us the existence and operation of God" (251). Finally, in order to find some point to uninhabited other worlds, Whewell made a new suggestion – the most crucial of all for his revised position – namely that man's mind is in essential respects like God's Mind, and part of our task on Earth might be to bring ourselves closer to God by tracing His laws as manifested by the endless motions of the heavenly bodies.

For if, on the earth, the Creator have placed a race who are not only endowed with a portion of the Divine Intellect, but who are placed there in order, (at least among other purposes,) that they may cultivate and develop this gift, and thus, rise nearer and nearer to the condition of the Divine Intellect, and be fitted, so far, for an immortal existence; we cannot have any ground to think that the scheme of creation

is too narrow; or that it needs, in order to give it sufficient dignity and value, and a worthy object in our eyes, that other worlds should be stocked with races of creatures... (309)

As you might imagine, suggestions like this were embraced with all of the enthusiasm of facing a lead balloon. Sir David Brewster, Scottish physicist and biographer of Newton, countered with *More Worlds than One: The Creed of the Philosopher and the Hope of the Christian* (1854). He argued that there is intelligent life everywhere, including on the Sun! You can imagine how well this bolstered the case of the non-evolutionists.

VI. ON THE ORIGIN OF SPECIES

Turn now to Charles Darwin and his great work, *On the Origin of Species*, published in 1859. What did he try to do in that work? He tried to show that all organisms, living and dead, are descended from “one or a few forms,” by a slow, natural – meaning law-bound – process that he called “natural selection.” First, he talked about artificial selection, what the farmer practices on the stock and what fanciers do with their birds and dogs and other animals that they prize and want to improve. He shows that the secret is choosing and breeding from those that have the desired features, over and over, until those features are fixed in the line or group. He then moved to the natural world, arguing that natural populations always have lots of variation, a prerequisite for a selective process. Then come the two key chapters. First, the struggle for existence, showing that not all organisms can survive and reproduce.

A struggle for existence inevitably follows from the high rate at which all organic beings tend to increase. Every being, which during its natural lifetime produces several eggs or seeds, must suffer destruction during some period of its life, and during some season or occasional year, otherwise, on the principle of geometrical increase, its numbers would quickly become so inordinately great that no country could support the product. Hence, as more individuals are produced than can possibly survive, there must in every case be a struggle for existence, either one individual with another of the same species, or with the individuals of distinct species, or with the physical conditions of life. It is the doctrine of Malthus applied with manifold force to the whole animal and vegetable kingdoms; for in this case there can be no artificial increase of food, and no prudential restraint from marriage. Although some species may be now increasing, more or less rapidly, in numbers, all cannot do so, for the world would not hold them. (Darwin 1859. 63–64.)

Then, in the next chapter, Natural Selection, he argued that the struggle within populations of organisms, with a range of variations, is going to lead to a natural selecting process.

HOW will the struggle for existence, discussed too briefly in the last chapter, act in regard to variation? 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. (80–81)

The key point is that natural selection doesn't just lead to change. It leads to change in the direction of features that help their possessors. A faster lion after prey is going to do better than a slower lion. A darker moth on a sooty tree is better camouflaged than a lighter one. A hardier plant in a rough environment is going to do better than a more delicate one. Organisms will develop features, "adaptations", that help in the struggle for existence, or more importantly struggle for reproduction.

How have all those exquisite adaptations of one part of the organisation to another part, and to the conditions of life, and of one distinct organic being to another being, been perfected? We see these beautiful co-adaptations most plainly in the woodpecker and missletoe; and only a little less plainly in the humblest parasite which clings to the hairs of a quadruped or feathers of a bird; in the structure of the beetle which dives through the water; in the plumed seed which is wafted by the gentlest breeze; in short, we see beautiful adaptations everywhere and in every part of the organic world. (60–61)

Darwin answered his question:

I have called this principle, by which each slight variation, if useful, is preserved, by the term of Natural Selection, in order to mark its relation to man's power of selection. We have seen that man by selection can certainly produce great results, and can adapt organic beings to his own uses, through the accumulation of slight but useful variations, given to him by the hand of Nature. But Natural Selection... is a power incessantly ready for action, and is as immeasurably superior to man's feeble efforts, as the works of Nature are to those of Art. (61)

VII. IMPLICATIONS

Stop right here and make three important points. First, Darwin is offering a natural, law-bound, within-the-machine-metaphor explanation of those characteristics like the hand and the eye that supporters of the organic metaphor claim can be explained only within their perspective. This implies those that think natural, machine-like explanations of adaptations (the kind Kant ruled out as impossible) cannot be and one must rely on non-natural interventions, miracles, are wrong. Darwin says that the eye, for example, exists and works because those would-be sighted animals that had variations more efficient in the direction of sight survived and reproduced and those that did not, did not. Blind, unguided law all the way.

Second, as he and Asa Gray realized, Darwin was not eliminating teleological – final cause – explanations. He was giving an answer other than miracles, but he was giving an answer to the same problem – adaptive characteristics seem to refer to the future. However, for the Creationist, it was the Mind of God responsible – He saw the intended future and planned for it. For the Evolutionist like Darwin, it was a case of this worked in the past, let us assume it will go on working. Kant pointed out that we have a kind of repetitive cause and effect process. It is a matter of organization or even self-organization. “This principle, or its definition, states: An organized product of nature is that in which everything is an end and reciprocally a means as well. Nothing in it is in vain, purposeless, or to be ascribed to a blind mechanism of nature” (Kant 1790. 247–248). Darwin agrees, but he thinks that that is just the way things are. The eye leads to seeing leads to survival and reproduction leads to another eye and... the process keeps repeating, over and over again. Of course, we might be mistaken. Darkness might envelope the Earth and no one can see again; but, the Designer has the same problem.

The point is that there is a genuine reference to the future. Darwin is giving a naturalistic explanation of final cause. He is not denying it. Indeed, in the *Origin*, he uses the notion of final cause without need of qualification. He asks why cuckoos lay their eggs in the nests of others.

