Studia Gilsoniana 10, no. 4 (October–December 2021): 847–891
ISSN 2300–0066 (print)
ISSN 2577–0314 (online)
DOI: 10.26385/SG.100436

Dennis F. Polis

Metaphysics and Evolution: Response to Critics

If Thomism is to be more than a venerated relic, we must follow Aquinas in engaging contemporary issues. Thus, it was gratifying to see Fr. Michał Chaberek, O.P., consider evolution from a Thomist perspective.[1] Unfortunately, three crucial errors marred his analysis.[2] First, he has an ultra-realist view of species. Second, he misunderstands Darwin's motivation, principles and conclusions. Third, he fails to see that metaphysics is too abstract to critique evolution. Responding to these issues led to reflections on the problem of universals, the nature of species, and the division of sciences in St. Thomas's *Commentary on the De Trinitate of Boethius*.

With regard to universals, I suggested that moderate realists can define species in alternate ways by fixing upon diverse aspects of organisms' intelligibility. This was insufficiently explained. My *projective realism* sees us as approaching reality from multiple perspectives

Dennis F. Polis — Fontana, Calif., USA
e-mail: dfpolis@tutanota.com ▪ ORCID: 0000-0002-8896-7333

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

[2] Dennis F. Polis, "The Compatibility of Evolution and Classical Metaphysics," *Studia Gilsoniana* 9, no. 4 (October–December 2020): 551. Hereafter cited as: "Compatibility."

ARTICLE — Received: Nov. 15, 2021 ▪ Accepted: Dec. 17, 2021

and projecting it into various conceptual spaces.[3] No such projection is exhaustive, but identifying their points of correspondence allows us to integrate several into a fuller understanding—perhaps unearthing points a projection has missed in its own right. The current discussion seeks to reconcile the philosophical and biological projections of species.

Chaberek[4] and Robert A. Delfino[5] published thoughtful responses to my critique. Chaberek disputes virtually every point. Delfino is "sympathetic to at least some kind of Theistic evolution,"[6] but believes my views flawed by nominalism and unappreciation of Aquinas's existential revolution. While I thank them for their courtesy, both mistake my position. This is understandable because of the complexity of the issues.

Chaberek's response convinced me that I had mistaken his position. His references to "evolution," "Darwin," and "the interplay of chance and necessity," led me to think he was criticizing Darwin's theory. Although partially true, I should have grasped that he is narrowly focused on the thesis that species evolve naturally. Thus, much of my criticism was misdirected; nevertheless, I rebutted his thesis that new species require supernatural causation.

Because my critics level similar charges, I offer a combined response to avoid repetition.

---

[3] Dennis F. Polis, "Paradigms for an Open Philosophy," *Metaphilosophy* 24, no 1 (1993): 33. "Projections" are named after the complementary views in technical drawings, *e.g.*, the front and rear elevations of a house. We have different conceptual spaces because we have individual potential intellects. *Cf. Summa Contra Gentiles*, II, 75, ad. 1.

[4] Michal Chaberek, "Metaphysics and Evolution: A Response to Dennis F. Polis," *Studia Gilsoniana* 10, no. 1 (January–March 2021): 45. Hereafter cited as: "A Response."

[5] Robert A. Delfino, "The Compatibility of Evolution and Thomistic Metaphysics: A Reply to Dennis F. Polis," *Studia Gilsoniana* 10, no. 1 (January–March 2021): 71. Hereafter cited as: "A Reply."

[6] *Ibid.*, 71.

Species and Nominalism

> Both respondents accuse me of nominalism. Delfino writes:
>
> > Polis wants to avoid nominalism, and he wants to base species on the properties of populations in reality. However, by reducing species to human concepts, and by denying that natures and species are ultimately grounded in God, his position results in a kind of nominalism.[7]

He continues, saying I deny species members have the same kind of substantial from, which I do not, and suggesting I am a conceptualist, which I cannot be, as I base universals on reality. Chaberek claims "Dr. Polis wrongly interprets Aristotle and Aquinas as nominalists—notions exist only in the intellect, in reality only accidents exist."[8] Again, "On Polis's account natures are only *entia rationis* that are ideas in the mind. This is a formulation of nominalism that strays from classical metaphysics."[9] Neither quotes me to support his accusations and both substitute their wording for my technical terms, *e.g.*, "nature" for "species."

> What is nominalism? Over a century ago Maurice De Wulf wrote,
>
> > Nominalism . . . models the concept on the external object, which it holds to be individual and particular. Nominalism consequently denies the existence of abstract and universal concepts, and refuses to admit that the intellect has the power of engendering them. What are called general ideas are only names, mere verbal designations, serving as labels for a collection of things or a series of particular events.[10]

More recently, Gonzalo Rodriguez-Pereyra informed us,

---

[7] *Ibid.*, 91.

[8] Chaberek, "A Response," 55.

[9] *Ibid.*, 62.

[10] Maurice De Wulf, "Nominalism, Realism, Conceptualism," in *The Catholic Encyclopedia*, vol. 11 (New York: Robert Appleton Company, 1911). Available online—see the section *References* for details.

> The word "Nominalism," as used by contemporary philosophers in the Anglo-American tradition, is ambiguous. In one sense, its most traditional sense deriving from the Middle Ages, it implies the rejection of universals. In another, more modern but equally entrenched sense, it implies the rejection of abstract objects.[11]

I never wrote only accidents exist, questioned God's creative omnipotence, or said that *natures* are *entia rationis*. I doubt neither universal concepts, nor the intellect's power to engender them. I reject the substantive existence of abstract objects, so I am a nominalist in Rodriguez-Pereyra's second sense, but neither critic refers to it. Still, their confusion is unsurprising. Distinguishing moderate realists from nominalists can be difficult. A number of contemporary thinkers call St. Thomas a nominalist. *E.g.*, Brian Leftow claims he is a "trope nominalist," and says David Armstrong sees him as a "concept nominalist."[12]

Such confusion has a long history. Fredrick Copleston, S.J., notes that "the foundations of the Thomist doctrine of moderate realism had . . . been laid before the thirteenth century, and indeed we may say that it was Abelard who really killed ultra-realism."[13] Despite this, John of Salisbury accused Peter Abelard of nominalism because in *Logica Ingredientibus*, 16, Peter wrote, "it remains to ascribe universals of this sort to words alone." While this seems a definitive statement of nominalism, it is not. In *Logica Nostrum Petitioni Sociorum* Abelard distinguishes *vox* (the voiced word) from *sermo* (the expression of logical content). It is *sermo* that is universal. Since their logical content derives from the objects they signify, this is actually moderate realism.

---

[11] Gonzalo Rodriguez-Pereyra, "Nominalism in Metaphysics," in *Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta (Summer 2019 Edition). Available online—see the section *References* for details.

[12] Brian Leftow, "Aquinas on Attributes," *Medieval Philosophy and Theology* 11 (2003): 1. *Cf.* Jeffrey E. Brower, "Aquinas on the Problem of Universals," *Philosophy and Phenomenological Research* 92, no. 2 (2016): 715–735.

[13] Fredrick Copleston, *A History of Philosophy*, vol. 2 (Westminister, Md.: Newman Books, 1950), 171.

> If we wish, with John of Salisbury, to call Abelard a "nominalist," we must recognise at the same time that his "nominalism" is simply a denial of ultra-realism, and an assertion of the distinction between the logical and real orders, without any denial of the objective foundation of the universal concept. The Abelardian doctrine is an adumbration . . . of the developed theory of moderate realism.[14]

Similarly, in saying that species are *entia rationis*, I am denying Chaberek's Neoplatonism, not that they are founded in individual, created natures. This is Aquinas's position in *Summa Contra Gentiles* I, 65: "Universals . . . are not subsisting things, but have being only in singulars, as proved by Aristotle in *Metaphysics* vii." As we shall see, they are in singulars potentially.

Of course, Aquinas's doctrine is more comprehensive. Copleston summarizes it:

> St. Thomas thus admits (i) the *universale ante rem* . . . for it is God considered as perceiving His Essence as the imitable *ad extra* in a certain type of creation; (ii) the *universale in re*, which is the concrete individual essence alike in the members of the species; and (iii) the *universale post rem*, which is the abstract universal concept.[15]

Compare my position. Following *Categories* i, I note that, as secondary substances, species and genera do not exist as primary substances, which are ostensible unities (*tode ti*). Rather they are concepts, *entia rationis* (*universale post rem*). This is Abelard's distinction of the logical and real orders.

How do universals signify particulars? Each instance of a concept has a specific intelligibility the agent intellect can actualize into that concept. In other words, it has the concept *in potency*. *De Anima* iii, 7, explains that the agent intellect actualizes two potencies simultaneously: the object's intelligibility and the subject's capacity to know.

[14] *Ibid.*, 172.

[15] *Ibid.*, 176.

The object's intelligibility is in its form. Thus, *contra* Delfino, I *do* see universals grounded in the forms of their instances.

Aquinas says, "it is clear that abstraction, which is common to all intellects, makes a form universal."[16] Cardinal Mercier writes:

> According to the thought of Aristotle, Abelard, Alexandre of Hales, Albert the Great, Saint Thomas Aquinas, and the great majority of medieval philosophy masters, there are universal representations, but no universal realities.
>
> How, then, are the first and second to be harmonized? These things are particulars, but we have the power to represent them abstractly.
>
> Now, the *abstract* type, when intellect considers it reflexively, and puts it in touch with the particular subjects in which it is realized or realizable, is found attributable to each and to all.
>
> This applicability of the abstract type to the individuals is its universality.[17]

Joseph Owens, C.Ss.R., concurs, "the universal is found only in the intellect, never in the sensible thing that is known by its means."[18] My claim that "a species . . . is not an *ens reale*, but an *ens rationis*" stands firmly in this tradition.

