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The Compatibility of Evolution and Classical Metaphysics

Recently, Fr. Michal Chaberek, O.P., defended the thesis that macroevolution, even theistic macroevolution, is incompatible with classical metaphysics,[1] *i.e.*, "the Aristotelian-Thomistic stream of Western philosophy." Were this so, the cause of naturalism would be strengthened, for the evolution of species is almost universally accepted as sound science.

A decade ago I published a paper[2] showing that evolutionary biology exemplifies providential teleology, not order emerging by mindless chance. So, naturally, I found Fr. Chaberek's thesis a challenge to my own thinking. His thesis similarly challenges other Thomists who have found Darwin's theory compatible with, and even dependent upon, Aquinas' teaching. For example, Armand Maurer sees Darwin as making intentional use of the Thomistic concept of secondary causality, which he received via Francisco Suárez.[3]

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[1] Michal Chaberek, "Classical Metaphysics and Theistic Evolution: Why Are They Incompatible?," *Studia Gilsoniana* 8, no. 1 (January–March 2019): 47.

[2] Dennis F. Polis, "Evolution: Mind or Randomness?," *Journal of Interdisciplinary Studies* XXII, no. 1/2 (2010): 32.

[3] Armand Maurer, "Darwin, Thomists, and Secondary Causality," *The Review of Metaphysics* 57, no. 3 (March 2004): 491.

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Fr. Chaberek argues that only macroevolution is opposed to classical metaphysics. Modern authors generally define "macroevolution" to be the evolution of species, as opposed to microevolution as the evolution of intraspecfic variations. Fr. Chaberek, however, uses "macroevolution" in an older sense as the evolution of genera and higher taxonomic groups. "[I]n the debate about origins we understand species as genera or families according to classical taxonomy."[4] It is unclear why he restricts his criticism to the evolution of higher taxonomic groups when his arguments seem to apply equally to all groups signified by *primae intentiones*—species as well as genera.

Beyond our substantive differences, we have methodological differences. I maintain, following Aquinas,[5] that scientific theses ought to be judged by the canons of the relevant science. If those canons are inadequate, philosophical analysis should be directed to them. Fr. Chaberek uses metaphysics to attack a scientific thesis directly, asking "Is evolution (biological macroevolution) possible in light of classical metaphysics?"[6]

To further complicate the issue, we disagree on the structure of evolutionary theory. While we are both discussing Darwinian evolution, Fr. Chaberek claims "Biological macroevolution is a theory of origins that has a scientific, a philosophical and a theological layer."[7] I see evolution as a biological theory logically prior to its philosophical

[4] *Ibid.*, 52. This makes zebras (*Equus quagga*), horses (*E. caballus*) and donkeys (*E. asinus*) into one species.

[5] "Any particular science . . . will fall into error unless it proceeds from its own proper principles." Thomas Aquinas, *Expositio super librum Boethii De Trinitate*, q. VI, a. 1, c, in *idem*, *The Division and Methods of the Sciences: Questions V and VI of His Commentary on the De Trinitate of Boethius*, trans. Armand Maurer (Toronto: Pontifical Institute of Mediaeval Studies, 1986).

[6] Chaberek, "Classical Metaphysics and Theistic Evolution," 54.

[7] *Ibid.*, 50.

or theological interpretations. Since the natural science and its interpretations have different canons, we must carefully distinguish them.

This article does not deal with every point of disagreement between our views. Instead, it addresses three principal issues: (1) the structure of evolutionary thought, including chance and necessity as principles; (2) the relation of natural science to classical metaphysics; and (3) Fr. Chaberek's philosophical arguments.

Nothing in this article should be taken to support the view that the human intellect evolved in a purely physical manner, for I hold that the intentional order is irreducible to the material order.

The Structure of Evolutionary Thought

To properly evaluate Fr. Chaberek's thesis, we need to understand evolution as the majority of biologists do—which is not as he describes. It is unfair to criticize those responding to a theory based on an alternate theory.[8]

The idea that species evolved over time—that those presently populating the earth differ from those of former eras—was scientifically accepted long before Darwin. Robert Hooke's microscopic examination of fossils revealed that many had the same cellular structure he observed in living organisms. Consequently, he rejected the hypothesis that fossils were *lapides sui generis* (purely inorganic in origin) and questioned the permanence of species. In lectures delivered to Royal Society of London (1667–1700), posthumously published as *Discourse of Earthquakes*, he asserts:

[8] Chaberek writes, "In science, there is an idea of biological species. This, however, is not the understanding of species relevant in the debate over origins" (*ibid.*, 52). Darwin's theory of evolution, which Chaberek claims to oppose, deals with biological species. If Chaberek's species are not biological, he is not discussing Darwin's theory.

> There have been many other Species of Creatures in former Ages, of which we can find none at present; and that 'tis not unlikely also but that there may be divers new kinds now, which have not been from the beginning.[9]

In response to a growing consensus about the impermanence of species, Jean-Baptiste Lamarck advanced a theory of evolution in his *Philosophie Zoologique* (1809). He hypothesized that environmental changes triggered species succession, and that acquired traits can be passed on to progeny, but failed to explain how this might occur. Astronomer and polymath John Hershel wrote in 1836 that the "mystery of mysteries" was "the replacement of extinct species by others," and suggested that it might be due to secondary causality.[10] In 1838, geologist Charles Lyell wrote to Darwin in a similar vein.[11]

Charles Darwin and Alfred Russel Wallace jointly provided an explanation of species succession by means of secondary causality to the Linnean Society of London on July 1, 1858. Darwin published an extended treatment of the theory in *The Origin of Species* on November 24, 1859.[12] In its introduction Darwin lays down the four principles on which his theory is founded: (1) superfecundity or the generation of more offspring than can survive; (2) the existence of randomly variant descendants; (3) a selection mechanism favoring variations enhancing reproduction and survival; and (4) inheritability—the capacity to pass on variations.[13] The rest of the book is "one long argument" justifying these principles and using them to explain a vast array of biological

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[9] Quoted by Ben Waggoner, "Robert Hooke (1635–1703)." Available online—see the section *References* for details.

[10] Quoted by Ronald W. Clark, *The Survival of Charles Darwin: A Biography of a Man and an Idea* (London: Widenfeld and Nicolson, 1984), 41.

[11] *Ibid.*, 57.

[12] Charles Darwin, *The Origin of Species by Means of Natural Selection, or Preservation of Favoured Races in the Struggle for Life* (London: John Murray, 1859), 11f.

[13] These remain "the syllogistic core" of natural selection. Stephen J. Gould, *The Structure of Evolutionary Theory* (Cambridge, Mass.: Harvard University Press, 2002), 125f.

data. The theory embodies the Aristotelian-Thomistic idea of science as an explanation by causes.

Darwin makes no distinction between variations not crossing taxonomic boundaries and those that do. Instead, the entire thrust of his argument is that new species emerge as the cumulative result of small variations. Indeed, he conceives of species as merely "well-marked and permanent varieties."[14] Fr. Chaberek assumes, without biological argument, that micro- and macroevolution differ essentially. Distinguishing micro- and macroevolution without adequate biological discussion lays the foundation for a *petitio principii* by supposing a difference where it is critical to Darwin's case that there is none.

Fr. Chaberek claims that universal common ancestry (UCA), to which he strongly objects, is one of Darwin's "postulates."[15] We have seen that it is not. It first occurs in the final chapter of *The Origin of Species* where Darwin speculates:

> I cannot doubt that the theory of descent with modification embraces all the members of the same class. I believe that animals have descended from at most only four or five progenitors, and plants from an equal or lesser number.
>
> Analogy would lead me one step further, namely, to the belief that all animals and plants have descended from some one prototype. But analogy may be a deceitful guide. Nevertheless all living things have much in common, in their chemical composition, their germinal vesicles, their cellular structure, and their laws of growth and reproduction. . . . Therefore I should infer from analogy that probably all the organic beings which have ever lived on this earth have descended from some one primordial form, into which life was first breathed.[16]

So, instead of being a postulate, UCA is a hypothesis inferred from "a deceitful guide." While Douglas L. Theobald calls it "a central

[14] Darwin, *The Origin of Species*, 450.