It is now commonly admitted that the more immediate and *final cause* of the cuckoo's instinct is, that she lays her eggs, not daily, but at intervals of two or three days; so that, if she were to make her own nest and sit on her own eggs, those first laid would have to be left for some time unincubated, or there would be eggs and young birds of different ages in the same nest. (216–217, my italics.)

Continuing, supposing that this spaced-out laying would have disadvantages but that sometimes a cuckoo might lay its eggs in the nest of another bird:

Now let us suppose that the ancient progenitor of our European cuckoo had the habits of the American cuckoo; but that occasionally she laid an egg in another bird's nest. If the old bird profited by this occasional habit, or if the young were made more vigorous by advantage having been taken of the mistaken maternal instinct of another bird, than by their own mother's care, encumbered as she can hardly fail to be by having eggs and young of different ages at the same time; then the old birds or the fostered young would gain an advantage. And analogy would lead me to believe, that the young thus reared would be apt to follow by inheritance the occasional and aberrant habit of their mother, and in their turn would be apt to lay their eggs in other birds' nests, and thus be successful in rearing their young. By a continued process of this nature, I believe that the strange instinct of our cuckoo could be, and has been, generated.

The crucial point, however, is that, whereas Whewell appeals to divine intervention – “says nothing but points upwards” – Darwin offers a naturalistic law-bound explanation. Natural selection!

The third point is that, without effort or the need of ad hoc explanations, Darwin can answer those problems about seeming exceptions to the design-like nature of organisms, most especially homologies. They are a function of common ancestry. Evolution does not start each generation afresh. It very often modifies what it has according to new needs. There are good reasons to go fast? Then take the horse option? Out of the jungle and onto the plains. You need to be able to look around you for predators and prey. Go the bipedal option, opening up your forelimbs for new, or much improved, functions. The important point is that whereas Whewell is constantly playing catch up – God worked through laws to exercise our minds sort of thing – the evolutionist, the Darwinian evolutionist in particular, has a ready explanation at hand. This is all very much in the tradition of Kuhn's analysis of scientific revolutions. The old paradigm gets into trouble – constantly coming up with ad hoc solutions to solve problems. The new paradigm deals with these problems briskly – they break down under the new modes of explanation – and the scientist can and does move on.

Move on, but note that the Darwinian agrees with the Creationist that it is function and final cause that comes first. Homologies and the like are explicable, but they are side effects.

It is generally acknowledged that all organic beings have been formed on two great laws – Unity of Type, and the Conditions of Existence. By unity of type is meant that fundamental agreement in structure, which we see in organic beings of the same class, and which is quite independent of their habits of life. On my theory, unity of type is explained by unity of descent. The expression of conditions of existence, so often insisted on by the illustrious Cuvier, is fully embraced by the principle of natural selection. For natural selection acts by either now adapting the varying parts of each being to its organic and inorganic conditions of life; or by having adapted them during long-past periods of time: the adaptations being aided in some cases by use and disuse, being slightly affected by the direct action of the external conditions of life, and being in all cases subjected to the several laws of growth. Hence, in fact, the law of the Conditions of Existence is the higher law; as it includes, through the inheritance of former adaptations, that of Unity of Type. (Darwin 1859. 206.)

Note, what Darwin always believed, that natural selection is not the sole causal force for change. Darwin always accepted, what we now think is wrong, that the inheritance of acquired characteristics – usually known as “Lamarckism,” after the use of it by the French evolutionist, Jean Baptiste de Lamarck – plays a role in the evolutionary story. “Wax of Ear, bitter perhaps to prevent insects lodging there, now these exquisite adaptations can hardly be accounted for by my method of breeding there must be some cor[r]elation, but the whole mechanism is so beautiful” (Darwin 1987. C 174). It is just that, alone, Lamarckism is not adequate.

VIII. DARWIN AND RELIGION

So much for Darwin’s *Origin*. Teleology without tears. Final cause accepted and highlighted, but under the machine root metaphor. Before we move on, it would be ungracious not to acknowledge that all who write on the topic of Darwin and teleology are hugely indebted to a 1993 article, “Darwin was a teleologist,” in *Biology and Philosophy* (a journal of which I was the founding editor), by James Lennox. He shows unambiguously that Darwin was a teleologist (for reasons given in the last section); additionally, he refutes those – for example, the biologist Michael Ghiselin – who argued that there was no such teleology, that Darwin had taken it out of biology, and that Darwin was consciously aware of what he was doing. Ghiselin, for instance, referred to the underlying teleology of Darwin’s next book after the *Origin* – *The Various Contrivances by Which Orchids are Fertilised by Insects* (1862) – as a “metaphysical satire” (Ghiselin 1969. 135). Lennox shows not only how mistaken an interpretation that is, but that back when Darwin became an evolutionist and discovered natural selection, he was already facing the fact that, although he had now taken God out of the equation,

the same could not be said of “final causes,” teleology. In an unpublished comment (written in 1838) in the margin of a book he was then reading – *Proofs and Illustrations of the Attributes of God*, by John Macculloch – Darwin wrote: “The Final Cause of innumerable eggs is explained by Malthus – (is it anomaly in me to talk of Final Causes: consider this! –) consider these barren Virgins” (Darwin 1987. 637). Remember that, in the *Origin*, Darwin was still worrying about those eggs! The reference to “barren virgins” refers to the already-encountered description of final causes by Francis Bacon. Darwin would have picked it up from William Whewell’s natural-theology-promoting *Bridgewater Treatise* (1833. 355–356). Clearly, anomaly or not, Darwin decided that he could legitimately go on using the term.

Ask now some questions that arise from the discussion. First, what about religion? Does Darwinian evolutionary theory, with natural selection as its central mechanism, refute God, specifically the Christian God? If so, it would have been a surprise to Darwin! Towards the end of the *Origin*, all six editions (last in 1872), Darwin affirms his belief in the possibility of religious acceptance. Indeed, his position makes it easier.