Even though actual species exist only in the mind, we can speak of species *in* their instances by an *analogy of attribution*, for causes may be named after their effects. Thus, food contributing to health is "healthy," even if it is dead, *e.g.*, cooked chicken. Similarly, the intelli-

---

[16] *De Veritate*, II, 6, *ad* 1. Again, "[t]he unity or community of the human nature, however, *is not a reality* [italics mine], but is only in the consideration of the mind" (*S.Th.* I, 39, 4, *ad* 3). *Cf. In VII Metaphysica*, lect. 13.

[17] Désiré-Joseph Mercier, *Cours de Philopophie*, vol. IV: *Critériologie* (Louvain: Institut Supériour de Philosophie, 1906), 343f. My translation. Note that a species concept is universal, not because it *is* the nature of its instances, but because it is *applicable* to them. Applicability is a logical property.

[18] Joseph Owens, "Thomistic Common Nature and Platonic Idea," *Medieval Studies* 21 no. 1 (1959): 218.

gibility eliciting a species concept may be called an individual's species. This is the *universale in re*.

Similarly, we may speak of species *in* God—*universale ante rem*. Aquinas argues that God has exemplar ideas insofar as He *intends* to create whatever He creates.[19] He wills, *inter alia*, the *universale in re* as a subset of the creature's intelligibility. Since God is simple, His "ideas" are diversified by terminating in many creatures, not by intrinsic complexity. Since there are no universal creatures, species exemplars cannot be similarly diversified. Thus, there are no *universal* "ideas" in God. Omniscience precludes God prescinding from intelligibility to form universals. Similarly, creating imperfect copies of a species archetype, rather than perfect realizations of His creative intention, insults God's omnipotence.

I questioned[20] Chaberek's claim that "Philosophically, natural species are those forms of life that possess the same substantial form."[21] He responded:

> Aquinas says that genus/species cannot apply to individuals because in an individual there is a lack of universality. But he does not say that individuals of the same genus/species do not share the same substantial form or nature.[22]

Delfino seconds this,[23] but with a nuance to which I shall return. In fact, Aquinas denies that abstracted forms are substantial forms.

> [W]hen we say form is abstracted from matter, we do not mean substantial form, because substantial form and the matter correlative to it are interdependent, so that one is not intelligible without the other, because the appropriate act is in its appropriate matter.

[19] *S.Th.* I, 15, 1, c.

[20] Polis, "Compatibility," 571.

[21] Chaberek, "Classical Metaphysics," 52.

[22] Chaberek, "A Response," 56.

[23] Delfino, "A Reply," 85.

> Rather, we mean the *accidental forms of quantity and figure* [italics mine] . . .[24]

This both rebuts Chaberek and endorses species definitions based on sensible accidents.[25] Since each substantial form actualizes *its* correlative matter, it is *unique*.

Delfino is nearer the truth. While acknowledging that substantial forms are unique, he writes, "I think Polis is confusing having the same *individual* substantial form, with having the same *kind* of substantial form."[26] I rejected "*the same* substantial form." Still, "the same *kind* of substantial form," is also inadequate. While species are based on natures, "the same *kind* of substantial form" leaves indeterminate *which* notes of intelligibility must be shared. It is circular to say that their *essential* notes must be shared, because ontological essences are individual.[27] Only abstracted essences are universal, and biological species abstraction is variously implemented.[28]

The same is true of philosophical species. Chaberek wrote, "in the debate about origins we understand species as genera or families according to classical taxonomy. Traditionally they were called natural

---

[24] *In De Trinitate Boethius*, V, 3, c. Again, "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" (*De Ente et Essentia*, 4).

[25] *Cf. In De Anima*, I, 1: "[A]ccidental qualities contribute much to knowing what a thing essentially is. When we can give an account of such qualities (some or all) according to appearances, then we shall have material for dealing as well as possible with the essence." *S.Th.*, I, 29, 1, ad 3: "Substantial differences being unknown to us, or at least unnamed by us, it is sometimes necessary to use accidental differences in the place of substantial."

[26] Delfino, "A Reply," 85.

[27] *In De Trinitate Boethius*, V, 3, c: "[T]his soul, this body, this nail, this bone, etc. These indeed are parts of *the essence of Socrates and Plato* [italics mine], but not of man precisely as man; and therefore the intellect can abstract man from these parts. And this is the abstraction of the universal from the particular."

[28] There are at least twenty-six different ways of defining biological species. John S. Wilkins, "Philosophically Speaking, How Many Species Concepts are There?," *Zootaxa* 2765, no. 1 (2011): 58.

species, such as dog, cat, horse, elephant, etc."[29] Later, he cites Charles De Koninck's taxonomy in which dogs are not a species.

> The ensemble of beings constituting nature is divided into four species: men, animals, plants, and the inorganic. . . . These four species are the only ones philosophically definable. The canine species is not a species in the philosophical sense.[30]

Even here, there is no agreement. Chaberek quotes Mortimer J. Adler proposing "five irreducible species: man, animal, plant, mixture and element," and Norbert Luyten proposing "only three essences: inanimate, animate and human."[31] By the principle of charity, I credit each with a basis in reality for his taxonomy; nevertheless, their species concepts are only analogous.

Chaberek's four philosophical, and Wilkins' twenty-six biological, species concepts show that the kind of similarity marking a species is ill-defined. Consider Aristotle's paradigm, "man is a rational animal." It makes rationality essential, yet some humans fail to become rational, or having been so, suffer dementia. Further, the notion of non-human rational animals on other planets is not self-contradictory. So, this definition, while fixing on a truth, is inadequate. Non-rational people are human by descent. Indeed, the Biblical tradition portrays humanity genealogically, by line of descent, never mentioning "rational animal." Again, we have no direct knowledge of the rationality or descent of people seen at a distance, but *know* them as human by their figure and action. So, even in nontechnical contexts we use alternate, if implicit, definitions, with notes essential to some not required by others.

How does this relate to evolution? First, as exemplar ideas are simply God's intention to create individuals, they do not preclude a line

[29] Chaberek, "Classical Metaphysics," 52.

[30] *Ibid.*, 73.

[31] *Ibid.*, 73, n. 39.

of descent beginning with members of one species, and ending with members of another—as evolution proposes.

Second, as regards the *universale in re*, biological species are defined by human taxonomists—not revealed from on high. Delfino recognizes this, but not its implications.[32] Taxonomists use sensible accidents to define species, as St. Thomas contemplated. Take, for example, the taxonomy of the Portuguese man-of-war:

> The monophyletic Cystonectae is defined by the presence of a pneumatophore and siphosome and lack of nectosomal nectophores. The group encompasses only two families, Physaliidae and Rhizophysidae. The pleustonic colonies of Physaliidae are represented by the well known Portuguese man-of-war, *Physalia physalis*, that is easily distinguished by the presence of an enlarged pneumatophore, a sail-shaped, bluish-pinkish structure filled with gas produced by a gas gland.[33]

No mention is made of an intelligible nature, form or quidity—not because the creature has none—but because such principles are not directly sensible. So, for biological species, the *universale in re* is a shared set of accidents (notes of intelligibility) reflecting organisms' natures. This does not mean only accidents exist. Organisms are unities, not collections of accidents.

Third, in De Koninck's and Adler's taxonomies, evolution proposes virtually no new species. Since evolution offers no explanation of

[32] Delfino, "A Reply," 90: "But just because humans, for epistemological reasons, struggle to understand a given species does not mean that the individual members of a given species do not share the same kind of substantial form, or the same nature, as Polis argues." I do not argue that. As species are *entia rationis*, epistemological limitations are essential limitations.

[33] Juliana Bardi and Antonio C. Marques, "Taxonomic Redescription of the Portuguese Man-of-War, *Physalia physalis* (Cnidaria, Hydrozoa, Siphonophorae, Cystonectae) from Brazil," *Iheringia, Série Zoologia* 97, no. 4 (30 December 2007): 425.

human consciousness, Chaberek's problem reduces to a common ancestor for plants and animals.[34] In Luyten's taxonomy, there is no problem.

My account lacks my critics' Platonism,[35] for Aristotle and Aquinas reject participation in actual universals. *Metaphysics* VII, 13, provides numerous arguments against it.

Delfino writes, "Aquinas argues that human nature in itself, which he calls the nature 'considered absolutely', has no being or unity proper to it. Instead, it is neutral with respect to all kinds of being."[36] I am unsure how this militates against me as I have not attributed existence to natures absolutely considered. His main point seems to be that "by holding that natures, such as human, are existentially neutral—in other words, that existence is accidental to them—Aquinas is able to predicate human identically of each and every individual human that exists."[37] While true, this does not help with Chaberek's question: how can species evolve? Only by seeing that species are *concepts* actualizing notes of intelligibility known via sensible accidents, can we understand how the modification of accidents over generations can lead to populations requiring new species concepts, *i.e.*, evolved species.

---

[34] The hypothesis of a Last Universal Common Ancestor (LUCA) of all cells is based on genetic extrapolation. *Cf.* M. Weiss, F. Sousa, N. Mrnjavac, *et al*., "The Physiology and Habitat of the Last Universal Common Ancestor," *Nature Microbiology* 1, 16116 (2016).

[35] *E.g*., evolutionary thought "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* [italics mine]" (Chaberek, "Classical Metaphysics," 52). Aristotle and Aquinas hold that know by sensing mobile being. "If Polis argued that God is the ultimate ground of natures and species, he could try to avoid this relativism, but he explicitly rejects this position" (Delfino, "A Reply," 89). I affirm God is the ultimate ground of reality, including individual natures, the basis of species concepts. I deny God has *universal* exemplars to which our concepts must conform.