[15] Chaberek, "Classical Metaphysics and Theistic Evolution," 79.

[16] Darwin, *The Origin of Species*, 420.

pillar of modern evolutionary theory,"[17] the hypothesis is questioned by many biologists,[18] and its supporting evidence is seen as relatively scant.[19] None of this precludes asking whether UCA is compatible with Aristotelian-Thomistic metaphysics. Still, the answer must depend on the more fundamental question of whether species (or genera) can evolve from one another, which is Fr. Chaberek's central question.

He further asserts,

> [T]he problems of Darwinism have their source not so much in stretching the Darwinian theory beyond biology (to ethics and philosophy), but in the very fact that the Darwinian biological theory assumes a mistaken metaphysics (philosophy) and a false theory of nature.[20]

He explains, "I am not talking about science as such, but about one theory in science which was contrived from the beginning to exclude teleology and design from nature."[21]

The supposed exclusion is only partially true of Darwin, and wholly false of Wallace. In *The Origin of Species*, Darwin writes of "the laws impressed on matter by the Creator," which he explicitly sees as secondary causes.[22] In 1860 he wrote to Asa Gray: "I am inclined to look at everything as resulting from *designed laws* [emphasis mine], with the details, whether good or bad, left to the working out of what we may call chance."[23] The rest of the letter shows that Darwin's diffi-

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[17] Douglas L. Theobald, "A Formal Test of the Theory of Universal Common Ancestry," *Nature* 465 (May 13, 2010): 219.

[18] For a discussion, see Theobald, "A Formal Test of the Theory of Universal Common Ancestry," for citations.

[19] Elliot Sober, *Evidence and Evolution: The Logic Behind The Science* (Cambridge University Press, 2008), 264. The biology of UCA is complex. Sober spends all of chapter 4 discussing its meaning and relevant evidence.

[20] Chaberek, "Classical Metaphysics and Theistic Evolution," 49.

[21] Michal Chaberek, private communication, May 8, 2020.

[22] Darwin, *The Origin of Species*, 359.

[23] *The Correspondence of Charles Darwin*, vol. 8, ed. Charles Burkhardt *et al*. (Cambridge, UK: Cambridge University Press, 1993), 224.

culty with providence was the suffering he perceived in nature, *i.e.*, the problem of evil. Indeed, Darwin may have abandoned Christianity because of the death of his daughter Annie in 1851 at age 10.[24]

Wallace is even less guilty of excluding design. For him, evolution is intrinsically teleological:

> [A]ll life development—all organic life forces—are due to mind-action, we must postulate not forces, but guidance; not only self-acting agencies as are involved in natural selection and adaptation through survival of the fittest, but that far higher mentality which foresees all possible results of our cosmos. That constitution, in all its complexity of structure and of duly coordinated forces acting continuously through eons of time, has culminated in the foreseen result.[25]

Thus, Fr. Chaberek mischaracterizes the assumptions and motivation of evolution. Yet, he is correct in one regard. As can be seen in his letter to Asa Gray, Darwin believed, if Wallace did not, that the consequences of the "designed laws" of nature were "left to the working out of what we may call chance." Let us turn, then, to chance or randomness in evolution.

Randomness

Fr. Chaberek writes:

> [T]heistic evolution encounters a difficulty—an incompatibility between, on the one hand, the Christian belief in creation according to the divine will and plan, and, on the other, the biological claims about the complete randomness of evolutionary processes.[26]

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[24] John Van Wyhe and Mark J. Pallen, "The 'Annie Hypothesis': Did the Death of His Daughter Cause Darwin to 'Give Up Christianity'?," *Centaurus* 54, no. 2 (2012): 105–123.

[25] Alfred Russel Wallace, *World of Life: A Manifestation of Creative Power, Directive Mind, and Ultimate Purpose* (New York: Moffat, Yard, and Co., 1911), 212.

[26] Chaberek, "Classical Metaphysics and Theistic Evolution," 69.

The province of biology includes neither the mathematical nature of randomness nor the physics of basic processes. Biology can only use randomness as a concept received from mathematics or physics.

"Randomness" is an analogous term with four relevant meanings: (1) indeterminate *in se* (ontologically random), (2) mindless or unintended, (3) unknowable or unpredictable, and (4) not directed to an end. Of these, the first two are clearly incompatible with classical theism, the third is not, and the fourth requires further reflection. We must ask, then, in what sense evolution's variant genotypes are "randomly" produced.

Nineteenth century science was strongly committed to physical determinism, paradigmatically formulated by Pierre Simon Laplace in 1820:

> An intelligence knowing, at a given instant of time, all forces acting in nature, as well as the momentary positions of all things of which the universe consists, would be able to comprehend the motions of the largest bodies of the world and those of the smallest atoms in one single formula, provided it were sufficiently powerful to subject all data to analysis; to it nothing would be uncertain, both future and past would be present before its eyes.[27]

Thus, Darwin worked in a milieu of unquestioned physical determinism. We have already seen that he believed that nature was causal and deterministic, subject to "designed laws." Hence, the "randomness" of Darwinian evolution is not ontological.

Some might object that, with the advent of quantum theory, physical determinism has been abandoned, so that contemporary science is committed to ontological randomness. Without going into the competing interpretations, quantum randomness, whatever its exact nature, is irrelevant to evolutionary mutations. This is because quantum theory distinguishes two kinds of processes: (1) observations and (2)

[27] Quoted by Robert Bruce Lindsay and Henry Margenau, *Foundations of Physics* (New York: Wiley, 1936), 517.

unobserved time development. It restricts chance to observations. Thus, *physical states, even quantum ones, evolve deterministically between observations*.[28] Quantum mechanics' equations of motion transform any state into a single, well-defined state at any subsequent time. Since there were no observations prior to the advent of man, physics continues to see virtually the entire history of evolution as deterministic—preprogrammed, as it were, in the big bang. We shall see that this view is entirely consistent with Aquinas' exegesis of *Genesis* 1.

With respect to the second meaning, Darwin believed, and Wallace did not, that the consequences of the laws of nature were unintended. Since Darwin and Wallace co-founded evolution, we must conclude that the theory is indifferent with respect to intentionality—leaving "randomness" in sense 2 an open question, not an essential postulate. This is altogether proper, as it is beyond the competence of natural science to resolve metaphysical issues.

The third sense is that in which the roll of a die is "random"—it is determined by the relevant physics, but "random" because we can't predict the outcome. Clearly, biological variations are unpredictable. Aside from the impracticability of gathering the required data, quantum indeterminism precludes acquiring such data, even in theory. This is hardly discordant with classical metaphysics, for our limited intellect and knowledge is commonplace of Thomism. On reflection, the predictability of evolutionary variations is irrelevant both to the dynamics of evolution and to its interpretation. Our knowledge cannot change the ontology of biological variation. The theory only requires variation, however produced—and variations in offspring are an indubitable fact.

The real threat, if there is one, is in the fourth meaning of "random," *i.e.*, that the causes of evolution are not directed to the development of new species as an end. In his autobiography Darwin wrote,

[28] Paul A. M. Dirac, *Quantum Mechanics* (Oxford: Clarendon Press, 1958), 108.

"There seems to be no more design in the variability of organic beings and in the action of natural selection, than in the course which the wind blows."[29] Charles F. Baer observes that evolutionary mutations "do not occur based on the potential future effect on fitness."[30] Evolution assumes that mutations are "random" in the sense that many are "wasted" —not being progenitors of the resulting species. Doesn't this kind of randomness conflict the basic premise of the fifth way: "whatever lacks intelligence cannot move towards an end, unless it be directed by some being endowed with knowledge and intelligence"[31]?