Authors of the highest eminence seem to be fully satisfied with the view that each species has been independently created. To my mind it accords better with what we know of the laws impressed on matter by the Creator, that the production and extinction of the past and present inhabitants of the world should have been due to secondary causes, like those determining the birth and death of the individual. When I view all beings not as special creations, but as the lineal descendants of some few beings which lived long before the first bed of the Silurian system was deposited, they seem to me to become ennobled. (488–489)

It is true that Darwin is pushing one to the God of deism – He works through and only through unbroken law – rather than the God of theism – God works through miracles. Darwin was hardly the first to go this way. Privately, Newton was a deist. Moreover, by the nineteenth century, many, independently of science, were starting to make miracles law-bound. The Marriage at Cana, where Jesus turns water into wine, is best understood, not as conjuring, but as a tale where Jesus so moved the party-giver that he voluntarily opened up his cellars and brought out his best wine. Many today, indeed, would say that calling for divine intervention is precisely to miss the meaning of the event. In the years of my childhood, the years after the Second World War, the British considered Dunkirk in 1940, when the British Army escaped across the Channel, to be a miracle. They were able to regroup and continue the fight against Hitler. God did not make it easy for them; He made it possible for them. If you had asked the average Brit whether God did it through special intervention or through blind law, they would have looked at you as though you were queer in the head.

Or making a somewhat inappropriate joke. What mattered was the meaning not the cause (Ruse 2001).

Clearly Darwin is aiding the cause of law-bound explanations, whether Christians like this or not. Is Darwin truly setting us on the road towards disbelief? After all, despite what he said in the *Origin*, by about 1870 he had become what Thomas Henry Huxley called an “agnostic.” Neither believer nor non-believer. However, in common with just about every Victorian agnostic, and as the nineteenth century drew to a close there were many of them, Darwin’s chief gripe against Christianity was theological. In his autobiography written about 1876, he wrote:

I gradually came to disbelieve in Christianity as a divine revelation. The fact that many false religions have spread over large portions of the earth like wild-fire had some weight with me. Beautiful as is the morality of the New Testament, it can hardly be denied that its perfection depends in part on the interpretation which we now put on metaphors and allegories.

But I was very unwilling to give up my belief; – I feel sure of this for I can well remember often and often inventing day-dreams of old letters between distinguished Romans and manuscripts being discovered at Pompeii or elsewhere which confirmed in the most striking manner all that was written in the Gospels. But I found it more and more difficult, with free scope given to my imagination, to invent evidence which would suffice to convince me. Thus disbelief crept over me at a very slow rate, but was at last complete. The rate was so slow that I felt no distress, and have never since doubted even for a single second that my conclusion was correct. I can indeed hardly see how anyone ought to wish Christianity to be true; for if so the plain language of the text seems to show that the men who do not believe, and this would include my Father, Brother and almost all my best friends, will be everlastingly punished. And this is a damnable doctrine. (Darwin 1958. 86–87.)

Darwin was an agnostic. Yet, an agnostic of a recognizable kind. For some, who call themselves “agnostic,” this is really a way of saying: “I couldn’t care less. I really find the whole topic rather boring.” (My wife falls into this category.) For others, in its way, agnosticism is as dynamic as full-blooded belief. (I fall into this category!) The eminent population geneticist J. B. S. Haldane wrote: “Not only is the world queerer than we think it is. It is queerer than we could think it is.” This is not a man who has shelved the problem. The ultimate meaning of things is a challenging mystery. This was Darwin’s position. Traditional Christianity is false and morally offensive. Deism, the long-held position, is truly knocked sideways by the law-bound process of natural selection. And yet.....? Towards the end of his life, to a correspondent who had just sent him a book on issues to do with science and religion, Darwin wrote:

You would not probably expect anyone fully to agree with you on so many abstruse subjects; and there are some points in your book which I cannot digest. The chief one is that the existence of so-called natural laws implies purpose. I cannot see this. Not to mention that many expect that the several great laws will some day be found to follow inevitably from some one single law, yet taking the laws as we now know them, and look at the moon, what the law of gravitation – and no doubt of the conservation of energy – of the atomic theory &c. &c. hold good, and I cannot see that there is then necessarily any purpose. Would there be purpose if the lowest organisms alone destitute of consciousness existed in the moon? (Letter to William Graham, July 3, 1881. Darwin Correspondence Project, letter:13230.)³

Darwin continues:

Nevertheless you have expressed my inward conviction, though far more vividly and clearly than I could have done, that the Universe is not the result of chance. But then with me the horrid doubt always arises whether the convictions of man's mind, which has been developed from the mind of the lower animals, are of any value or at all trustworthy. Would any one trust in the convictions of a monkey's mind, if there are any convictions in such a mind?

An agnostic indeed!

Should Darwin have gone all the way to atheism? This seems to be the assumption of many. The title of Sam Harris's book, *The End of Faith*, tells the tale. He states flatly that "the truth is that religious faith is simply unjustified belief in matters of ultimate concern – specifically in propositions that promise some mechanism by which human life can be spared the ravages of time and death. Faith is what credulity becomes when it finally achieves escape velocity from the constraints of terrestrial discourse – constraints like reasonableness, internal coherence, civility, and candor" (Harris 2004. 65).

Go back to Hume. He then was caught on the argument to the best explanation. Now, a law-bound explanation of design is no longer impossible. The way was open to Hume to declare for atheism. Whether he would have done is another matter. Whether Darwin would have forced him to become an atheist is up for doubt. Richard Dawkins (1986) has said "Darwin made it possible to be an intellectually fulfilled atheist." There is certainly no compulsion to be an atheist. Indeed, you can go on believing fully as a Christian, although you might now be more inclined to put your money on revealed religion rather than natural religion. This is a stance taken independently by many Christians in the last two centuries. Inspired particularly by Søren Kierkegaard, the feeling is that faith is undercut if it is backed up by reason. Faith is no longer courageous, if it

³ https://www.darwinproject.ac.uk/letter/?docId=letters/DCP-LETT-13230.xml#Lfoot_f2

is no longer a leap into the absurd. Many would not go this far but would agree – with the traditional position of St Thomas – that faith must come first. This was certainly the stance of the great nineteenth-century theologian John Henry Newman. “I believe in design because I believe in God; not in a God because I see design” (Newman 1973. 97). As a Christian, one believes on faith all about the Christian God, and then one fleshes this out by looking at the world and using reason. After all, that is what being made in the image of God is all about.