[36] Delfino, "A Reply," 86.

[37] *Ibid.*, 88.

Relativism

Delfino characterizes my position as "relativism."[38] He begins:

> Hair color is an accident possessed by human beings. But both Aristotle and Aquinas would agree it is a mistake to divide my students, for example, into different species based on brunette, blond, and red hair color. Indeed, their refusal to do so is based on their commitment to the real distinction between substance and accident in existing things. . . . [I]n order to be faithful to Thomistic metaphysics, Polis must find a way to defend this distinction . . .[39]

He quotes Aquinas's *In Physica,* 150, where, speaking of materialists, St. Thomas says, "But insofar as they said that all forms are accidents, this position is false." Delfino concludes, "Obviously, if the only kinds of forms in matter are accidental forms, then the substance-accident distinction collapses."[40] Chaberek makes a similar point.[41]

Aquinas says we know species via sensible accidents. He adds, "what is a principle of knowledge is not of necessity a principle of existence, as Plato thought: since at times we know a cause through its effect, and substance through accidents."[42] So, my claim hardly implies that only accidents exist. Still, I am challenged to defend the substance-accident distinction.

Gilson offers a caution that my critics seem to have run afoul of:

> We often hear it said that this philosophy [Thomism] consists in imagining the structure of the real is analogous to that of human language. Because our phrases are made up of a subject and predicates, St. Thomas would have concluded that the real is made up of substances of which accidents are predicated and of acci-

[38] *Ibid.*, 84.

[39] *Ibid.*, 84f.

[40] *Ibid.*, 84, n. 40.

[41] Chaberek, "A Response," 56.

[42] *S.Th* I, 85, 3, *ad* 4.

> dents which are attributed to substances. This is to completely misunderstand his thought and to confuse his logic with his metaphysics.[43]

I said that there are primary substances. Their existence entails an actuality or form, *i.e.*, a substantial form.[44] Organisms are not collections of accidents, but *unities* in which accidents inhere—not as Chaberek seems to think, like raisins in a pudding or ornaments on a tree,[45] but as distinguishable aspects of the whole, *i.e.*, as notes of intelligibility *of* the substance.[46] If substances were the residue after removing all accidents, they would be unintelligible, because we know substances by their action on our senses, and action is an accident. The idea of unintelligible substance can't be, and isn't, right. Since a primary substance is a unity, it encompasses its inherent accidents—for their *esse* is its *esse*.[47]

---

[43] Étienne Gilson, *The Christian Philosophy of St. Thomas Aquinas* (N.Y.: Random House, 1956), 31.

[44] Substantial forms may be variously conceived: an entity's present actuality, its actuality over a lifetime, and its *telos* or mature form. An organism's *telos* can be ill-defined, *e.g.*, most cnidarians (the phylum of jellyfish, corals and hydras such as the Portuguese man-of-war) have alternate generations: a sessile form reproducing asexually via strobilation (horizontal splitting) and a sexually reproducing swimming form. Rosalind T. Hinde, "The Cnidaria and Ctenophora," in *Invertebrate Zoology*, ed. Donald T. Anderson (Oxford: Oxford University Press, 1998), 28. Since actuality *simpliciter* is actuality now, substantial forms are immutable only *sub specie aeternatatis*—making substantial forms dynamic when viewed temporally.

[45] Chaberek writes of the "fundamental division into substance (substantial form and matter) and accidents that come together to constitute every individual" ("A Response," 56). Accidents *inhere in*, rather than being divided from, substances. Later on the page: without substance, "there would be nothing that the attributes could hang on."

[46] *S.Th.*, I, 29, 1, *ad* 3: "[P]roper accidents are the effects of substantial forms, and make them known."

[47] Aristotle, *Metaphysics*, VII, 3, 1029^{a}15: "[S]ubstance is rather that to which these [accidents] belong primarily." Gilson, *The Christian Philosophy of St. Thomas Aquinas*, 31: "To speak of things as 'substances' is not to conceive of them as groups of accidents bound by some kind of copula to a subject. . . . It is to say that they set themselves up as units of existence, all of whose constituent parts *are* by virtue of one and the same act of existing, which is that of the substance."

Delfino seems to confound two meanings of "accident." The first is an existent in Aristotle's last nine of categories. Accidents in this sense differ from substances because they lack independent existence. Instead, they are aspects, or notes of intelligibility, *of the substance* in which they inhere. This is the sense in which we know substances by sensible accidents and accidents vary in descendants.

Topics I, 5, defines a different sense of accident. There, substance serves as a substrate of contrariety, *i.e.*, of properties that may or may not be present, which are termed "accidents." Contrariety reoccurs discussing change in *Physics* I, 7. There, the coming to be and passing away of contraries, such as having a hair color or not, are accidental changes, while the generation and corruption of the underlying unity are substantial changes. Neither discussion invokes species archetypes to distinguish substance from accidents. Only by conflating these two senses of "accident" would one think that knowing substances, and defining species, via accidents entails defining humans using hair color.

A second form of Delfino's objection focuses on intersubjective variability.

> By allowing humans to choose which properties count as essential or accidental when producing a concept of a given species, he seems to be implicitly rejecting the reality of the substance-accident distinction in existing things.[48]

First, this seems to confuse the real and logical orders. We can distinguish substance and accident (sense 2) based on the effects of changes. On the other hand, to distinguish essential and accidental properties we must begin with our species *concept*, to see whether *it* requires the property. I hope my critics would agree that properties an individual *must* possess to instantiate a species concept are essential,

[48] Delfino, "A Reply," 85.

while those that it *may or may not* possess are accidental.[49] Since species are *entia rationis*, this is a logical matter, depending on how a species is defined.

Second, an individual's intelligibility stands to its species as potency to act. Just as the marble that became Michaelangelo's *David* could have become a *Moses* or a *Pietà*, so we can actualize intelligibility in many ways by selecting which notes to attend to. Those actualized inhere in the object, but the subject fixes on some while omitting others. Similarly, we can *choose* modes of representation. Mathematicians represent points with various coordinate systems[50] and vector bases,[51] and physicists quantum states with different sets of eigenstates.[52] Thus, objects do not *fully* determine their representations. While neither Aristotle nor Aquinas proposed diverse, well-founded taxonomic schemes, their moderate realism *allows* them.

Third, who, other than humans, is to decide "which properties count as essential or accidental," which notes of intelligibility are actualized in a concept? We are discussing *human* knowledge, not divine omniscience. The *joint* actualization of the object's intelligibility and the subject's capacity to know makes knowledge intrinsically relative. Similarly, Aquinas sees truth as relational—the adequation (approach to equality) of intellect and reality.[53]

---

[49] *S.Th.*, I, 9, 2, c: "[S]upposing the accident to be such as to follow on the essential principles of the subject, then the privation of such an accident cannot coexist with the subject."

[50] Philip M. Morse and Herman Feshbach, *Methods of Theoretical Physics*, vol. 1 (New York: McGraw-Hill, 1953), 494–523, 655–666.

[51] Paul Richard Halmos, *Finite-Dimensional Vector Spaces* (New York: Springer, 1987), 10.

[52] Stephen Gasiorowicz, *Quantum Physics* (New York: John Wiley & Sons, 1974), 119.

[53] *E.g.*, *De Veritate*, I, 1, resp.

Eric of Auxerre (841–876) recognized that *limitations of the human mind* force the resort to universal concepts.[54] Modern psychology has shown that our working memories can only maintain 5–9 "chunks" of information.[55] Unable to grasp experience exhaustively, we attend to some aspects, while missing others.[56] Our attention is directed by our will—informed by experience, education, culture, judgements of import, mood and even prejudice. Thus, each subject has a personal *projection* of reality. This merely names something both Aristotle and Aquinas knew. In the account of his predecessors in *Metaphysics* A, Aristotle acknowledges each for his true, but incomplete, insight—his projection of reality. In responding to objections, St. Thomas typically notes their partial truth before showing their inadequacy.

Knowledge is a *projection* in both the mathematical sense of a dimensionally diminished mapping (we know a *subset* of the object's intelligibility) and the existential sense of the object dynamically penetrating our intellect. Just as the builder building the house *is* the house being built by the builder, so *our intellect* being informed by the object is, *identically*, *the object* informing our intellect. Thus, knowledge is inseparable from its object, being its *intentional existence* within us.[57] Experiential content is a projection of the object's form, the Scholas-

[54] Copleston, *A History of Philosophy*, 164. Eric held that the mind, unable to deal with the multitude of individuals, gathers them together (*coarctat*) to form species concepts.

[55] Donald E. 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.

[56] As "the intellect passes from potentiality to act it has a likeness to things which are generated, which do not attain to perfection all at once but acquire it by degrees . . ." (*S.Th.* I, 85, 5, c).

[57] *De Ente et Essentia*, 2: "For human nature itself exists in the intellect abstracted from all individuating conditions."

tics' *sensible* and *intelligible species*.[58] So, while a *taxonomic species* is an *ens rationis*, it participates in the being of its seminal instance, any encountered instance, and potentially, every instance.

Further, as the *object* being held in existence by God, is, *identically*, *God* holding the object in existence, the object's existential penetration is also an existential penetration of God. So, we have within us the *universale ante rem*, the *universale in re*, and the *universale post rem*. It is this presence of God in the intellect, which can be teased out by analysis, that makes possible knowing His existence from sensible experience—for we cannot find what is not there.