Consider the evolution of a succulent in response to increasing aridity. Say its adaptive feature is thicker leaves able to store more water given the same surface area. Some variant descendants will have the same or thinner leaves. They will dry out first and be prone to die in arid climes. Variants with thicker leaves will take longer to desiccate, and be more likely to survive. Because the thinner-leafed variants are not in the ancestral line of the thicker-leafed species, it seems that the process is not teleological, but random—that variants failing to survive serve no purpose.

An immediate response is to point to the basic insight on which Darwin bases his theory: the analogy between intentional breeding and natural selection. As the offspring selected by a breeder reflect her goals, so those selected by nature reflect its Author's ends. While arguments by analogy lack the cogency of strict deductions, they can motivate us to look deeper. Natural selection is just an operational mode of natural laws. If those laws are intentional, surely their operation, which is their actuality, is as well.

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[29] *The Autobiography of Charles Darwin*, ed. Nora Barlow (New York: Norton, 1958), 57.

[30] Charles F. Baer, "Mutation," in *The Princeton Guide to Evolution*, ed. Jonathan B. Losos *et al*. (Princeton: Princeton University Press, 2014), 317.

[31] Thomas Aquinas, *Summa Theologiae* I, q. 2, a. 3, c. Hereafter cited as *S.Th.*

The problem with arguing that random variations are not directed to an end is that it it fixes on an abstract subprocess to the neglect of the whole—instantiating Alfred North Whitehead's "fallacy of misplaced concreteness" (confusing an abstraction with concrete reality).[32] The generation of non-ancestral variations is directed to end of a new species in the same way as Michelangelo's production of marble chips was directed to the sculpting of David. If we fix our attention on the production of chips in abstraction from sculpting, it seems a pointless waste of marble.

Evolution uses a problem solving strategy widely mimicked in artificial intelligence, where it is called "generate and test."[33] In it, one subprocess generates possible solutions while another tests them for viability. In human thought this is the hypothetico-deductive or scientific method. In evolution, genetic diversity and mutagenesis generate variant individuals, while the environment tests them for viability. Both subprocesses are guided by the laws of nature, which, as I will show, are intrinsically intentional. Rather than being mindless, evolution's generate and test process, as well as the laws guiding it, show mind in action. By taking such a holistic view, Wallace saw that evolution is the result of "that far higher mentality which foresees all possible results of our cosmos."

The presence of intentionality is shown by the existence of predefined targets in evolution. My earlier paper[34] argues in three ways that evolution has such targets. First, convergent evolution (homoplasy) shows that certain morphologies are implicit in the laws of nature. Second, the existence and refractory nature of toolkit genes shows that

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[32] Alfred North Whitehead, *Science and the Modern World* (New York: Macmillan Co., 1925), 11.

[33] Avron Barr and Edward A. Feigenbaum, *Handbook of Artificial Intelligence*, vol. 1 (Los Altos, Calif.: William Kaufman, Inc., 1981), 30.

[34] Polis, "Evolution: Mind or Randomness?"

means required by new species are prepared in advance of need. Finally, the evolutionary stasis underpinning the theory of punctuated equilibrium shows that evolution does not progress aimlessly, but toward a *telos* responsive to extant environmental conditions. Indeed, if evolution lacked predetermined targets, "survival of the fittest" would be tautological, reducing to the thesis that whatever survives is fit because it survived.

Together with routine biological observations, these arguments show that evolution confirms Aristotle's falsifiable claims for a teleological process. (a) Means-ends relationships exist in nature[35]—confirmed whenever behavior is a means to an end such as communication, propagation, or nutrition; (b) there are target forms[36]—verified by convergent evolution, the stability of toolkit genes, and evolutionary stasis in stable environments; and (c) means are prepared in advance of need[37]—confirmed by the history of toolkit genes.

In sum, no relevant definition of evolutionary "randomness" poses a metaphysical threat either to teleology or to theism. Of course, there is a long tradition of naturalist argument using evolutionary "randomness" to attack providential intentionality. The proper response to such attacks is to show that they are fallacious, not to deny the science on which they are based.

"*Necessity*" *or the Laws of Nature*

In addition to chance, Fr. Chaberek sees another principle in evolution, *i.e.*, necessity, which he identifies with the laws of nature.[38] He does not recognize the hand of God in these laws, for he believes that theistic supporters of evolution must add divine guidance to evolution's

[35] Aristotle, *Physics* II, 8, 199^{a}8ff.
[36] *Ibid.* II, 8, 199^{b}15–18.
[37] *Ibid.* II, 8, 199^{a}10ff.
[38] Chaberek, "Classical Metaphysics and Theistic Evolution," 47.

chance and necessity.[39] Indeed, supporters of "Intelligent Design" do so —typically by positing evolutionary gaps where "irreducible complexity" must be bridged by divine intervention.[40]

The idea of fixed laws of nature first occurs in the Western tradition in *Jeremiah*, a generation before Thales of Miletus brought it to the Greek world.

> Thus says the Lord, who gives the sun for light by day and the fixed order of the moon and the stars for light by night, who stirs up the sea so that its waves roar—the Lord of hosts is his name: "If this fixed order departs from before me, says the Lord, then shall the descendants of Israel cease from being a nation before me for ever."[41]

And, again:

> Thus says the Lord: If I have not established my covenant with day and night and the ordinances of heaven and earth, then I will reject the descendants of Jacob and David my servant . . .[42]

Considering the cosmic order in relation to God, we conclude with Aquinas that "it is necessary that the type of the order of things towards their end should preexist in the divine mind: and the type of things ordered towards an end is, properly speaking, providence."[43] Thus, the order or "necessity" underpinning evolution is not some godless fate, but "ordinances of heaven and earth" ordained by God—the expression of divine providence.

Reflecting on *Jeremiah*, we see that fixed laws are not presented as a novel revelation, but as so uncontroversial as to aid in grasping God's faithfulness to Israel. This elevates the laws of nature from an empirical finding to a sign of covenant. For Jeremiah, doubting their

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[39] *Ibid.*, 48.

[40] For example, Michael J. Behe, *Darwin's Black Box: The Biochemical Challenge to Evolution* (New York: Simon and Schuster, 2001).

[41] *Jeremiah* 31:35–36 (*RSV Catholic Edition*).

[42] *Ibid.*, 33:25–26.

[43] *S.Th.* I, q. 22, a. 1, c.

fixity questions God's faithfulness. Yet, "Intelligent Design" advocates see God as creating gaps that He must bridge by diddling with His own laws—as if God were incapable of devising uniform laws to effect His will.

These thinkers only see the hand of God in supernatural intervention. Ibn Sina (Avicenna) and Aquinas, however, saw God as the ultimate Necessity and the source of necessity in a contingent world. Even Darwin recognized that the laws of nature were "designed" or intentional. Thomists see nature "acting always, or nearly always, in the same way,"[44] as compelling evidence of divine providence. Indeed, the more frequent interventions were, the less cogent the fifth way would be.

Finally, "Intelligent Design" attacks the integrity of creation, whose secondary causality is the reality through which we come to understand divine causality. It makes nature a heterogeneous affair in which the primary causality of God, which is only analogous to secondary causality, is mixed willy-nilly with it. This reduces primary and secondary causality—the action of Infinite Being and finite being—to the same level.

My earlier paper demonstrates that the laws of nature are immaterial and intentional. First, the ontology of physics includes not only the material menagerie of elementary quanta, but also immaterial laws guiding that menagerie's behavior. To ask what the laws are made of is a blatant category error. Second, just as the conservation of physical quantities requires the on-going operation conservation laws, so the continuing operation of the laws of nature requires the on-going operation of a sustaining reality—God. Third, the laws of nature belong to the genus of "Logical Propagators," for only they and committed human intentions allow us to draw sound conclusions about future states

[44] *S.Th.* I, q. 2, a. 3, c.

from a knowledge of present states—propagating information in time. Consequently, the laws of nature are generically similar to human acts of will. Finally, the laws exhibit the essential characteristic of intentionality identified by Franz Brentano in his *Psychologie vom empirischen Standpunkte* (1874), *viz.* "aboutness." Just as my intention to go to the store is *about* me arriving at the store, so the laws of nature are *about* the succession of states into which physical states develop under their guidance.