Whatever you may think about the argument from design, this does not exhaust natural theology. There are other proofs for the existence of God, and there are still arguments against the existence of God. We have seen reason to think that the argument from miracles is perhaps less convincing than formerly – Darwin’s theory does not deny miracles, but it certainly starts to make divine intervention less pressing. Other arguments – the ontological argument and the causal argument, for instance – have to be considered independently, on their merits. The biggest argument against God is the traditional argument from evil. An all-powerful, all-knowing God, all-loving God would not let evil exist. This powerful passage is from *The Brothers Karamazov*:

“Tell me yourself, I challenge your answer. Imagine that you are creating a fabric of human destiny with the object of making men happy in the end, giving them peace and rest at last, but that it was essential and inevitable to torture to death only one tiny creature – that baby beating its breast with its fist, for instance – and to found that edifice on its unavenged tears, would you consent to be the architect on those conditions? Tell me, and tell the truth.”

“No, I wouldn’t consent,” said Alyosha softly.

(Dostoevsky 1879. ch. 4.)

There are some things an all-loving God would not allow, not even for the eternal salvation of every human being, past and present. And, remember, this was written before the Holocaust.

Traditionally the response to the problem of evil divides it into two: natural evil and moral evil (Ruse 2001). Natural evil focusses on natural mishaps like the Lisbon earthquake; less dramatic, like the painful, incurable cancer of a small child (Davies and Ruse 2021). Moral evil focuses on free will. It is better that Heinrich Himmler had free will, than not, even though it did lead to the Final Solution and the death of six million Jews. Interestingly, Darwinism has been taken as relevant to both natural and moral evil. Even more interestingly – perhaps “paradoxically” is a better word – Darwin has been taken as supportive of the two approaches. In the case of natural evil, it is Richard Dawkins (1983) of all people who has made the point that natural selection clearly leads to pain and suffering. That is what a struggle for existence is all about. Darwin wrote to Asa Gray on the subject. “I cannot persuade myself that a beneficent & omnipotent

God would have designedly created the Ichneumonidæ with the express intention of their feeding within the living bodies of caterpillars, or that a cat should play with mice.” (Letter to Asa Gray, 22, May 1860, in Darwin 1985/8. 224.) Dawkins stresses what we have been stressing, namely the design-like nature of organisms, and argues that the only way that such design-like organisms could have been created is through natural selection. Lamarckism, the inheritance of acquired characteristics, is empirically false, saltations (jumps from one form to another) are inadequate – they just lead to randomness – and there really is no other game in town. So, natural evil is an inevitable consequence of getting organisms naturally, and this includes humans.

Moral evil, depending on free will, raises the question of the plausibility of the free will. Darwinism stresses that nature is law-bound. Doesn't this preclude freedom of choice? Calvinists are right. Everything is predestined. Free will is only possible if we can escape law, and we cannot. In response, philosophers distinguish between two takes on the free will problem. Libertarianism, which has nothing to do with the political philosophy of Ayn Rand, says we can escape laws. Kant thought this possible. Compatibilism, free will can occur only with a law frame. Hume thought this, probably reflecting the Calvinist background of Protestant Scots. In America, Jonathan Edwards endorsed it. In support of their position, compatibilists argue that absence of laws does not imply freedom. It implies craziness. If the late Queen had taken off all her clothes before she appeared on the balcony of Buckingham Palace, we would not applaud her actions, but worry about her mental health. All training is designed, not to preclude freedom, but the very opposite: the freedom to make reasoned choices and not to act on blind prejudice.

Understood in this light, the Darwinian is clearly going to be a compatibilist. Now add a nice point. Evolutionists distinguish between *r* reproductive strategies and *K* reproductive strategies (MacArthur and Wilson 1967). The former, *r* strategies, puts the emphasis on having lots of offspring but little parental care. Herrings. The latter, *K* strategies, puts the emphasis of few offspring but much parental care. Primates. The former strategy makes sense when conditions fluctuate. Famine or feast. The *r* strategy can take full advantage of good times and these more than balance bad times. The *K* strategy makes sense when conditions are stable. You can rely on a steady background and take time raising offspring. Humans, obviously, are the supreme *K* strategists. Think of the time it takes for our offspring to mature. The *r* strategist has little need of free will. If a rain shower washes away a crowd of ants, too bad. Rather than putting effort into raising far fewer who might react to the shower and try to escape, the Queen is better off producing many more to take their place. Humans cannot afford to lose offspring every time it rains. So, we need to have a dimension of freedom. If it starts to rain, stop shopping and go to Starbucks for a latte, until it is over. We are like Mars Rover (Dennett 1984). It is completely governed by law, but it

does not have to wait for instructions from Earth every time it meets an obstacle. A rock is in the way? Go around it, rather than come to grief trying to ride up the side. In other words, on both fronts, Darwinism is supportive of traditional answers to the problem of evil. This is not to say that they are now adequate. I doubt anything like this is going to move Dostoevsky's Alyosha. I suspect most people are supremely unworried as to whether Heinrich Himmler is or is not like Mars Rover. He was grotesquely inhumane and no excuse about the value of his free will is going to affect that judgment. Enough said.

IX. FINE TUNING

Or is it enough? Have we perhaps sold design short? Drawing to a conclusion to this essay, I want to look at two groups who think the discussion is ending too quickly. There is more to design than the eviscerated machine-metaphor analysis that Darwin offers us. Some think this opens the way back to the Christian God; others think, perhaps God but not the traditional Christian version; and yet others think, maybe no God at all. I shall look first at a group that strikes me as putting enthusiasm and wish fulfillment above critical thinking. Then a group that offers a much more interesting challenge to the Darwinian position presented in this essay. They may or may not be right, but they should be taken seriously.