Returning to species definition, my critics and I agree with Aristotle in *Posterior Analytics* II, 3, that proper definitions express the nature of what is defined. Still, species definitions *necessarily* represent *projections* of natures, for God alone is omniscient. While biologists share data and insights, their definitions, however collegial, will be both objective and subjective—both reality-based and the result of *personal* interest, comprehension and synthesis. So, I leave the selection of essential, species-defining, accidents to humans. There is nowhere else to leave it.

Definition Issues

Fr. Chaberek wrote, "By evolution we understand *biological macroevolution*, that is the idea that all living beings come from a single ancestor via natural generation."[59] I noted this was not working biologists' definition. He responds:

---

[58] *E.g.*, in *S.Th.*, I, 85. *Cf.* Charles Dubray, "Species," in *The Catholic Encyclopedia*, vol. 14 (New York: Robert Appleton Company, 1912). Available online—see the section *References* for details.

[59] Chaberek, "Classical Metaphysics," 49.

> Polis mentions three authors, but he does not show how any of them would deny my definition of evolution. My definition skips the particulars of these theories (and many other, including modern ones) and keeps what is essential for them in the context of evolution-creation debate.[60]

No reasonable author would object to another's definitions of terms. His definition is not the issue, but confounding his definition with the modern evolutionary synthesis.

Having defined evolution in purely biological terms, he went on to say that "Biological macroevolution is a theory of origins that has a scientific, a philosophical and a theological layer."[61] Surely, this is inconsistent with his definition, for nothing in it hints at philosophical and theological *layers* as opposed to implications or interpretations.

Chaberek makes an unexplained distinction between the evolution of biological species and macroevolution. I objected that this begs the question, because it is crucial to Darwin's case that species grade into each other gradually—without sharp distinctions.[62] He neither clarified his distinction nor rebutted my objection.

He had written me that evolution "was contrived from the beginning to exclude teleology and design from nature."[63] I showed that both Darwin and Wallace believed in design.[64] He sees this as attacking his definition.[65] It rectifies his history.

Chaberek offers a way forward saying, "the crucial problem is . . . the idea that natural secondary causes can produce the entire variety of

---

[60] Chaberek, "A Response," 46. He says an "evolution-creation debate," not an evolution-metaphysics debate.

[61] Chaberek, "Classical Metaphysics," 50.

[62] Polis, "Compatibility," 553.

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

[64] Polis, "Compatibility," 554f. Darwin was hostile to creationism, defined as the belief "in separate and innumerable acts of creation." Charles Darwin, *The Origin of Species* (London: John Murray, 1859), 186.

[65] Chaberek, "A Response," 47.

species beginning with just one or a few living organisms."[66] Despite his claim that I deny it,[67] I agree that this is "what the vast majority of biologists believe." I further agree that *this idea* (not the theory of evolution) has biological, philosophical and theological layers. Thus, it is best to bracket Darwin's theory, because Chaberek is unconcerned with it. Any mention of Darwin, who explained *how* species evolve, is almost irrelevant because Chaberek only cares about new species emerging *naturally*, which he denies. I say *almost* irrelevant, because if he had studied evolution, he would know that he is attacking a proposition it does not advance, *i.e.*, that species change.

Since Chaberek is concerned only with the thesis that species change naturally, my methodological criticisms[68] become a side issue. As his metaphysics is not directed at Darwin's theory or *its* implications, its confusion of the levels of abstraction in Aquinas's *Commentary of the De Trinitate of Boethius* is unimportant.

He seems motivated by the incompatibility of evolution with creationist *theology*—specifically with the claim that new species require *supernatural* intervention. "The problem is that when one proposes a natural explanation to the origin of species one excludes its supernatural explanation."[69] This fails to appreciate both the power of secondary causality,[70] and that the supernatural order is beyond philosophy. While

---

[66] Copleston, *A History of Philosophy*, 46.

[67] "Dr. Polis implies that Darwin was not a supporter of universal common ancestry (UCA)" (Chaberek, "A Response," 47). I quoted Darwin's support of UCA at length, noting it was not a postulate, but "a hypothesis inferred from 'a deceitful guide'" (Polis, "Compatibility," 553). He sees no difference (page 48) between a postulate (the evident logical foundation of a theory) and a hypothesis (a working guess).

[68] Polis, "Compatibility," 563 ff.

[69] Chaberek, "A Response," 59ff.

[70] *Cf.* Alfred J. Freddoso, "God's General Concurrence with Secondary Causes: Pitfalls and Prospects," *American Catholic Philosophical Quarterly* 68, no. 2 (1994): 131–156, and Armand A. Maurer, "Darwin, Thomists, and Secondary Causality," *The Review of Metaphysics* 57, no. 3 (March 2004): 491–514.

the theory of evolution is incompatible with Chaberek's demand for a supernatural explanation, it is consonant with Thomism. As my primary concerned is philosophical, I address Chaberek's creationism in an appendix.

Metaphysical Issues

Evolution's compatibility with Thomism does not mean that it is consistent with every text of St. Thomas. It is not. Aquinas was immersed in the science of his time—including immutable superlunary matter,[71] an inadequate theory of gravity,[72] spontaneous generation[73] and fixed biological species. He died before Isaac Newton posited *universal* laws of nature, and Darwin his theory.

I did show that evolution is compatible with the *core principles* of the Aristotelian-Thomistic tradition. Delfino quotes Brian Shanley, O.P.:

> At the heart of Aquinas's philosophy is his understanding of being as ultimately rooted in *esse* as *actus essendi*. . . . Here then is where the ultimate test of allegiance lies. . . . What I am arguing is that to be a Thomist of any stripe requires some primary commitment to Thomas's metaphysics; without that commitment, one may be an interpreter or even a specialist, but one is not a Thomist. It is a matter of debate, of course, what other doctrines of St. Thomas one must adhere to in order to be a Thomist and surely the items are broader than the metaphysics of *esse*. But however one draws the Thomistic circle, the core must be *esse* in St. Thomas's sense, not Frege's.[74]

[71] *De Sub. Sep.*, X, 56.

[72] *De Pot. Dei*, III, 7.

[73] *Ibid.*, III, 8, 9, & 11.

[74] Brian J. Shanley, "Analytical Thomism," *The Thomist* 63, no. 1 (1999): 136f. Frege thought existence was a second intention, and so an *ens rationis*. *Cf.* Ignacio Angelelli, *Studies on Gottlob Frege and Traditional Philosophy* (Dordrecht: Springer, 1967), 224f. I see existence as convertible with the power to act.

A key principle is that God conveys the *actus essendi* to creatures, which express it through *their own causal efficacy.* Aquinas writes,

> [W]e must admit without any qualification that God operates in the operations of nature and will. Some, however, through failing to understand this aright fell into error, and ascribed to God every operation of nature in the sense that nature does nothing at all by its own power.[75]

So, the critical question is whether, as Darwin held, *secondary causes* can generate populations requiring new species concepts. We only know powers by observing them *in act*, reading the Book of Nature to see *what is*. Aquinas divides God's productive acts into instantaneous direct creation, and those marked by change and mediated by second causes.[76] The biological consensus is that new species emerge through change. Chaberek disputes neither the truth of evolution's postulates,[77] nor the validity of evolution's logic. Since no postulate confers supernatural power, the argument, if sound, shows that the natural emergence of new species is a reality metaphysicians must explain rather than deny. Even if the argument is hypothetical, as long as no hypothesis is impossible, Chaberek's thesis fails.

I previously argued that contemporary physics implies that, before the advent of man, evolution is fully determined by the initial state

---

[75] *De Pot. Dei*, III, 7, c. Gilson, *The Christian Philosophy of St Thomas Aquinas*, 181: "Thomistic philosophy, in which the creature is nothing and does nothing without God, is set off against any teaching which would refuse to confer upon second causes the full share of being and efficacy to which they are entitled."

[76] *De Sub. Sep.*, X, 55.

[77] They are: (1) superfecundity or the generation of more offspring than can survive; (2) the existence of variant descendants; (3) a selection mechanism favoring variations enhancing reproduction and survival; and, (4) inheritability—the capacity to pass on variations. Stephen J. Gould, *The Structure of Evolutionary Theory* (Cambridge, Mass.: Harvard University Press, 2002), 125f. Chaberek, affirms (2) and (3): "[N]ature itself generates a multitude of variants within given species according to the accidental factors that determine better adaptations in these or other conditions" ("A Response," 53).

of the universe.[78] Thus, the natural emergence of new species springs *directly* from God's creative power. He created the cosmos, wills its laws, and sustains it in spinning out its fabric. Natural evolution is the work of secondary agents participating in the *Actus Essendi*. This view echos Augustine's *rationes seminales*,[79] which blossom into new species over time—either naturally, or, in the case of man, by providing a ground for the supernatural infusion of spirit. Augustine saw the human body as created "invisibly, potentially, causally, in the way that things are made which are to be but are not yet made."[80]

> Thomas Aquinas refers to Augustine's *rationes seminales* on several occasions in his commentary on the work of six days in *Summa theologiae*, and in his other works, seemingly accepting the idea of all species (except for human species) being virtually present in the outcome of the initial act of creation, as well as accepting both possibilities of their actualization—through gradual development and through instantaneous and direct divine intervention.[81]

Problematic Texts

Chaberek cites two problematic texts. The first is from *De Substantiis Separatis*.

> [W]hen a horse is generated, the generating horse is indeed the reason why the nature of horse begins to exist in this being, but it is not the essential cause of equinity. For that which is essentially the cause of a certain specific nature, must be the cause of that

[78] Dennis F. Polis, "Evolution: Mind or Randomness?" *Journal of Interdisciplinary Studies* XXII, no. 1/2 (2010): 32–66.