Thus, the necessity in evolution, the laws of nature, needs no additional divine guidance, for it *is* God's providential will.

Methodological Considerations

While natural science can not prove philosophical or theological theses, it is the charism of scientists to study the book of nature, in which God reveals Himself. As Giuseppe Tanzella-Nitti, notes:

> The proposal of a philosophical path to recognize a provident Creator starting from the observation of his works, and the view that through these works he speaks to us, are ideas which belong to the entire history of human culture, from the very beginning up until today.[45]

Romans 1:20 tells us, "Ever since the creation of the world His invisible nature, namely, His eternal power and deity, has been clearly perceived in the things that have been made."

The metaphor of nature as a revelatory book along side Scripture begins with Anthony the Abbot in the third century. Subsequently, the doctrine of two books occurs widely in both the patristics (St. Basil, St. Gregory of Nyssa, St. Augustine, John Cassian, St. John Chrysostom, St. Ephrem the Syrian, and Maximus the Confessor)[46] and the Scholas-

[45] Giuseppe Tanzella-Nitti, "The Two Books Prior to the Scientific Revolution," *Perspectives on Science and Christian Faith* 57, no. 3 (September 2005): 237.
[46] *Ibid*., 237.

tics (St. Bernard of Clairvaux, Hugh of St. Victor, St. Bonaventure, St. Thomas Aquinas, Thomas of Chobham, Dante Alighieri, Thomas of Kempis and Raymond of Sebond).[47] Further, as James Hannam details in *The Genesis of Science: How the Christian Middle Ages Launched the Scientific Revolution*,[48] the notion of the two books motivated ecclesiastical support for natural science, leading to the Scientific Revolution.

The two books might seem far removed from the present question had not Darwin quoted Francis Bacon opposite the title page of *The Origin of Species*:

> "To conclude, therefore, let no man out of a weak conceit of sobriety, or an ill-applied moderation, think or maintain, that a man can search too far or be too well studied in the book of God's word, or in the book of God's works; divinity or philosophy; but rather let men endeavour an endless progress or proficience in both." Bacon: *Advancement of Learning*.

Of course, reading the book of nature is not the same as interpreting it. Scientific findings can only provide grist for philosophic and theological reflection. As Thomists, we take God's existence as a proven fact, and rightly hold that no sound interpretation of sound science can conflict with theism. This brings us to the heart of the methodological issue, whether sound natural science can be overturned by philosophy or theology.

Aquinas teaches that each science must follow its own canons.[49] If those canons are defective, philosophy may show why they are inadequate, but is not the role of, nor is it within the power of, philosophy to directly criticize scientific findings conforming to the relevant canons. Why is this?

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[47] *Ibid.*, 239.

[48] Washington, DC: Regnery Publishing, Inc., 2011.

[49] Aquinas, *Expositio*, q. VI, a. 1, c.

In his *Expositio super librum Boethii De Trinitate*, Aquinas considers the division of the speculative sciences. Boethus,[50] following Aristotle,[51] had divided these sciences into "physics,"[52] mathematics and theology/metaphysics based on the kind of being considered. Aquinas' innovation was to focus on the intellectual acts required by these sciences,[53] each of which moves further from what is more intelligible to us (matter and motion) to what is more intelligible in itself.[54] "Physics" requires us to consider being *qua* mutable, and hence material, while metaphysics demands that we focus on being *qua* being, separate from matter. While natural science is not the philosophy of nature, Aristotle included both in his definition of "physics." They share a common material object, mobile being, whose study requires the same degree of abstraction. Their difference is formal, lying in the kind explanation sought and a corresponding difference in method.

Since abstraction fixes on certain notes of intelligibility to the exclusion of others, it prescinds from data outside of a science's sphere of study. Natural science does not treat essence and existence *per se*. Similarly, metaphysics does not study the dynamics of natural processes, because it abstracts from matter and motion. The objects of "physics" "depend on matter both for their being, and for their being understood," while those of metaphysics/theology "do not depend on matter for their being."[55] In *In Metaphysica*, Aquinas states that "it belongs to the same science to investigate the proper causes of any genus and the

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[50] Boethius, *De Trinitate*, 2.

[51] Aristotle, *Metaphysics* VI, 1, $1026^{a}18$; XI, 7, $1064^{b}1$–6.

[52] The scare quotes distinguish Aristotle and Aquinas' "physics" (the general study of nature) from modern mathematical physics.

[53] Marvin E. Kanne, "Saint Thomas Aquinas' Division of the Sciences," *Transactions of the Nebraska Academy of Sciences* VII (1979): 145f.

[54] For a detailed discussion, see Jacques Maritain, *Distinguish to Unite or the Degrees of Knowledge* (Notre Dame, Ind.: University of Notre Dame Press, 1995), 37ff.

[55] Aquinas, *Expositio*, q. V, a. 1, c.

genus itself, as for example natural philosophy investigates the principles of natural bodies,"[56] while metaphysics is concerned solely with being in general (*ens commune*). Investigating the proper causes of species and genera is precisely what the theory of evolution attempts to do.

Thus, metaphysics lacks any evidentiary basis for judging evolution, which addresses a certain kind of change. As Aquinas notes, "the sciences of sensible reality are not based upon the knowledge of certain substances separated from the sense world."[57] Instead, evolution must be judged based on its adequacy in explaining the data it addresses, *viz*. the fossil record and its relation to present biological populations.

Fr. Chaberek asserts that evolution and metaphysics share common ground involving randomness and species. I have already discussed randomness, so let us consider species.

What Is a Species?

Most of Fr. Chaberek's argument hinges upon the nature of species, beginning with Darwin's problematic use of "species."

The first specifically biological definition of "species" may have been that of John Ray in 1686.

> In order that an inventory of plants may be begun and a classification (*divisio*) of them correctly established, we must try to discover criteria of some sort for distinguishing what are called "species". After long and considerable investigation, no surer criterion for determining species has occurred to me than the distinguishing features that perpetuate themselves in propagation from seed. Thus, no matter what variations occur in the individuals or the species, if they spring from the seed of one and the same plant, they are accidental variations and not such as to distinguish a species . . . Animals likewise that differ specifically preserve

[56] *In Metaphysica* Promoemium, in Armand Maurer, *Thomas Aquinas: The Division and Method of the Sciences* (Toronto: Pontifical Institute of Medieval Studies, 1986), 98.

[57] Aquinas, *Expositio*, q. V, a. 2., c.

> their distinct species permanently; one species never springs from the seed of another nor vice versa.[58]

Ray's assumption of essential invariance—that "like begets like"—conforms with Aristotelian and Scholastic thought on biological generation,[59] while being incompatible with the evolution of species. Still, we need to remember that this is an empirical generalization, not a metaphysical principle.

The incompatibility of evolution with the species concept is one of Fr. Chaberek's cardinal points:

> Darwin got caught in a paradox—to introduce evolution he had to deny the stability or the real existence of species, but to claim that he found the explanation to the origin of species he had to reintroduce the notion of species after destroying it at the first step.[60]

This is a fair criticism. While Fr. Chaberek provides no citations,[61] modern biologists and philosophers have struggled with the "species problem" for years—unable to agree on a univocal definition. The problem has continued so long that its very persistence is grist for the philosophic mill.[62] John S. Wilkins enumerates twenty-six definitions of biological species, which he has classed into

> seven "basic" species concepts: *agamospecies* (asexuals), *biospecies* (reproductively isolated sexual species), *ecospecies* (eco-

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[58] *Historia Plantarum Generalis* (1686), Tome I, Libr. I: 40. Quoted by Ernst Mayr, *The Growth of Biological Thought: Diversity, Evolution, and Inheritance* (Cambridge, Mass.: Belknap Press of Harvard University, 1982), 256.