To start with the first group, its members champion design, not in biology, but in physics. This is the so-called "fine-tuning" argument, that argues the basic constants of the universe are not random, but carefully thought out and chosen, else life and much else would be impossible (Friederich 2001). Hence, God makes a comeback. Why should we think the universe is fine-tuned? Several physical arguments are offered, all along the line of "if this had not been exactly as it is, that would not have happened, and so no life would have been possible." What would be an example? The carbon atom is a popular choice (Weinberg 1999). In the early stages of the universe there were no carbon atoms. At that point, everything was just hydrogen and helium. For carbon to be produced, we need three helium nuclei. Normally, even with the right ingredients nothing happens because the energy of carbon is way below that of three helium nuclei – as things normally are, the nuclei could not come together and stay that way. They are too hyped up as it were. Fortuitously, however, there is a variant, radio-active form of carbon. It has just the higher energy that is needed and so everything works out perfectly – this energy of the radio-active form is precisely that needed to make carbon. Anything a little more, it would not work. Anything a little less, it would not work. The actual energy level is right on target. Like Goldilocks' third try at the Three Bears dishes of porridge, it is just fine. But before you get all excited and think that nature is not just fine but fine-tuned,

the very skeptical physics Nobel Laureate Steven Weinberg asks us to keep questioning. How do you get the three helium nuclei in the first place? They come together in a two-part process. First, two of them combine to make beryllium. Only then is the third is added to make carbon. It turns out that looking at things from this perspective there is a lot more room for flexibility – there is a wider range of energy levels that would let these processes move forward. There is thus no unique possible energy needed to make carbon. All in all, therefore, perhaps things are not so tightly designed.

The trouble with the arguments in favor of fine-tuning is that we are just working from ourselves – from the world we know – and putting probabilities on things is such guesswork. Think of a number, double it, and the answer you want is a half. The fine-tuning enthusiasts start from premises no one would deny. Of course, we humans could not function on a planet where, because it is bigger, the gravitational attraction is (let us say) twice as strong. As we are constituted now, the strain on our limbs and our internal organs like the heart would lead to early death. But then the fine tuners go astray by assuming that this is all there is to be said on the subject. This is a mistake. If we were on a bigger planet, then natural selection would have made us so that we could live there. We might, for instance, have evolved with elephantine-sized legs. Or more plausibly, perhaps like the whales we could have spent most of our time in the water where we would weigh that much less, and so presumably we would have adaptations like dolphins for living an aquatic life, our hearts, and lungs and (obviously most important) brains could be very human-like. I am not sure that advanced civilization is beyond mermen and mermaids. And this is all before you start to think of the trendy new notion of “multiverses” (Ellis 2011). Perhaps our universe is just one of an infinite number, some of which work, some of which don’t, some of which support life, some of which don’t. We are right back to winning the lottery without any fraud behind our success. We couldn’t buy the Mercedes if we hadn’t won it, but winning it was no miracle.

X. ROMANTICISM

Turn now to the second, more-interesting challenge to the Darwinian analysis. By the end of the eighteenth century, with the failure of mechanism to explain organisms, there were those who started to champion the organicist metaphor, thinking that in the Scientific Revolution it had been too quickly discarded (Cunningham and Jardine 1990; Richards 2003). These “Romantics”, as they were called, included the poet Johann Wolfgang von Goethe, the anatomist Lorenz Oken, and above all the philosopher Friedrich Schelling (Knight 1990). As a teenager, Schelling had written a sixty-page essay on the *Timaeus*. It had a lasting influence. “The key to the explanation of the entirety of the Platon-

ic philosophy is noticing that Plato everywhere carries the subjective over to the objective” (Schelling 1833. 212). Schelling saw the world in organic terms, meaning that he thought there is value to be found out in the world, it is not just ascribed by us to value-free machines.

Even in mere organized matter there is life, but a life of a more restricted kind. This idea is so old, and has hitherto persisted so constantly in the most varied forms, right up to the present day – (already in the most ancient times it was believed that the whole world was pervaded by an animating principle, called the world-soul, and the later period of Leibniz gave every plant its soul) – that one may very well surmise from the beginning that there must be some reason latent in the human mind itself for this natural belief. (Schelling 1803. 35.)

The world is something that produces itself, has its developing powers inside, as an unfurling organism is driven by forces within rather than without. One goes from the simple to the complex, from the undifferentiated to the highly differentiated. “Nature should be Mind made visible, Mind the invisible nature. Here then, in the absolute identity of Mind in us and Nature outside us, the problem of the possibility of a Nature external to us must be resolved. The final goal of our further research is, therefore, this idea of Nature; if we succeed in attaining this, we can also be certain to have dealt satisfactorily with that Problem” (42). Schelling saw the world in constant motion. And we humans come at the top. “It is One force, One interplay and weaving, One drive and impulsion to ever higher life” (Schelling; *Proteus of Nature*, 1800, in Morgan 1990. 35). Note that we have now an extra dimension to purpose. There is the purpose as exhibited by adaptation. The purpose of the teeth is to bite off and chew one’s food. And now, more explicitly, we have purpose in a historical mode. Things don’t just change, they change in order to point us ever closer to the apotheosis of the historical story. Humankind! Progress!

Note the relevance of all of this to the theme of this essay. For the Darwinian, design is a product of blind law. It is brought on by the external force of natural selection. Design in itself has no absolute value. It is neither good nor bad. It is we who make the judgment. The eye of humans is a good thing for us. The fang of the snake is a bad thing for us, although it might well be a very good thing for the snake. Under the organicist model, the design flows naturally from within. The flower grows naturally, first a bud and then an opening in all its splendor and functioning to attract pollinating insects. For the Platonist, the design is Design, produced by an intelligence. For the Aristotelian it is something that emerges from the natural value-laden laws of nature. They are infused with soul in some sense.