[79] *Cf.* Mariusz Tabaczek, "The Metaphysics of Evolution: From Aquinas's Interpretation of Augustine's Concept of *Rationes Seminales* to the Contemporary Thomistic Account of Species Transformism," *Nova et Vetera* 18, no. 3 (Summer 2020): 945–972.

[80] Augustine, *De Genesi ad Litteram* 6, 5, 8, quoted by Armand A. Maurer, *Medieval Philosophy*. (New York: Random House, 1962), 15. *Cf.* Copleston, *A History of Philosophy*, 91f.

[81] Tabaczek, "The Metaphysics of Evolution," 947.

> nature of all the beings that have that species. Since, then, the generating horse has the same nature, it would have to be its own cause, which is impossible. It remains, therefore, that above all those participating in equinity, there must be some universal cause of the whole species. . . . [I]t must be reduced to that which is essentially the cause of that nature, but not to something which participates in that nature in a particular way.[82]

A universal effect does demand a universal cause. Since Aquinas did not contemplate *universal* laws of nature, he placed intelligibility entirely in individual forms.[83] We now understand these laws to be causally efficacious, but not as individual entities are. Rather, they are intentional realities (God's general will for matter), acting directly and teleologically on matter.[84] Their universal operation on organisms with a shared gene pool and environment explains the common nature of descendants—satisfying St. Thomas's demand for a universal cause.

The second text is from the *Summa Theologiae*.

> The first formation of the human body could not be by the instrumentality of any created power, but was immediately from God. . . . God, though He is absolutely immaterial, can alone by His own power produce matter by creation: wherefore He alone can produce a form in matter, *without the aid of any preceding material form* [italics mine]. . . . Therefore as no pre-existing body has been formed whereby another body of the same species could be generated, the first human body was of necessity made immediately by God.[85]

First, this text neither anticipates nor precludes Darwin's mechanism, which, like Augustine's, sees the human body developing *with* the aid of a preceding material form. Given that humans' essential difference is *infused intellect and will*, humanity's immediate ancestor could have a

---

[82] *De Sub. Sep.*, X, 58.

[83] Dennis F. Polis, "A New Reading of Aristotle's *Hyle*," *The Modern Schoolman* 63, no. 8 (March 1991): 225–244.

[84] Polis, "Evolution: Mind or Randomness?," 33ff.

[85] *S.Th.*, I, 91, 2, c.

purely *material* form meeting Aquinas's requirement. Second, an anti-evolutionary interpretation is inconsistent with St. Thomas's view that new species may be immanent in the initial creation and actualized later, via secondary causality.

> 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.[86]

I quoted this previously. Chaberek responded that no one now believes in spontaneous generation, and that medievals appealed to the heavens to explain what they did not understand. While true, this does not rebut Aquinas's acceptance of new species emerging naturally.

Methodological Issues

Following Aquinas, I asserted that scientific, philosophical and theological theses must each be judged according to their own canons. One cannot judge scientific theories by philosophical or theological norms as Fr. Chaberek does. He responds, "questions of origins, by their very nature, go beyond any given discipline as well as science as such."[87]

We must distinguish the absolute origin in creation *ex nihilo*, which is beyond human science, from particular origins, which are within its competence. As Augustine and Aquinas agree,[88] it belongs to natural sciences to examine the origin of their objects. Thus, cosmology

---

[86] *S.Th.*, I, 73, 1, ad 3.

[87] Chaberek, "A Response," 50.

[88] Augustine, *De Trinitate*, IV, 16, quoted in *S.Th.*, I, 84, 5, c. "It belongs to the same science to investigate the proper causes of any genus and the genus itself, as for example natural philosophy investigates the principles of natural bodies" (*In Metaphysica Promoemium*, in Armand Maurer, *Thomas Aquinas: The Division and Method of the Sciences* [Toronto: Pontifical Institute of Medieval Studies, 1986], 98).

examines the physical causes of the universe, astrophysics of stars, geology of strata and biology of species. In studying secondary causes, natural science trespasses neither metaphysics or theology. Darwin in particular worked in a tradition, traceable to Suarez, explicitly seeking the origin of species in second causes.[89]

Delfino also criticizes my methodological observations. He says, as though I had denied it,

> [T]o the extent that evolutionary biology is making use of metaphysical principles (e.g., causality, the metaphysical law of non-contradiction and its corollaries, such as the effect cannot be greater than the cause, etc.), metaphysicians can comment on the misuse of such principles in evolutionary biology.[90]

I said, "If those canons are inadequate, philosophical analysis should be directed to them."[91] Surely, abusing metaphysical principles betrays inadequate canons and shows that a science is not proceeding "from its own proper principles" as Aquinas requires. Since Chaberek never examines Darwin's reasoning, I had no occasion to say more.

Delfino claims that in denying the evolution of the human intellect, I am applying metaphysics directly to biology, thus "legitimizing the general kind of metaphysical critique that Fr. Chaberek and others have made."[92] While philosophically motivated, I studied naturalistic "explanations" of consciousness and found each flawed on its own grounds.[93] While science cannot disprove sound metaphysics, we should follow Aquinas and explain why objections are unsound.

---

[89] Polis, "Compatibility," 552.

[90] Delfino, "A Reply," 75.

[91] Polis, "Compatibility," 550.

[92] Delfino, "A Reply," 75.

[93] Dennis F. Polis, *God, Science and Mind: The Irrationality of Naturalism* (Fontana, Calif.: Xianphil Press, 2012), 94–118.

Delfino has the "impression" that I think "metaphysics does not study change at all."[94] I said evolution's study of "a certain kind of change" falls outside the province of metaphysics.[95] Metaphysical abstraction prescinds from specific modes of change, *e.g.*, predation and mutation.

He concludes that "it should be clear that a metaphysical critique of biological evolution is possible because other sciences borrow principles from metaphysics, and because metaphysics does study material beings and change from the perspective of being."[96] Nothing Delfino argues militates against my position that, if a science's "canons are inadequate, philosophical analysis should be directed to them."

True Science?

Fr. Chaberek seems to support "Intelligent Design" (ID), which imagines God as too unintelligent to design a universe following "fixed ordinances" (*Jeremiah* 31:35–36). In defense of ID, he claims,

> [T]rue science, free from ideological bias, testifies to the inability of nature to produce biodiversity as we know it. The fossil record is incompatible with Darwinian theory and the Darwinian mechanism of random mutation and natural selection (even in its modern form and different variants) is incapable of explaining the origin of any significant biological novelties.[97]

He cites[98] a report on the 2016 Joint Discussion Conference of the British Academy and the Royal Society, "New Trends in Evolutionary Biology." The report was in *Evolution News*, a fundamentalist apologetics

[94] Delfino, "A Reply," 78.
[95] Polis, "Compatibility," 566.
[96] Delfino, "A Reply," 75.
[97] Chaberek, "A Response," 50f.
[98] *Ibid.*, 51, n. 6.

organ hardly "free from ideological bias." The official proceedings[99] do not support Chaberek's claims.

I wrote that "supporters of 'Intelligent Design' . . . typically [posit] evolutionary gaps where 'irreducible complexity' must be bridged by divine intervention."[100] Chaberek asks for documentation. Michael J. Behe writes:

> An irreducibly complex system cannot be produced directly (that is by continuously improving the initial function, which continues to work by the same mechanism) by slight, successive modifications of a precursor system, because any precursor to an irreducibly complex system that is missing a part is by definition nonfunctional.[101]

The supposed inability to evolve gradually creates the gaps that ID advocates believe require divine intervention.

As I am concerned with the interpretation and implications of science, I shall consider nonscientific alternatives no further.

Chaberek's Five Arguments

Chaberek offered five metaphysical arguments against the natural evolution of species. He continues to believe them sound, even though he has not resolved the issues I raised. His response begins with a preamble illustrating his confusion. He writes "on the level of a distinct nature/substance the change may go only this far."[102] The theory of evolution proposes neither a being's nature (its principle of motion and rest) nor its substance (its unity) change. It only says what Cha-

[99] Patrick Bateson, *et al.*, "New Trends in Evolutionary Biology: Biological, Philosophical and Social Science Perspectives," *Interface Focus* 7, no. 5 (2017).

[100] Polis, "Compatibility," 564.

[101] Michael J. Behe, *Darwin's Black Box: The Biochemical Challenge to Evolution* (New York: Simon and Schuster, 2001), 39. A precursor system may be perfectly functional with respect to another end.

[102] Chaberek, "A Response," 53.

berek admits, *i.e.*, that descendants vary from their forebears. This is not a change in the philosophical sense, for it does not occur in a single substrate (*Categories* I, 5, $4^{a}17–20$), nor is it the actualization of a potency insofar as it is still in potency (*Physics* III, 1, $201^{b}5$). It is simply succession. Thus, Chaberek's "'iron law' of metaphysics . . . that accidental changes impact the accidents while substance is changed by the substantial change,"[103] is inapplicable.

He attacks my reading of Aristotle's *Categories*.

> The core of the mistake in Dr. Polis's argument consists of this statement: "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." The "so" does not follow from the quoted *Categories* or from Aquinas.[104]

Of course, it does. Aristotle is quite clear on the similarities and differences between primary and secondary substances.

> But as regards the secondary substances, though it appears from the form of the name—when one speaks of man or animal—that a secondary substance likewise signifies a certain 'this', this is not really true; rather, it signifies a certain qualification . . .[105]

Argument 1

Chaberek's first argument is based on effects not exceeding the power of their causes. We agree both on the principle and that we must determine the power of causes experientially, not *a priori*. Still, he objects:

> [B]ecause we do not see species evolving into different species (like apes turning into humans or reptiles into birds) via natural

[103] *Ibid.*, 52.

[104] *Ibid.*, 54f.

[105] Aristotle, *Categories*, I, 5, $3^{b}14$ff.