[59] *E.g.*, Aristotle, *Metaphysics* Z, 8, l 033^{b}30ff, where it is presented as an empirical fact, rather than a philosophical conclusion. An exception to the rule is St. Thomas' understanding of spontaneous generation, to which I shall return.

[60] Chaberek, "Classical Metaphysics and Theistic Evolution," 51.

[61] The source of his definition of a biological species (Ernst Mayr, *Systematics and the Origin of Species from the Viewpoint of a Zoologist* [New York: Columbia University Press, 1942]) is out of date—antedating the discovery of DNA and the consequent development of the new evolutionary synthesis.

[62] Yuichi Amitani, "The Persistence Question of the Species Problem" (PhD diss., The University of British Columbia, 2010).

> logical niche occupiers), *evolutionary species* (evolving lineages), *genetic species* (common gene pool), morphospecies (species defined by their form, or phenotypes), and *taxonomic species* (whatever a taxonomist calls a species).[63]

His "basic" species concepts hint at the complexity of the problem. Morphology may not distinguish populations that cannot fruitfully interbreed. The fruitful interbreeding criterion is inapplicable to organisms reproducing asexually—and so on.

Despite these difficulties, the term "species" is a *sine qua non* of biological work—required to communicate what has been studied. As Ray noted, to do biological work "we must try to discover criteria of some sort for distinguishing what are called 'species'." Thus, biologists use "species" to practice their profession, generally deferring to the authority of taxonomists.[64] Darwin's project, then, was not to defend a definition, but to show how what biologists call "species" originated.

The frequent lack of sharp species demarcations is of special interest. In addition to the slow temporal changes addressed by evolution, some populations have spatial variations precluding sharp species boundaries. Anthony Preus explains,

> [S]ome parts of the living world present synchronic polytypical continuities, called "clincs," in which variations are subspecific from each local population to the next, but types removed at some distance are judged, by any standard, to be of different species.[65]

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[63] John S. Wilkins, "Philosophically Speaking, How Many Species Concepts are There?," *Zootaxa* 2765, no. 1 (2011): 58.

[64] I asked Fr. Chaberek for a definition, or at least an example, of "natural species." He responded "Each natural species (currently about 20 k extant) is the example." I found this unhelpful as recent estimates give 8.7±1.3 million species. See Camilo Mora *et al.*, "How Many Species Are There on Earth and in the Ocean?," *PLoS Biology* 9, no. 8 (August 2011): e1001127.

[65] Anthony Preus, "*Eidos* as a Norm in Aristotle's Biology," in *Essays in Ancient Greek Philosophy*, vol. II, ed. John P. Anton and Anthony Preus (Albany: State University of New York Press, 1983), 341.

For example, gray squirrels in the eastern United States can fruitfully interbred with adjacent populations, and so on across the country, but east coast squirrels cannot successfully interbred with west coast squirrels.[66] The lack of sharp demarcations is not a new insight, but was noted by Aristotle:

> Nature passes in a continuous gradation from lifeless things to animals, and on the way there are living things which are not actually animals, with the result that one class is so close to the next that the difference seems infinitesimal.[67]

For our purposes, it is sufficient to think of species as classifying populations of similar organisms in light of observable characteristics.

In *The Nicomachean Ethics*, Aristotle reflects that "Our discussion will be adequate if it has as much clearness as the subject-matter admits of, for precision is not to be sought for alike in all discussions, any more than in all the products of the crafts."[68] Since demarcations between natural kinds are often ill-defined, it is foolish to demand a precise definition of biological species.

As this imprecision results in alternate taxonomies, Fr. Chaberek asserts, "To believe in macroevolution one needs to adopt nominalism."[69] This is not so. Nominalism maintains that universals are mere names, reflecting no underlying reality. Each alternative species definition has an empirical foundation in reality. So, allowing alternate taxonomies with different species demarcations is compatible with moderate realism as long as their definitions are adequately founded.

Let us turn to a philosophical discussion of species. Classical metaphysics follows Aristotle's definitions of substance and species in the *Categories.*

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[66] Gary A. Polis, private communication.

[67] Aristotle, *On the Parts of Animals* IV, 5, 681^{a}12–15.

[68] Aristotle, *Nicomachean Ethics* I, 3.

[69] Chaberek, "Classical Metaphysics and Theistic Evolution," 52.

> A substance—that which is called a substance most strictly, primarily, and most of all—is that which is neither said of a subject nor in a subject, e.g. the individual man or the individual horse. The species in which the things primarily called substances are, are called secondary substances, as also are the genera of these species. For example, the individual man belongs in a species [*eidos*[70]], man, and animal is a genus of the species; so these—both man and animal—are called secondary substances.[71]

So substances are primarily ostensible unities (*tode ti* = this something) like Socrates or Bucephalus, and, secondarily, species and genera, not because they are ostensible unities, but because of the grammatical fact that they also serve as subjects of predication.[72]

Aquinas is equally clear that species are not primary substances:

> [I]t cannot be said that the notion of genus or species applies to human nature insofar as it exists in individuals; for in the individuals human nature does not have the sort of unity according to which it is some single thing pertaining to all, which the notion of universals requires.
>
> It remains, therefore, that the notion of species applies to human nature insofar as it exists in the intellect.[73]

A species, then, is not an *ens reale*, but an *ens rationis.*

Consequently, species cannot change in the proper sense, because they lack a material principle to serve as a principle of continuity; nonetheless, biological species can evolve. This is possible because the evolution of species does not mean that an *ens rationis* changes, but that a biological population instantiating to one species concept is succeeded by a population no longer instantiating that concept. Rather, the

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[70] The same word, but with a different meaning, is translated "form." Here *eidos* has a taxonomic sense, while as "form" it is the principle of actuality correlative to *hyle* ("matter") as the principle of potency. Species, as classifications, are abstracted from the actuality of their instances; nevertheless, species are not the actuality of instances because they are found in the mind rather than in their instances.

[71] Aristotle, *Categories* V, 2^a13–18.

[72] *Ibid.*, V, 2^b8–22.

[73] Aquinas, *De Entia and Essentia*, ch. 4.

new population is the *fundamentum in re* for a new concept—the evolved species.

This view is compatible not only with Aristotle's treatment of ideogenesis in *De Anima* III, 7, but with Aquinas' position in the *Summa Theologiae*.

> [B]esides the intellectual light which is in us, intelligible species, which are derived from things, are required in order for us to have knowledge of material things. . . . Wherefore Augustine says (*De Trin.* iv, 16): "Although the philosophers prove by convincing arguments that all things occur in time according to the eternal types, were they able to see in the eternal types, or to find out from them how many kinds of animals there are and the origin of each? Did they not seek for this information from the story of times and places?"[74]

Intelligible species are derived from sensible species,[75] which derive from sensible accidents. So, species are known via accidents. We may conclude, then, that a sufficient difference in accidents will engender a different species concept.

This might seem to the end of the matter, but Fr. Chaberek distinguishes not only biological and philosophical species, but also logical and natural species.

> Philosophically, natural species are those forms of life that possess the same substantial form. In philosophy we can also distinguish a logical understanding of species. In this sense, species is just a category projected by a mind on a group of objects.[76]

This seems to conceive of logical species nominalistically. While moderate realism sees a species concept as actualizing of the intelligibility of its instances, his logical species is "a category projected by a mind on a group of objects"—a nominalist, or perhaps Kantian, notion for-

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[74] *S.Th.* I, q. 84, a. 5, c.

[75] *S.Th.* I, q. 84, a. 6. In "sensible species" and "intelligible species," "species" means representation, not a taxonomic group.

[76] Chaberek, "Classical Metaphysics and Theistic Evolution," 52.

eign to Thomistic material logic. This leaves us with "natural species" as the Aristotelian concept we have already discussed.

There is one more point, *i.e.*, Fr. Chaberek's claim that individuals of the same species have "the same substantial form." What is the meaning of this? How can we know when one substantial form is the same as another, given ubiquitous accidental variations? Finally, how does this accord with Aquinas' position, quoted above, that "in the individuals human nature does not have the sort of unity according to which it is some single thing pertaining to all"?