Where this leaves someone like Schelling is a matter for inquiry. Someone like him could be a Christian but equally they might be a non-believer, simply

thinking that the value-laden world is the way things are. Certainly, for Schelling, God is within the organicism circle, developing and of great value. “God is himself bound to nature through freely willed love; he does not require her and yet will not exist without her. For love is not the result of two beings requiring one another, but it occurs when each could exist for itself,... yet where neither can exist morally without the other” (Richards 2003. 146). There is a shift from traditional Protestant theology. God traditionally is thought not to want anything from us. In the words of Martin Luther: “a Christian lives not in himself, but in Christ and in his neighbor. Otherwise he is not a Christian. He lives in Christ through faith, in his neighbor through love. By faith he is caught up beyond himself into God. By love he descends beneath himself into his neighbor” (Luther 1970. 309). Schelling’s idealism, his organicism, implying his holism for the plant develops as a whole and not in parts, means that God is interacting with us. He is not the eternal, separate entity posited by Augustine and others.

Much influenced by Schelling was Darwin’s contemporary Herbert Spencer (Ruse 2021). An evolutionist, he thought less in terms of natural selection and more in terms of Lamarckian processes, the inheritance of acquired characteristics (Spencer 1852; Richards 1987). He was a holist, thinking societies are like organisms (Spencer 1860). And he was a fanatical progressionist.

This law of organic progress is the law of all progress. Whether it be in the development of the Earth, in the development of Life upon its surface, in the development of Society, of Government, of Manufactures, of Commerce, of Language, Literature, Science, Art, this same evolution of the simple into the complex, through successive differentiations, holds throughout. (Spencer 1857. 245.)

He explained that the English language is more complex and hence above all others. Expanding on this, grabbing ideas from physics, Spencer suggested that external forces cause things to get out of equilibrium, then as they strive to reach equilibrium, they rise higher. History therefore is a series of stages, going from one stable level to another (higher) one. “Dynamic equilibrium” (Spencer 1862).

Following Spencer came the French philosopher Henri Bergson, author of *L'évolution créatrice*, published in 1907 (English translation 1911), champion of the neo-Aristotelian life force, the *élan vital* – hence, better known as a “vitalist” rather than the more comprehensive “organicist”. The philosophy is the same and is derivative: deeply Aristotelian, including the importance of final cause. “The ‘vital principle’ may indeed not explain much, but it is at least a sort of label affixed to our ignorance, so as to remind us of this occasionally, while mechanism invites us to ignore that ignorance” (Bergson 1911. 42). Expectedly, vitalism speaks to “internal finality.” With predictable conclusions: “not only does consciousness appear as the motive principle of evolution, but also, among

conscious beings themselves, man comes to occupy a privileged place. Between him and the animals the difference is no longer one of degree, but of kind” (Bergson 2011. 34). More than this even: “in the last analysis, man might be considered the reason for the existence of the entire organization of life on our planet” (35).

A little later, crossing the Atlantic, we encounter the transferred Englishman, Alfred North Whitehead (1926). The world has value, in some sense it is living, and so naturally one thinks of mind as being all-pervasive. “The doctrine that 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 1938. 205). Continuing: “this sharp division between mentality and nature has no ground in our fundamental observation. We find ourselves living within nature.” Hence: “I conclude that we should conceive mental operations as among the factors which make up the constitution of nature” (214). It is the perceived unacceptability of the traditional God of Christianity, eternal and unchanging, that is the *raison d’être* for Whitehead’s approach to the God problem, developed as it was into so-called “Process Theology.” Whitehead and his followers wanted nothing to do with a God who is unmoved – could not be moved because He is eternal and unchanging – by the death of Anne Frank in Bergen-Belsen. In any case, as an out-and-out follower of Schelling, on the one hand Whitehead took the inherent change of organicism as all-important, and, on the other hand, was totally committed to a God in the world rather than a God who is in some sense logically separate. Remember: “Nature should be Mind made visible, Mind the invisible nature. Here then, in the absolute identity of Mind in us and Nature outside us, the problem of the possibility of a Nature external to us must be resolved” (Schelling 1803. 42). Whitehead writes:

The vicious separation of the flux from the permanence leads to the concept of an entirely static God, with eminent reality, in relation to an entirely fluent world, with deficient reality. But if the opposites, static and fluent, have once been so explained as separately to characterize diverse actualities, the interplay between the thing which is static and the things which are fluent involves contradiction at every step in its explanation. (Whitehead 1929. 346)

Continuing:

The final summary can only be expressed in terms of a group of antitheses, whose apparent self-contradictions depend on neglect of the diverse categories of existence. In each antithesis there is a shift of meaning which converts the opposition into a contrast.

It is as true to say that God is permanent and the World fluent, as that the World is permanent and God is fluent. Whitehead's God is a God who evolves with us, working with us to achieve progress, a better world.

Moving to the present and to science, through the mentors he had as a graduate student at Harvard, the eminent evolutionist Edward O. Wilson was deeply influenced by Spencer. In his major work on the evolution of social behavior, *Sociobiology: The New Synthesis*, Wilson tells us that of all animals: "Four groups occupy pinnacles high above the others: the colonial invertebrates, the social insects, the nonhuman mammals, and man" (Wilson 1975. 379). He continues: "Human beings remain essentially vertebrate in their social structure. But they have carried it to a level of complexity so high as to constitute a distinct, fourth pinnacle of social evolution" (380). He concludes by speaking of humans as having "unique qualities of their own." He now launches at length into showing us how humans have crossed over and mounted the "fourth pinnacle" (382) – the "culminating mystery of all biology" (382). All this, as Wilson makes clear in subsequent writings, is very much part of the general picture. "The overall average across the history of life has moved from the simple and few to the more complex and numerous. During the past billion years, animals as a whole evolved upward in body size, feeding and defensive techniques, brain and behavioral complexity, social organization, and precision of environmental control – in each case farther from the nonliving state than their simpler antecedents did" (Wilson 1992. 187). Wilson talks of selection, but it is not the traditional selection of Darwinism, where adaptations are always for the individual. Wilson sees selection acting for groups and hence there is a kind of integration, holism, about the nature of species (Wilson and Wilson 2007). If this isn't an organicist picture of life's history, it is hard to know what would be. One doubts that Wilson has even heard of Friedrich Schelling, let alone read him, but the tradition lives on (Gibson 2013).