> generation, we cannot conclude that "God has imbued causes" with such powers.[106]

Consider the logic of the case. He wishes to show that natural evolution is impossible. This requires showing that God *cannot* create a creature capable of engendering progeny of a different species. Saying we have not observed it falls well short of the mark.

He seems to think that direct observation and deduction is the only path to knowledge. The scientific method does not *deduce* hypotheses. Rather, it considers falsifying and confirming evidence for competing hypotheses. If only one it is *adequate* to the data, we judge it true, for *veritas est adaequatio rei et intellectus*. Here, we infer forebears' power by confirming evolution's postulates, and the fossil forms and genetic similarities they entail. Further, evidence suggests that humans did see wolves evolving into dogs.

I argued that assuming ancestral populations are the sole cause of evolved species ignores environmental factors and the laws of nature. He responds, "From the premise that laws of nature are designed does not follow that they can design."[107] That was not my claim. I argued that "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"[108]—creation and God's will for matter. Earlier I had written:

> 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." Thus, the order or "necessity" underpinning evolu-

[106] Chaberek, "A Response," 58.

[107] *Ibid.*

[108] Polis, "Compatibility," 576.

> tion is not some godless fate, but "ordinances of heaven and earth" ordained by God—the expression of divine providence.[109]

So, Chaberek missed my point that *God's design* of species is immanent in the initial universe and its laws—as St. Augustine suggested.

His confusion about secondary causality continues:

> Bringing God into the equation (as Dr. Polis and other theistic evolutionists do) begs the question, because if God was to overcome the limits of nature in evolution, then it would not be evolution anymore but some kind of creation. I do not argue against "some form of creation," but against natural evolution as producing new species.[110]

God does not *overcome* the limits of nature, but *endows* nature, as His creative instrument, with its own existence, including the power to evolve new species. While God is their ultimate author, secondary causes spin out His designs in time.

Argument 2

Chaberek's second argument is "no accidental change brings about new substance."[111] I wrote, following *Physics* I, 7, "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."[112] He responded that I confused "substantial form and individual form, the nature of a thing with its accidents."[113] It is he who is confused. First, substantial forms, being bound to their correlative matter, are individual. Second, the generation of descendants is a substantial, not an accidental, change. Finally, he continues to confuse succession with change.

---

[109] *Ibid.*, 561, citing *S.Th.*, I, 22, 1, c.

[110] Chaberek, "A Response," 59.

[111] *Ibid.*, 61.

[112] Polis, "Compatibility," 578.

[113] Chaberek, "A Response," 61.

Argument 3

Chaberek's third argument is one I discussed in connection with problematic texts. He begins by quoting the *Summa Theologia:*

> A perfect thing participating in any nature, makes a likeness to itself, not by absolutely producing that nature, but by applying it to something else. For an individual man cannot be the cause of human nature absolutely, because he would then be the cause of himself; but he is the cause of what human nature is in this man begotten.[114]

He argues:

> If biological evolution were true, it would follow that an individual (or a group) of one species at some point of its development begets an individual of another species. By this the individual would be the cause of the new species.[115]

Certainly, there must be a first member of a new species, but Chaberek's premise is false. Parent(s), together with other factors, generate variant offspring, not new species. The agent intellect, operating on the sensible phantasm, is the efficient cause of the new species concept. It does so because the final variant's sensible accidents fail to elicit the old species concept. There is nothing supernatural in this. The new individual simply falls outside the old definition. Using a different species definition, another individual might be first.

The question Aquinas raises is how many individuals come to have natures *similar enough* to elicit the same species concept. I say "similar" because as Darwin, Chaberek and I agree, there are variations in any species, *i.e.*, individuals whose sensible accidents express slightly variant natures. Since slight variations are common, the puzzle is not that descendants differ from ancestors, but that they are similar enough to elicit the same concept.

---

[114] *S.Th.*, I, 45, 5, ad 1.

[115] Chaberek, "A Response," 62f.

Abstractly, the answer lies partly in Darwin's postulate of *inheritability*, and partly in the universal laws of nature guiding all natural processes. Concretely, it lies in inherited DNA being nearly identical to ancestral DNA. Chaberek does not dispute the inheritability of traits, he over-relies on it, thinking enough traits will be inherited that descendants will invariably elicit the same species concept as their forebears. The consensus of biologists reject this thesis. How many and which traits are inherited is contingent matter—to be resolved by studying the Book of Nature. Biologists study it professionally, while Chaberek has little interest in it.[116] Only by understanding how evolution happens (*what is*) can we provide an adequate philosophical account.

He summarizes, "This argument is a variant of the first argument. It boils down to saying that nothing can be the cause of itself, which would be the case if biological macroevolution were true."[117] Darwin proposed no such thing, and I responded accordingly. "Evolution does not suggest that any being causes its own nature, only that descendants may differ from their forebears."[118] He countered:

> If evolution was just about the fact that posterity differs from parents, there would be no debate whatsoever. . . . No, the problem is that the ancestors of one animal, let's say a dinosaur, on evolutionary account are supposed to beget another animal, let's say a horse or a cow.[119]

The reason for the debate is that Chaberek does not understand evolution. He cannot document his claims because *The Origin of Species* proposes no more than he agrees with, *viz*. "posterity differs [slightly] from

[116] *Ibid*., 46: "[M]y discussion is not limited to just the Darwinian type of evolution, because 'Darwinian' in this context signifies the mechanism, but does not have any bearing on the alleged effects of the process in the form of emerging biodiversity." The consensus of biologists is that the mechanism is essential to understanding emerging biodiversity.

[117] *Ibid*., 63.

[118] Polis, "Compatibility," 579.

[119] Chaberek, "A Response," 63.

parents." This is not like dinosaurs begetting horses or cows, but even if it were, a member of one species begetting a member of another is not self-causation.

Argument 4

Chaberek's fourth argument is "that biological macroevolution is contrary to classical metaphysics because it denies two out of four Aristotelian causes."[120] As no biological text was cited, I showed the role of each cause in evolution.[121] He replies I did "not really provide any argument."[122] Surely, identifying the causes rebuts their undocumented denial. Still, I did not deconstruct his argument. I now turn to that task.

He begins by mischaracterizing evolution, saying "On evolutionary accounts, every being is turning into something different from what it is thanks to the processes embedded in nature by the Creator."[123] As we have seen, evolutionary differences occur between generations, not within a single organism. He rejoins:

> (Mind that in the discussion about the origin of species we do not talk about the changes of individuals but species, so if evolution means that a reptile transforms into a bird, we do not mean a particular individual or a population but the species or secondary substance).[124]

This is Platonism and quite problematic. First, *secondary* substances are not beings, but *ens rationis*—nor does Chaberek deny this. "Aristotle and Aquinas say is that universals, once they are derived from individuals, do not exist in the individuals but independently, as ideas in the intellect."[125] Second, species cannot change, as Aquinas explains:

---

[120] *Ibid*., 63f.
[121] Polis, "Compatibility," 579f.
[122] Chaberek, "A Response," 64.
[123] *Ibid.*, 63f.
[124] *Ibid.*, 65.
[125] *Ibid.*, 55.

> [A] universal is said to be incorruptible, not because it possesses some form giving it incorruptibility, but because those material qualities which cause corruption in individuals do not belong to it as a universal.[126]

Third, while Chaberek may not mean that evolutionary transformations occur in populations, he knows that biologists do.[127] So, he is attacking a straw man.

He continues, "If this was the case, the efficient cause, the one that 'makes things' would be reduced to changes in matter, such as genetic mutations, environmental influences, natural selection and so forth."[128] This is befuddled. First, it is aimed at Darwinian evolution, not the natural emergence of new species *per se*. Second, his examples fail. Mutations are new *forms*, the *effect* of many efficient causes. Environmental influences are causes, not changes in matter. Natural selection is an informing principle rather than a type of change. Third, efficient causality is not denied. Abstractly, the laws of nature, God's general will for matter, are evolution's efficient cause. Concretely, it is secondary causes, such as cosmic rays, chemical mutagens, disease organisms, predators, competitors and symbiotes—all cooperating to effect God's design.

He adds, "Dr. Polis does not seem to fully understand what the formal cause is. The formal cause makes the thing what it is, it is the cause of the being be itself. It is the form that makes the thing what it is."[129] This seems to confuse formal with efficient causes, which alone *make* things. Aristotle's "causes" are not "causes" in the English sense, but *principles of explanation* (*arché*)—ways of answering "why?" The formal cause is "the form or the archetype, *i.e.*, the statement of the es-

[126] *De Veritate*, V, *ad* 14.
[127] Chaberek, "A Response," 66.
[128] *Ibid.*, 63f.
[129] *Ibid.*, 64.

sence, and its genera, are called 'causes' (*e.g.*, of the octave the relation of 2:1, and generally number), and the parts in the definition."[130] A being's actuality, its form, does not *make* it because it is realized *with* the being. As for archetypes, statements, parts of definitions and numbers, they make nothing. Agents do.

Chaberek misconstrues final causality as well. "On the classic metaphysical account, the final cause is the idea in divine intellect according to which the Creator produces given species."[131] We just saw Aristotle say archetypes are formal causes. Final causes are the "end or 'that for the sake of which' a thing is done, *e.g.*, health is the cause of walking about."[132] Thus, a being's final cause is its God-given purpose —including its multi-faceted role in evolving later species.