Corporeal essences can be logically decomposed into matter and substantial form. Further, essences are the foundation in reality of substantial definitions.[77] As Aristotle explains in *De Anima* III, 7, there are no actual concepts in material beings. Rather, they have notes of intelligibility that must be actualized by the agent intellect to engender concepts. In other words, individuals have the same substantial form if their intelligibility can elicit the same defining concept. Thus, to be a member of a species is to have the notes of intelligibility defining that species. Each individual also has other notes of intelligibility which are *accidental with respect to that species definition*.

Nothing in this analysis prohibits alternative classification schemes apportioning individuals among species in different ways. In an alternative scheme, some notes essential in the original scheme are accidental and vice versa. For example, one might use a morphological perspective to say that all gray squirrels are one species, or the fruitful interbreeding criterion to say that west coast squirrels and east coast squirrels are different species. Again, as long as each taxonomic scheme is adequately founded in reality, this is a moderate realist, not a nominalist, position.

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[77] "The term quiddity, surely, is taken from the fact that this is what is signified by the definition. But the same thing is called essence because the being has existence through it and in it." Aquinas, *De Ente et Essentia*, ch. 1.

Species and Exemplar Ideas

Fr. Chaberek argues as though a species were an *ens reale* instead of an *ens rationis*. For example, "if species exist as natural kinds, they are permanent elements of the universe."[78] Again, "This approach stems from the very impossibility of talking about nature (and any reality for that matter) without having abstract notions that are derived from unchangeable elements of the universe."[79] With the possible exception of fixed laws of nature, there are no "unchangeable elements of the universe." Corporeal being is mobile being, and intrinsically impermanent.

Since species are *entia rationis*, they depend for their existence on human minds, and cannot be "permanent elements of the universe." As human populations grew and migrated, new flora and fauna were encountered, and new species concepts formed. Not long after the last woolly mammoth died, humans forgot their species until its fossil remains were discovered. So species concepts come to be and pass away. Any permanence they have is potential rather than actual.

A possible ground for permanence might be neoplatonic exemplar ideas, *e.g.*, Augustine's eternal types encountered earlier. This seems to be what Fr. Chaberek has in mind, for he says, "even if all chickens in the world were destroyed, there still exists the idea of a chicken in the divine intellect . . ."[80] Of course, this is not a moderate realist position, but some version of neoplatonic extreme realism.

While St. Thomas affirms divine types, his position does not support a univocal "idea of a chicken in the divine intellect." Univocal predication is critical here. Primarily, "species" refers to an *ens rationis* in the human mind. If that is not univocally what is in God's mind, we

[78] Chaberek, "Classical Metaphysics and Theistic Evolution," 51.
[79] *Ibid.*, 52.
[80] *Ibid.*, 57.

can not unqualifiedly say that there "exists the idea of a chicken in the divine intellect." Since we can only speak of God analogically,[81] His exemplar "ideas" are only analogous to human ideas.

God has "ideas" only insofar as He creates beings intentionally.

> In all things not generated by chance, the form must be the end of any generation whatsoever. But an agent does not act on account of the form, except in so far as the likeness of the form is in the agent, . . . by God acting by His intellect, as will appear later, there must exist in the divine mind a form to the likeness of which the world was made. And in this the notion of an idea consists.[82]

Again, "So far as the idea is the principle of the making of things, it may be called an 'exemplar' . . ."[83] While it may seem from this that there are distinct ideas for each species in God's mind, that is impossible, for there are no distinctions in God. Rather, "God is the similitude of all things according to His essence; therefore an idea in God is identical with His essence."[84] Of course, God's essence is His existence and absolutely simple.

Whether God were to create ensembles of identical creatures, or make each organism *sui generis*, He would fully intend each creation and so have exemplar ideas in Aquinas' sense. Thus, the Angelic Doctor's position on types or exemplar ideas provides neither support for universal ideas in God, nor an objection to the evolution of species.

Why Do We Have Species Concepts?

Before replying to Fr. Chaberek's specific objections to evolution, let us consider one final question. Why do we even have universal concepts, such as species? Aristotle and Aquinas agree that to have a

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[81] *S.Th.* I, q. 13, a. 5, c.
[82] *S.Th.* I, q. 15, a. 1, c.
[83] *S.Th.* I, q. 15, a. 3, c.
[84] *S.Th.* I, q. 15, a. 1, ad. 3.

concept, we need to reflect on a phantasm, which, as sensory image, is a neural representation. Psychological studies have shown that we can only maintain 5–9 "chunks" of information in our working memories.[85] This means that our phantasms cannot represent perceived objects, or even our sensations, exhaustively. So, in abstraction, we fix on some notes of intelligibility to the exclusion of others. In other words, we have universal concepts, such as species and genera, to scale the complexity of nature down to our limited representational capacity. God's knowledge is completely different, for He, numbering the hairs on our heads (*Luke* 12:7), has no need to reduce complexity.

All knowledge is a subject-object relation, requiring both a knowing subject and a known object. Consequently, we cannot understand concepts, such as species, independently of the subject. While objects bring intelligibility to the relation, subjects choose which notes of intelligibility to attend to—and so determine which will become actualized as concepts.

To the extent that individuals choose to fix upon different aspects of being, they will have different, equally objective, conceptual spaces. Wilkins' twenty-six proposed species definitions is an example. While alternative conceptual spaces may be equally objective, none are exhaustive, because each leaves innumerable notes of intelligibility unactualized. This suggests that we broaden our thinking by including as many perspectives as possible. Aristotle's discovery of alternate modes of explanation (his four causes) in the work of his predecessors is a familiar example.

[85] D. A. Broadbent, "The Magical Number Seven after Fifteen Years," in *Studies in Long-Term Memory*, ed. Alan Kennedy and Alan Wilkes (New York: Wiley, 1975), 3–18.

Reply to Objections

In section "A" of his paper, Fr. Chaberek offers five metaphysical objections to theistic evolution. I reply to them here.

Objection 1: "The first is that no effect can exceed the power of its cause." The substance of this argument is that "generation cannot create new design. Hence, the combined working of material causes is not sufficient to produce new species."[86]

It is tautological and so unquestionable that no effect can exceed the power of its causes. The power of causes is revealed in their effects, as we cannot know potencies directly, but only via their actualization. Thus, we must look at actual effects rather than *a priori* estimates to determine the power God has imbued causes with. Once we know an effect, we can try to determine the role of various causal factors. This is exactly what the new synthesis in evolutionary theory seeks to do. The problem with this objection, then, is not in its principle, but in its application.

Clearly, insensate parents cannot form designs, novel or otherwise. Still, it is the fallacy of misplaced concreteness to think that parents are the sole cause of their offspring. Rather, offspring are joint effect the parents and mutagenic factors in their environment, *i.e.*, the state of nature immanent in the initial state of the universe and its laws.

This is the position St. Thomas takes in discussing the work of the seven days:

> Species, also, that are new, if any such appear, existed beforehand in various active powers; so that animals, and perhaps even new species of animals, are produced by putrefaction by the power which the stars and elements received at the beginning.[87]

[86] Chaberek, "Classical Metaphysics and Theistic Evolution," 56.

[87] *S.Th.* I, q. 73, a. 1, ad 3.

Of course, the mechanism of evolution is not putrefaction, but the metaphysics is the same. New species are immanent in "the power [laws of nature] which the stars and elements received at the beginning."

The Angelic Doctor received the problem of spontaneous generation from the Arabs. As Dag Hasse explains, Ibn Sina held that spontaneous generation required the direct action of his unary Active Intellect as the "giver of forms."