There is today a vibrant group of evolutionary biologists who declare for organicism – the "New Biologists" (Laland et al 2014, 2015; Bateson et al 2017). But, to conclude this brief survey, turn to the philosophers, for there too we find much enthusiasm. British philosopher John Dupré is blunt. "There are powerful reasons for thinking that emancipation from the mechanistic paradigm is a precondition for true insight into the nature of biological processes" (Dupré 2012. 83). We learn that, at best, natural selection does little. "Where does adaptive change come from? A trivial but sometimes obfuscated point is that it never comes from natural selection." Continuing: "Selection cannot occur unless some other process provides alternatives to select from. It follows that any thesis about the power of natural selection to generate change implicitly presupposes a thesis about a process or processes that generate selectable change." The reader will not be surprised to learn that "our forms of consciousness of which we are capable, are very different from those of other terrestrial animals." Likewise with

human culture. It “involves the articulation and synchronization of a variety of roles and functions that is different in kind from anything else in our experience.” Adding: “our forms of consciousness of which we are capable, are very different from those of other terrestrial animals.”

Fellow philosopher Jerry Fodor (2007) feels much the same way. Of the correct evolutionary picture, we learn: “The slogan is the evolution of ontogenies. In other words, the whole process of development, from the fertilized egg to the adult, modifies the phenotypic effects of genotypic changes, and thus ‘filters’ the genotypic options that ecological variables ever have a chance to select from” (Fodor and Piattelli-Palmarini 2010. 27). And that of course is precisely what the Romantics claim. Look at the development of the individual – the growth of the chimpanzee – you have the answer to the evolution of the group – the evolution of the primates.

Finally, another fellow philosopher, Thomas Nagel (2010), stresses that it is precisely the problem of design that makes him turn from the Darwinian, mechanical explanation. He speculates that possibly “there are natural teleological laws governing the development of organization over time, in addition to laws of the familiar kind governing the behavior of the elements.” He allows that: “This is a throwback to the Aristotelian conception of nature, banished from the scene at the birth of modern science. But I have been persuaded that the idea of teleological laws is coherent, and quite different from the intentions of a purposive being who produces the means to his ends by choice. In spite of the exclusion of teleology from contemporary science, it certainly shouldn’t be ruled out a priori” (22). One should add that Nagel is an avowed atheist, so a Platonic option is not really open. As he himself says, Nagel is looking more for “natural teleological laws.”

XI. PROGRESS

Note something of importance. Dupré particularly has more to his thinking about design (real or apparent) than adaptation, such as the working of the hand or the eye. He is also thinking historically. He sees purpose in the course of evolution. Monad to man (Ruse 2017). Dupré puts humans above other organisms. Evolution for him is *progressive*. In this belief, as we have seen, Dupré belongs to a long tradition. Above all the “Romantics.” Goethe and Schelling. Then, their English disciple Herbert Spencer. And so down to the present and to Edward O Wilson. Was Darwin indifferent to all this? Even if he showed that teleology at the individual level, adaptation, could be explained within the mechanical paradigm, did he quietly avoid teleology at the historical level? Some did this for Darwin. The German evolutionist Ernst Haeckel (1834–1919) claimed – and it does seem in respects that he genuinely thought – he was a great disciple

of Darwin. But if one looks carefully at his writing and theorizing, he sounds much more Romantic – organismic – than Darwinian – mechanistic. This came naturally to one who cut his scientific teeth on embryological studies – the area of biology focusing on the development, irrespective of outside forces, of the fertilized egg to the full-grown adult. This hints – more than hints – that biological development, change of any kind, is going to be fueled from within, as it were, rather than from without, which latter is precisely the way that the force of natural selection works. This belief was confirmed by Haeckel’s championing of the “biogenetic law”: “ontogeny recapitulates phylogeny.” As the individual organism develops it is precisely mimicking the way that the group develops. Confirming Haeckel’s debts to Romanticism, in looking at the many phylogenies that he drew – he was a talented illustrator – we inevitably see progress, usually progress to human beings. Haeckel’s vision of evolution was value-laden in a way we have just seen Darwin explicitly eschewing. But what then was Darwin’s response to the challenge of progress? Above all, he strove to keep values out of his science. Most particularly in repudiating claims about progress and humans at the top. From the beginning of his thinking about evolution, as soon as he discovered natural selection, he was arguing that it gives no guarantee of progress. What else would one expect from someone so hugely within Lyell’s uniformitarian orbit? “The enormous number of animals in the world depends of their varied structure & complexity. – hence as the forms became complicated, they opened fresh means of adding to their complexity. – but yet there is no necessary tendency in the simple animals to become complicated although all perhaps will have done so from the new relations caused by the advancing complexity of others” (E97, written in January 1839). On the flyleaf of his copy of a pre-*Origin* evolutionary *Vestiges of the Natural History of Creation*, he cautioned himself never to use the terms “higher” and “lower.”