As long as a being is whatever it is, it has a formal "cause." As long as God intends to create whatever He creates, it has a divine exemplar or archetype. As long as there is a state that is good for an entity, it has an end. What it does not have is what Chaberek requires, a Platonic archetype.[133]

I had written, "Evolution posits no unnatural activity. Instead, the activity of each being is the second actualization of its own form."[134] Chaberek claims that "The first two sentences are just, say so, unsupported statements. How does a being that changes into something else not tend to be anything other than it is?"[135] I had quoted evolution's four postulates, which do not claim "a being . . . changes into some-

[130] Aristotle, *Physics*, II, 3, 194^{b}27–9.

[131] Chaberek, "A Response," 65.

[132] *Physics*, II, 3, 194^{b}32.

[133] Chaberek, "A Response," 64: "[I]f we fully adopt the premises of biological macroevolution, there are no species but only the connecting links and thus the formal cause is annihilated." Eliminating archetypal *species* does not annihilate the formal cause, for God still intends each individual form.

[134] Polis, "Compatibility," 580.

[135] Chaberek, "A Response," 65.

thing else." That is Chaberek's invention. "Second act" is the operation of a being already in (first) act, which Aquinas derives[136] from *De Anima* II, 1.

The notion of species archetypes is a strong undercurrent in Scholastic thought. Still, it is based on a theory rejected by Aristotle and Aquinas—Plato's participation in Ideas.

Argument 5

Chaberek's fifth argument is based on the premise "that according to classical metaphysics nature consists of parts that fit each other and work for the perfection of the whole."[137] I pointed out that evolution does not deny that parts are ordered to the good of the whole. His reply fails to document his claim. Instead, he offers two texts from the *Summa Theologiae*. The first is "because [God's] goodness could not be adequately represented by one creature alone, He produced many and diverse creatures."[138] The second is:

> It is part of the best agent to produce an effect which is best in its entirety; but this does not mean that He makes every part of the whole the best absolutely, but in proportion to the whole; in the case of an animal, for instance, its goodness would be taken away if every part of it had the dignity of an eye. Thus, therefore, God also made the universe to be best as a whole, according to the mode of a creature; whereas He did not make each single creature best, but one better than another.[139]

---

[136] *S.Th.* I–II, 3, 2, c. Also, "Now, just as be-ing (*ipsum esse*) is the actualisation of an essence or nature, so activity (*operari*) is the actualisation of a power or capacity to act. Each of the two is in actuality as follows: essence or nature in terms of be-ing (*secundum esse*); a power or capacity in terms of activity (*secundum operari*)" (*De Spitituali-bus Creaturis*, XI, c).

[137] Chaberek, "Classical Metaphysics," 61.

[138] *S.Th.*, I, 47, 1, c.

[139] *S.Th.*, I, 47, 2, c. and *ad* 1.

The first suggests that individuals perfectly realizing to God's diverse intentions would better represent His goodness than defective copies of species prototypes. Ignoring this, Chaberek offers his own interpretation.

> The problem is that the theistic evolutionary account of nature denies this principle of creation and proposes something directly opposite. On the evolutionary account, different species compete and struggle to adapt, they must become something else in order to survive, and finally the entire world of biology is supposed to reach ever higher levels of life and complexity. This vision of nature flatly contradicts the principle of gradation laid down by Aquinas. Species are not supposed to evolve, because they represent divine power and wisdom by their complementary existence at different levels of "perfection."[140]

This is fraught with difficulties. First, it addresses Darwinian evolution, not the natural emergence of new species *per se*. So, even if sound, it would not prove his thesis. Second, its premises are false. The gradation of being is a metaphysical concept, outside of the competence of biology. The theory of evolution does not address it—nor does it speak of reaching "higher levels of life and complexity." That is an interpretation. If it did, Chaberek should have documented the transgression. Third, he continues to reify species, saying "they must become something else," when we agree that they are immutable beings of reason.

Chaberek's argument reaffirms his disinterest in the Book of Nature, for it is an empirical *fact*, not an evolutionary hypothesis, that animals compete for food, and plants for light and root space, in the struggle to survive. Saying "Species are not supposed to evolve" presumes to know God's will *a priori* rather than by studying His self-revelation in creation.

---

[140] Chaberek, "Classical Metaphysics," 67.

Next, he proves too much. If creation were perfect in the way he believes, the supernatural creation of new species would degrade it as much as their natural evolution. More fundamentally, there would be no change, for all changes involve the acquisition or loss of perfections.

Finally, he continues to distort evolution. I documented the theory's four postulates. He invents undocumented substitutes: "The theory of evolution . . . postulates that one species, such as hippopotamus (or some ancient artiodactyl), changed into another species, such as whale . . ."[141]

Since the Book of Nature reveals that God has created a world of change, natural perfection cannot be a static, but a dynamic process ordered to ends only God fully understands.

Conclusion

Chaberek's thesis rests, first, on a consistent refusal to consider the actual postulates, structure, claims and evidence of evolution and, second, on the Neoplatonic reification of species as a secondary substance. His alternate portrayal of evolution is an undocumented straw man for his attacks.

Two thinkers responded to my critique of Chaberek. Neither refers to the Book of Nature, to *what is*, in making their case. Chaberek seems not to have read Darwin, or any other treatise on evolution. Delfino supports theistic evolution, but considers none of Chaberek's arguments, and offers no alternative to my critique. I answered their charges of nominalism and relativism—affirming Thomistic moderate realism while rejecting Platonism. Evolution is compatible with the Aristotelian-Thomistic tradition because it does not trespass into metaphysical speculation.

[141] *Ibid.*

Appendix

The Theological Issue

I am not a theologian. Still, research shows that Chaberek's creationism conflicts with the views of Augustine, Aquinas and recent popes.

Obviously, a literal interpretation of *Genesis* 1 involves his sort of creationism. The famous Jesuit exegete Cornelius à Lapide (1567–1637), known for his encyclopedic knowledge of Patristic literature, says that most Fathers took the *Hexaemeron* (the six days of creation) literally.[142] Still, early Christians understood the theological points of dependence and intrinsic goodness, not the days of creation, to be the central message of *Genesis* 1.[143] Nonliteral interpretations were not deemed heretical. Irenaeus uses one or seven days depending on which provides a better theological metaphor. Origin explicitly says that the creation account was universally understood figuratively, not literally.

> For who that has understanding would think that the first second and third day—and the evening and the morning—existed without a sun, moon and stars? Or, too, would think that the first day was, as it were, without a sky? . . . *I do not think that anyone doubts* [italics mine] that these things figuratively indicate certain mysteries—the history having taken place in appearance, not literally.[144]

As we have seen, St. Augustine believed that creation included *rationes seminales* which would actualize into new species through natural processes. While not envisioning one species evolving from another, he saw new species appearing *naturally* over the course of time,

---

[142] Fr. John Lawrence, F.F.I. (Michael F. Polis), private communication.

[143] John R. Willis, *The Teachings of the Church Fathers* (San Francisco: Ignatius Press, 1966), 203–213, and *A Dictionary of Early Christian Beliefs*, ed. David W. Bercot (Peabody, Mass.: Hendrickson Publishers, Inc., 1998), 179ff, 189.

[144] Quoted in *A Dictionary of Early Christian Beliefs*, 189.

foreshadowing modern physics, in which later material states are immanent in prior states and the laws of nature.

Similarly, Aquinas explicitly accepts the idea of new species emerging via secondary causality in the *Summa Theologiae* I, 73, 1, ad 3. While he saw both direct creation and the elaboration of creation over time as theologically acceptable, he says Augustine's interpretation "is the more subtle, and is a better defense of Scripture against the ridicule of unbelievers."[145]

Catholic thinkers quickly accepted Darwin's theory. In 1909, Erich Wasmann wrote in the *Catholic Encyclopedia*,

> [Evolution] is in perfect agreement with the Christian conception of the universe; for Scripture does not tell us in what form the present species of plants and of animals were originally created by God. As early as 1877 Knabenbauer stated "that there is no objection, so far as faith is concerned, to assuming the descent of all plant and animal species from a few types" (*Stimmen aus Maria Laach*, XIII, p. 72).[146]

More recently, in *Humani generis* (1950), Pope Pius XII found no intrinsic conflict between the Catholic faith and the evolution of the human body.[147] Pope John Paul II, addressing the Pontifical Academy of Sciences on October 22, 1996, said "new findings lead us toward the recognition of evolution as more than a hypothesis."[148] Cardinal Joseph

---

[145] *De Pot. Dei*, IV, 2, c.

[146] Erich Wasmann. "Catholics and Evolution," in *The Catholic Encyclopedia*, vol. 5 (New York: Robert Appleton Company, 1909). Available online—see the section *References* for details. Joseph Knabenbauer, S.J., was a leading light in the Catholic acceptance of evolution. See Ctirad V. Pospíšil, "Joseph Knabenbauer SJ (1839–1911) a otázka evolučního vzniku člověka," *Acta Universitatis Carolinae Theologica* 7, no. 1 (January 8, 2017): 143–155.

[147] Pope Pius XII, *Humani Generis* (August 12, 1950). Available online—see the section *References* for details.

[148] Pope John Paul II. "Message to the Pontifical Academy of Sciences: On Evolution" (October 22, 1996). Available online—see the section *References* for details. The original French is "la theorie de l'evolution plus qu'une hypothese." Translating *une* as "a" instead of "one" is justified by the context.

Ratzinger, later to be Pope Benedict XVI, was president of the International Theological Commission in July 2004 when it released a statement that said:

> While there is little consensus among scientists about how the origin of this first microscopic life is to be explained, there is general agreement among them that the first organism dwelt on this planet about 3.5–4 billion years ago. Since it has been demonstrated that all living organisms on earth are genetically related, *it is virtually certain that all living organisms have descended from this first organism* [italics mine]. Converging evidence from many studies in the physical and biological sciences furnishes mounting support for some theory of evolution to account for the development and diversification of life on earth, while controversy continues over the pace and mechanisms of evolution.[149]

Thus, Fr. Chaberek's creationism, while theologically *acceptable*, is out of step with the positions of Sts. Augustine and Thomas, current theology, and science.