> Thomas Aquinas argues that there is no need to assume the existence of an Avicennian giver of forms to explain spontaneous generation, since the celestial power suffices for producing ordinary animals from matter. More complex beings, however, such as horses and human beings, cannot be produced by the celestial power alone without the formative power of the semen (*Quaest. de potentia*, q. 3, a. 8, 9, 11). Thomas' position was called the *media via* by later authors, that is, the middle way between Avicenna and Averroes, since Thomas rejected Avicenna's theory, but also modified Averroes' position in treating spontaneous generation as a natural, and not a miraculous phenomenon.[88]

In other words, St. Thomas had no problem with abiogenesis (life being derived from inanimate matter) as the actualization of potencies created at the beginning of time. While Darwinian evolution does not address the origins of life, new species being generated from inanimate matter is a far greater change that one living species evolving into another.

There is a deeper correspondence between Aquinas' position and evolutionary biology. Both see the generation of organisms as the combined result of two similar factors: (1) genetic inheritance/seed and (2) the operation of the laws of nature (mutagenic factors/celestial power).

My position also conforms with the texts Fr. Chaberek cites in support of his objection: "Every imperfect thing is caused by one per-

[88] Dag Nikolaus Hasse, "Influence of Arabic and Islamic Philosophy on the Latin West," *The Stanford Encyclopedia of Philosophy* (Spring 2020 Edition), ed. Edward N. Zalta. Available online—see the section *References* for details.

fect"[89] and "The perfection of the effect demonstrates the perfection of the cause, for a greater power brings about a more perfect effect."[90] God is the author of each creature's form, which is immanent in "the power which the stars and elements received at the beginning," *viz.*, the laws of nature. As argued earlier, those laws are immaterial and intentional.

Objection 2: "The second reason theistic evolution is impossible stems from the division of being into substance and accidents. . . . In short, accidental change cannot produce substantial change."[91]

This argument misunderstands the nature of both change and Darwinian evolution. Substantial changes occur when an organism is generated or dies. Everything that happens to it between generation and death is an accidental change, for its substance persists. If a change that would normally be accidental terminates in death, it is, by definition, a substantial change.

While Lamark's theory envisioned acquired traits (accidental changes) being inherited by the next generation, Darwin's theory does not. Rather, all of the differences which cumulatively lead to a new species occur in the generation of offspring (a substantial change).

More fundamentally, no changes *can* happen to species or natures, which are immaterial *entia rationis* and so immutable. Secondary substances (genera and species), as concepts, do not change. Only primary substances (individual material beings) can change.[92] The differences between offspring and parents, which cumulatively lead to new

[89] *S.Th.* I, q. 44, a. 2, ad 2.

[90] Thomas Aquinas, *Summa Contra Gentiles* III, 69, 15.

[91] Chaberek, "Classical Metaphysics and Theistic Evolution," 57.

[92] "Forms are called invariable, forasmuch as they cannot be subjects of variation; but they are subject to variation because by them their subject is variable. Hence it is clear that they vary in so far as they are; for they are not called beings as though they were the subject of being, but because through them something has being." *S.Th.* I, q. 9, a. 2, ad 3.

species, are neither substantial nor accidental changes, for they are not the actualization of potency in one being.

In sum, since the evolution of species is not the change of a being, the distinction between accidental and substantial changes is irrelevant.

Objection 3: "The third reason is that according to classical metaphysics no perfect being is the cause of its own nature."[93]

Evolution does not suggest that any being causes its own nature, only that the nature of descendants may differ from that of their forebears. This difference involves the generation of each being by its forebears, not the impossibility of self-generation. Neither are the differences caused by forebears alone, but in conjunction with the laws of nature, which are the vehicle of divine providence.

Objection 4: "The fourth reason is that theistic evolution reduces the four Aristotelian causes to just two. In the evolutionary scenario new species are supposed to appear owing to the power of generation combined with random changes in matter. Hence, in theistic evolution the efficient cause is reduced down to material cause. . . . [E]very living being tends to be something else and thus it does not embody its own nature: an amphibian tends to become a reptile, a reptile tends to become a bird or a mammal. Hence formal cause is reduced *up* to final cause."[94]

There is no reduction of efficient to material causality. Material causes bring the potential for actualization to a process while efficient causes actualize that potential. Evolution does not deny, but affirms, both. The potential for change is of the very essence of material being, which is always mobile being. That potential is actualized in each variant offspring by the joint operation of its forebears and mutagenic fac-

[93] Chaberek, "Classical Metaphysics and Theistic Evolution," 57.
[94] *Ibid.*, 60.

tors operating according to the providential laws of nature—not ontological randomness.

Formal causality consists in each being operating according to its own actuality or nature. Evolution posits no unnatural activity. Instead, the activity of each being is the second actualization of its own form. The tendency to evolve new species does not occur in individuals, but in the response of populations to environmental challenges. Variant offspring are produced whether or not the environment changes, but, if it does change, the mix of variants most likely to reproduce successfully will change if possible (survival of the fittest), adapting to the new conditions. This adaptation is determined providentially, for it is by the laws of nature that populations are guided to the end of being a well-adapted species. Thus, there is no confusion of formal and final causality in evolution.

Objection 5: "The fifth reason is that according to classical metaphysics nature consists of parts that fit each other and work for the perfection of the whole. . . . Thus, an amphibian is perfect as an amphibian and changing it into a reptile does not make it more perfect, but rather diminishes the perfectness of the simultaneous existence of amphibians and reptiles."[95]

Again, this misunderstands evolution. It does not suggest that an amphibian ever becomes a reptile. Rather some descendants of amphibians may be slightly more reptilian in form and some less. Which variation, if any, will be more advantageous depends on the environment. If the present population is well adapted and the environment stable, then variations will confer no systematic advantage, and the species will be stable (the "equilibrium" in the theory of punctuated equilibrium). However, if the environment changes (the "punctuation" in punctuated equilibrium), some inheritable variations may prove advantageous. If

[95] *Ibid.*, 61f.

so, the population will tend toward a new form, signified by a new species concept.

There is no claim that parts of an organism are not ordered to the good of the whole. However, it is an empirical fact that some genetic mutations result in physically defective, and even monstrous, offspring. Further, the kind of part best ordered to the good of the whole organism is not an absolute, but is relative to the organism's environment.

Conclusion

Fr. Chaberek addresses a series of questions in his paper:

> Is evolution (biological macroevolution) possible in light of classical metaphysics? This one general question breaks down to a few more particular: Can the process of generation be the efficient cause of creating new natural species? Is transformation of species (natural species) possible due to an accumulation of accidental changes over time? Is Aquinas's positive teaching on the origin of species (natural species) compatible with theistic evolution?[96]

I have argued that macroevolution presents no philosophical difficulties for Thomists, and that many of his subsidiary questions are ill-conceived. Generation cannot cause species, which are *primae intentiones* whose efficient cause is the agent intellect. It can, in conjunction with environmental factors, cause individual progeny (*tode ti*) which differ from their progenitors. Since species are intentional beings (*entia rationis*), they are immaterial and so immutable. However, biological populations instantiating a species can have descendant populations that no longer instantiate the ancestral species concept. That, and not changes to *primae intentiones*, is what is meant by the evolution of species. St. Thomas agrees that new species can originate as the result of natural

[96] *Ibid.*, 55.

powers the cosmos was endowed with at the beginning of time, *viz*., the laws of nature.

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I wish to thank Fr. Chaberek for his correspondence on these issues—both before and after the publication of his article. I also wish to acknowledge many informative discussions on biological issues with my late brother, Gary A. Polis, Ph.D. Finally, I am grateful to my wife, Jill Hoffman, for proofreading the manuscript.

The Compatibility of Evolution and Classical Metaphysics

SUMMARY

The compatibility of evolution with Aristotelian-Thomistic metaphysics is defended in response to Fr. Michal Chaberek's thesis of incompatibility. The motivation and structure of Darwin's theory are reviewed, including the roles of secondary causality, randomness and necessity. "Randomness" is an analogous term whose evolutionary use, while challenging, is fully compatible with theism. Evolution's necessity derives from the laws of nature, which are intentional realities, the vehicle of divine providence. Methodological analysis shows that metaphysics lacks the evidentiary basis to judge biological theories. Species are *entia rationis* whose immutability does not conflict with the evolutionary succession of biological populations. While Darwin's theory was unknown to Aquinas, he endorses the possibility of new species immanent in the initial state of the universe, nor does his understanding of exemplar ideas offer ground for objection. Finally, five arguments given by Fr. Chaberek are answered.