Darwin kept on worrying about this issue. In the first edition of the *Origin*, 1859, he does allow a kind of progressive odor to the fossil record, but it is hardly an enthusiastic endorsement. In the third edition of the *Origin*, 1861, just two years after the first edition, he added several new paragraphs on the topic. He basically repeated the sentiment in his notebooks about organization leading to highness. “If we look at the differentiation and specialisation of the several organs of each being when adult (and this will include the advancement of the brain for intellectual purposes) as the best standard of highness of organisation, natural selection clearly leads towards highness;...” But then, later – in this same edition – he qualified what he had said to be virtually vacuous:

To attempt to compare in the scale of highness members of distinct types seems hopeless: who will decide whether a cuttlefish be higher than a bee – that insect which the great Von Baer believed to be “in fact more highly organised than a fish, although upon another type”? In the complex struggle for life it is quite credible that

crustaceans, for instance, not very high in their own class, might beat the cephalopods or highest molluscs; and such crustaceans, though not highly developed, would stand very high in the scale of invertebrate animals if judged by the most decisive of all trials – the law of battle.

Darwin kept emphasizing the underlying sentiment even after the *Descent* was published. To the American evolutionist Alpheus Hyatt he wrote: “After long reflection I cannot avoid the conviction that no innate tendency to progressive development exists, as is now held by so many able naturalists, & perhaps by yourself” (Letter, December 4, 1872).

By the mid-nineteenth century, mechanism was proving its worth again and again. Darwin’s *Origin* apparently proved this. He set out to give the biological equivalent of Newtonian mechanics, the final stage of the effort to show that the world could be explained by scientific theories guided by the machine root metaphor. He accepted teleology. Then, he offered an account of teleology that fell under this metaphor. It is true that there were/are those who thought/think that one can remain a mechanist and yet believe in progress. There is no contradiction in you making the judgment that humans are above all other animals. It is just that this is your judgment and not something you derive from Darwin’s theory of evolution through natural selection. In the immortal words of the paleontologist Jack Sepkoski: “I see intelligence as just one of a variety of adaptations among tetrapods for survival. Running fast in a herd while being as dumb as shit, I think, is a very good adaptation for survival” (Ruse 1996, 486).

Candor demands that one admit there are those, committed Darwinians, who nevertheless think that the theory supports notions of progress. Richard Dawkins is one such person. “Directionalist common sense surely wins on the very long time scale: once there was only blue-green slime and now there are sharp-eyed metazoan” (Dawkins 1986, 38). He finds the key in “arms races.” As one who embraced computer technology early and enthusiastically, perhaps expectedly Dawkins notes that, more and more, today’s arms races rely on computer technology rather than brute power, and – in the animal world – he finds this translated into ever-bigger and more efficient brains. No need to hold your breath about who has won. Dawkins invokes a notion known as an animal’s EQ, standing for “encephalization quotient” (Dawkins 1986, 39). This is a kind of cross-species measure of IQ that takes into account the amount of brain power needed simply to get an organism to function (whales require much bigger brains than shrews because they need more computing power to get their bigger bodies to function), and that then scales according to the surplus left over. Dawkins writes: “The fact that humans have an EQ of 7 and hippos an EQ of 0.3 may not literally mean that humans are 23 times as clever as hippos! But the EQ as measured is probably telling us something about how much ‘computing power’ an animal probably has in its head, over and above the irreducible amount

of computing power needed for the routine running of its large or small body.” As always, it is the analogy with human progress that is the key. Computer evolution in human technology is enormously rapid and unmistakably progressive. It comes about through at least partly a kind of hardware/software coevolution. Advances in hardware are in step with advances in software.

There is also software/software coevolution. Advances in software made possible not only improvements in short-term computational efficiency – although they certainly do that – they also make possible further advances in the evolution of the software. So the first point is just the sheer adaptedness of the advances of software make for efficient computing. The second point is the progressive thing. The advances of software, open the door – again, I wouldn’t mind using the word “floodgates” in some instances – open the floodgates to further advances in software. (Ruse 1996. 469.)

He adds, “I was trying to suggest, by my analogy of software/software coevolution, in brain evolution that these may have been advances that will come under the heading of the evolution of evolvability in the evolution of intelligence.”

Let us leave things at that. Critics are going to be less than enthused by computer-fueled advance. Anyone who thinks that the development of technology will always spell progress is an optimist indeed. Is it really the case that in the next twenty thousand years no mad fools will find a way to destroy us all? All one can say is that, even for mechanists, progress can be an elusive and much-desired vision. And this apart from the fact that there were (and still are) those who regretted the demise of the organic root metaphor. Somehow there was a feeling that something of value had been lost. Something of spiritual value, without necessarily being overtly Christian.

XII. CONCLUSION

As always, Hume had the measure of things. “In subjects adapted to the narrow compass of human reason, there is commonly but one determination, which carries probability or conviction with it; and to a man of sound judgement, all other suppositions, but that one, appear entirely absurd and chimerical” (Hume 1779. 81). The problem is that men of “sound judgement” so often come to different conclusions. Whewell thought he was right. Darwin thought he was right. The Romantics, Schelling to Nagel, think that they are right. I am not sure that it is my job here to make a decision. I think we can fairly say that Darwin had the measure of the traditional organicists, from Plato through to Whewell. He explained design as a matter of blind laws, eternally in motion. At the same time, he explained the problems for traditional design, such as the homologies between organisms. We have just seen, however, that organicism

may have been flooded. A vigorous group argue that it is not out. One should add that Darwinians argue with no less vigor that organicism is still not adequate. Responding to Dupré's musings, Chicago evolutionary biologist Jerry Coyne replies: "We do not need a new philosophical framework for evolution, much as Dupré wants one. Traditional reductionist views are still valid and yielding valid insights (what is microRNA other than a 'bottom-up' phenomenon that regulates genes?)." He adds: "As an evolutionary biologist – which Dupré is not – I think I'd know if my field was in crisis. Yet I haven't heard any recent lamentations from my colleagues" (Coyne 2012).

One might feel that Coyne is just stating his position rather than arguing for it. I suspect he would return the challenge to the critics. Highly regarded today is the work of Peter and Rosemary Grant on the evolution of the finches on the Galapagos Archipelago (Grant and Grant 2014). Their work is so highly regarded that a Pulitzer Prize winning book was published about their work (Weiner 1994). Tell us, he would say, what is inadequate about this science. And with this rhetorical question, I will leave matters there. What comes next is an exercise for the reader!

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