KEYWORDS

Aristotelianism, Thomism, evolution, randomness, teleology, necessity, laws of nature, philosophy of science, species problem, intelligent design, problem of universals, abstraction, exemplar ideas, theism.

REFERENCES

Amitani, Yuichi. "The Persistence Question of the Species Problem." PhD diss., The University of British Columbia, 2010. Available online at:

https://open.library.ubc.ca/cIRcle/collections/ubctheses/24/items/1.0071552. Accessed July 30, 2020.

Aquinas, Thomas. *De Entia and Essentia* [*On Being and Essence*]. Translated by Gyula Klima. In *Medieval Philosophy: Essential Readings with Commentary*, edited by Gyula Klima, Fritz Allhoff and Anand Jayprakash, 227–249. Malden, Mass.: Blackwell Publishing, 2007.

Aquinas, Thomas. *Summa Theologiae*. 5 Volumes. Translated by Fathers of the English Dominican Province. Westminster, Md.: Christian Classics, 1981.

Aquinas, Thomas. *The Division and Methods of the Sciences: Questions V and VI of His Commentary on the De Trinitate of Boethius*. Translated by Armand Maurer. 4th Revised Edition. Toronto: Pontifical Institute of Mediaeval Studies, 1986.

Aristotle. *Categories and de Interpretatione.* Translated by J. L. Ackrill. Oxford: Oxford University Press, 1963.

Aristotle. *Metaphysics*. 2 Volumes. Translated by W. D. Ross. Oxford: Oxford University Press, 1924.

Aristotle. *On the Parts of Animals.* Translated by A. L. Peck. Cambridge, Mass.: Harvard University Press, 1961.

Aristotle. *Physics*. Translated by Richard Hope. Lincoln, Nebr.: University of Nebraska Press, 1961.

Aristotle. *The Nicomachean Ethics: Translated with an Introduction.* Translated by David Ross. Oxford: Oxford University Press, 1925.

Baer, Charles F. "Mutation." In *The Princeton Guide to Evolution*, edited by Jonathan B. Losos *et al*., 315–320. Princeton: Princeton University Press, 2014.

Barr, Avron, and Edward A. Feigenbaum. *Handbook of Artificial Intelligence*. Vol. 1. Los Altos, Calif.: William Kaufman, Inc., 1981.

Behe, Michael J. *Darwin's Black Box: The Biochemical Challenge to Evolution.* 10th Anniversary Edition. New York: Simon and Schuster, 2001.

Broadbent, D. A. "The Magical Number Seven after Fifteen Years." In *Studies in Long-Term Memory*, edited by Alan Kennedy and Alan Wilkes, 3–18. New York: Wiley, 1975.

Chaberek, Michal. "Classical Metaphysics and Theistic Evolution: Why Are They Incompatible?" *Studia Gilsoniana* 8, no. 1 (January–March 2019): 47–81. DOI: 10.26385/SG.080102.

Clark, Ronald W. *The Survival of Charles Darwin: A Biography of a Man and an Idea*. London: Widenfeld and Nicolson, 1984.

Darwin, Charles. *The Origin of Species by Means of Natural Selection, or Preservation of Favoured Races in the Struggle for Life*. London: John Murray, 1859.

Dirac, Paul A. M. *Quantum Mechanics*. 4th Edition. Oxford: Clarendon Press, 1958.

Gould, Stephen J. *The Structure of Evolutionary Theory*. Cambridge, Mass.: Harvard University Press, 2002.

Hannam, James. *The Genesis of Science: How the Christian Middle Ages Launched the Scientific Revolution*. Washington, DC: Regnery Publishing, Inc., 2011.

Hasse, Dag Nikolaus. "Influence of Arabic and Islamic Philosophy on the Latin West." *The Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta. Spring 2020 Edition. Available online at: https://plato.stanford.edu/archives/spr2020/entries/arabic-islamic-influence/. Accessed July 30, 2020.

Kanne, Marvin E. "Saint Thomas Aquinas' Division of the Sciences." *Transactions of the Nebraska Academy of Sciences* VII (1979): 145–148.

Lindsay, Robert Bruce, and Henry Margenau. *Foundations of Physics*. New York: Wiley, 1936.

Maritain, Jacques. *Distinguish to Unite or the Degrees of Knowledge*. Notre Dame, Ind.: University of Notre Dame Press, 1995.

Maurer, Armand. "Darwin, Thomists, and Secondary Causality." *The Review of Metaphysics* 57, no. 3 (March 2004): 491–514. Available online at: https://apologetyka.com/ptkr/groups/ptkrmember/spor/2004/maurer%20darwin-aquinas.pdf. Accessed July 30, 2020.

Maurer, Armand. *Thomas Aquinas: The Division and Method of the Sciences*. 4th Revised Edition. Toronto: Pontifical Institute of Medieval Studies, 1986.

Mayr, Ernst. *Systematics and the Origin of Species from the Viewpoint of a Zoologist*. New York: Columbia University Press, 1942.

Mayr, Ernst. *The Growth of Biological Thought: Diversity, Evolution, and Inheritance*. Cambridge, Mass.: Belknap Press of Harvard University, 1982.

Mora, Camilo, *et al*. "How Many Species Are There on Earth and in the Ocean?" *PLoS Biology* 9, no. 8 (August 2011): e1001127. DOI: 10.1371/journal.pbio.1001127.

Polis, Dennis F. "Evolution: Mind or Randomness?" *Journal of Interdisciplinary Studies* XXII, no. 1/2 (2010): 32–66. Available online at: https://archive.vn/sAvOI. Accessed July 30, 2020.

Preus, Anthony. "*Eidos* as a Norm in Aristotle's Biology." In *Essays in Ancient Greek Philosophy*, vol. II, edited by John P. Anton and Anthony Preus, 340–363. Albany: State University of New York Press, 1983. Also available online at: https://orb.binghamton.edu/sagp/86. Accessed July 30, 2020.

Sober, Elliot. *Evidence and Evolution: The Logic Behind The Science*. Cambridge University Press, 2008.

Tanzella-Nitti, Giuseppe. "The Two Books Prior to the Scientific Revolution." *Perspectives on Science and Christian Faith* 57, no. 3 (September 2005): 235–248. Available online at: https://www.asa3.org/ASA/PSCF/2005/PSCF9-05Tanzella-Nitti.pdf. Accessed July 30, 2020.

The Autobiography of Charles Darwin, edited by Nora Barlow. New York: Norton, 1958.

The Correspondence of Charles Darwin, vol. 8, edited by Charles Burkhardt *et al*. Cambridge, UK: Cambridge University Press, 1993.

Theobald, Douglas L. "A Formal Test of the Theory of Universal Common Ancestry." *Nature* 465 (May 13, 2010): 219–222. DOI: 10.1038/nature09014.

Van Wyhe, John, and Mark J. Pallen. "The 'Annie Hypothesis': Did the Death of His Daughter Cause Darwin to 'Give Up Christianity'?" *Centaurus* 54, no. 2 (2012): 105–123.

Waggoner, Ben. "Robert Hooke (1635–1703)." Available online at: https://ucmp.berkeley.edu/history/hooke.html. Last modified January 20, 2001. Accessed July 30, 2020.

Wallace, Alfred Russel. *World of Life: A Manifestation of Creative Power, Directive Mind, and Ultimate Purpose*. New York: Moffat, Yard, and Co., 1911.

Whitehead, Alfred North. *Science and the Modern World*. New York: Macmillan Co., 1925.

Wilkins, John S. "Philosophically Speaking, How Many Species Concepts are There?" *Zootaxa* 2765, no. 1 (2011): 58–60. DOI: 10.11646/zootaxa.2765.1.5.