Metaphysics and Evolution: Response to Critics

SUMMARY

I respond to Michał Chaberek's and Robert A. Delfino's criticisms of my argument that evolution is compatible with Aristotelian-Thomistic metaphysics. Biological species, as secondary substances, are beings of reason founded in the natures of their instances. They are traceable to God's creative intent, but not to universal exemplars. Aquinas teaches that concepts are derived from sensible accidents. Thus, evolution's directed variation of such accidents will eventually require new *species concepts*. This accords with *projective realism*, which allows diverse, well-founded concepts based on the multiple perspectives and conceptual spaces of knowing subjects. Charges that this is nominalism, not moderate realism, are rebutted; however, it is relativism because knowl-

[149] International Theological Commission, *Communion and Stewardship: Human Persons Created in the Image of* God, Plenary sessions, Rome 2000–2002 (July 2004), 63. Available online—see the section *References* for details.

edge is a subject-object relation. Other metaphysical issues are considered. Chaberek's thesis that species cannot evolve naturally fails because he: (1) reifies the species concept, (2) misrepresents the motivation, structure and conclusions of evolution, (3) confuses Aristotle's four causes and (4) limits God's creative omnipotence. Finally, Chaberek is out of step with contemporary theology.

KEYWORDS

Aristotelianism, Thomism, evolution, substance-accident distinction, epistemology, moderate realism, projective realism, nominalism, relativism, intentional existence, teleology, laws of nature, species problem, intelligent design, problem of universals, abstraction, exemplar ideas, creationism.

REFERENCES

A Dictionary of Early Christian Beliefs, edited by David W. Bercot. Peabody, Mass.: Hendrickson Publishers, Inc., 1998.

Angelelli, Ignacio. *Studies on Gottlob Frege and Traditional Philosophy*. Dordrecht: Springer, 1967.

Aquinas, Thomas. *Commentary on Aristotle's De Anima*. Translated by Kenelm Foster, O.P., and Sylvester Humphries, O.P. New Haven: Yale University Press, 1951. Available online at: https://isidore.co/aquinas/english/DeAnima.htm#19L. Accessed Nov. 5, 2021.

Aquinas, Thomas. *Commentary on Aristotle's Physics: Books I–II*. Translated by Richard J. Blackwell, Richard J. Spath & W. Edmund Thirlkel. Yale: Yale University Press, 1963. Available online at: https://isidore.co/aquinas/Physics.htm. Accessed Nov. 5, 2021.

Aquinas, Thomas. *De Ente et 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. *De Potentia Dei. On the Power of God*. Translated by the English Dominican Fathers. Westminster, Md.: The Newman Press, 1952.

Aquinas, Thomas. *De Substantiis Separatis. Treatise on Separate Substances*. Translated by Francis J. Lescoe. West Hartford Conn.: Saint Joseph College, 1959. Available online at: https://isidore.co/aquinas/SubstSepar.htm. Accessed Nov. 5, 2021.

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.

Aquinas, Thomas. *On the Truth of the Catholic Faith: Summa Contra Gentiles*. Translated by Anton C. Pegis, F.R.S.C. Garden City, N.Y.: Doubleday & Co., 1955.

Aquinas, Thomas. *Summa Theologiae*. 5 Volumes. Translated by Fathers of the English Dominican Province. Westminster, Md.: Christian Classics, 1981. Available online at: https://www.newadvent.org/summa/. Accessed Nov. 5, 2021.

Aquinas, Thomas. *Truth: A Translation of Quaestiones Disputatae De Veritate*, Volume I, Questions I–IX. Translated by Robert W. Mulligan, S.J. Chicago: Henry Regnery Company, 1952.

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 Soul*. Translated by Walter Stanley Hett. Cambridge, Mass.: Harvard University Press, 1957).

Aristotle. *Physics*. Translated by R. P. Hardie and R. K. Gaye. Princeton: Princeton University Press, 1984.

Aristotle. *Posterior Analytics*. Translated by E. S. Bouchier. Oxford: B. H. Blackwell, 1901. Available online at: https://oll-resources.s3.us-east-2.amazonaws.com/oll3/store/titles/902/0248_Bk.pdf. Accessed Nov. 5, 2021.

Bardi, Juliana, and Antonio C. Marques. "Taxonomic Redescription of the Portuguese Man-of-War, *Physalia physalis* (Cnidaria, Hydrozoa, Siphonophorae, Cystonectae) from Brazil." *Iheringia, Série Zoologia* 97, no. 4 (30 December 2007): 425–433. DOI: 10.1590/S0073-47212007000400011.

Bateson, Patrick, Nancy Cartwright, John Dupré, Kevin Laland and Denis Noble. "New Trends in Evolutionary Biology: Biological, Philosophical and Social Science Perspectives." *Interface Focus* 7, no. 5 (2017). DOI: 10.1098/rsfs.2017.0051.

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

Broadbent, Donald E. "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.

Brower, Jeffrey E. "Aquinas on the Problem of Universals." *Philosophy and Phenomenological Research* 92, no. 2 (2016): 715–735. DOI: 10.1111/phpr.12176.

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.

Chaberek, Michal, "Metaphysics and Evolution: A Response to Dennis F. Polis." *Studia Gilsoniana* 10, no. 1 (January–March 2021): 45–69. DOI: 10.26385/SG.100102.

Copleston, Fredrick, S.J. *A History of Philosophy*. Vol. 2. Westminister, Md.: Newman Books, 1950.

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.

De Wulf, Maurice. "Nominalism, Realism, Conceptualism." In *The Catholic Encyclopedia*, Vol. 11. New York: Robert Appleton Company, 1911. Available online at: http://www.newadvent.org/cathen/11090c.htm. Accessed April 21, 2021.

Delfino, Robert A. "The Compatibility of Evolution and Thomistic Metaphysics: A Reply to Dennis F. Polis." *Studia Gilsoniana* 10, no. 1 (January–March 2021): 71–102. DOI: 10.26385/SG.100103.

Dubray, Charles. “Species.” In *The Catholic Encyclopedia*, Vol. 14. New York: Robert Appleton Company, 1912. Available online at: http://www.newadvent.org/cathen/14210a.htm. Accessed Nov. 5, 2021.

Freddoso, Alfred J. “God’s General Concurrence with Secondary Causes: Pitfalls and Prospects.” *American Catholic Philosophical Quarterly* 68, no. 2 (1994): 131–156. DOI: 10.5840/acpq199468224.

Gasiorowicz, Stephen. *Quantum Physics*. New York: John Wiley & Sons, 1974.

Gilson, Étienne. *The Christian Philosophy of St. Thomas Aquinas*. New York: Random House, 1956.

Goodwin, Colin Robert. *A Translation of the Quaestio Disputata De Spiritualibus Creaturis of St. Thomas Aquinas, with Accompanying Notes*. Master’s thesis. Fitzroy, Victoria: Australian Catholic University, June 24, 2002. Available online at: https://acuresearchbank.acu.edu.au/download/b4a512f67eead513c15b47b40a166eb9f2c817c2501ebc737014f101ea304eb1/1015553/64883_downloaded_stream_108.pdf. Accessed Nov. 5, 2021.

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

Halmos, Paul Richard. *Finite-Dimensional Vector Spaces*. 4th edition. New York: Springer, 1987.

Hinde, Rosalind T. “The Cnidaria and Ctenophora.” In *Invertebrate Zoology*, edited by Donald Thomas Anderson. Oxford: Oxford University Press, 1998.

International Theological Commission. *Communion and Stewardship: Human Persons Created in the Image of* God. Plenary sessions, Rome 2000–2002. July 2004. Available online at: https://www.vatican.va/roman_curia/congregations/cfaith/cti_documents/rc_con_cfaith_doc_20040723_communion-stewardship_en.html. Accessed Sept. 21, 2021.

Leftow, Brian. “Aquinas on Attributes.” *Medieval Philosophy and Theology* 11 (2003): 1–41. DOI: 10.1017/S105706080300001X.

Maurer, Armand A., “Darwin, Thomists, and Secondary Causality.” *The Review of Metaphysics* 57, no. 3 (March 2004): 491–514.

Maurer, Armand A., *Medieval Philosophy*. New York: Random House, 1962.

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

Mercier, Désiré-Joseph. *Cours de Philopophie*, Vol. IV: *Critériologie*. Louvain: Institut Supériour de Philosophie, 1906.

Morse, Philip M. and Herman Feshbach. *Methods of Theoretical Physics*. New York: McGraw-Hill, 1953.

Owens, Joseph. “Thomistic Common Nature and Platonic Idea.” *Medieval Studies* 21, no. 1 (1959): 211–223.

Polis, Dennis F. “A New Reading of Aristotle’s Hyle.” *The Modern Schoolman* 63, no. 8 (March 1991): 225–244. Available online at: https://philarchive.org/rec/POLANR. Accessed Nov. 5, 2021.

Polis, Dennis F. “Evolution: Mind or Randomness?” *Journal of Interdisciplinary Studies* XXII, no. 1/2 (2010): 32–66. DOI: 10.5840/jis2010221/22.

Polis, Dennis F. *God, Science and Mind: The Irrationality of Naturalism*. Fontana, Calif.: Xianphil Press, 2012.

Polis, Dennis F. "Paradigms for an Open Philosophy." *Metaphilosophy* 24, no. 1/2 (January–April 1993): 33–46. DOI: 10.1111/j.1467-9973.1993.tb00443.x.

Polis, Dennis F. "The Compatibility of Evolution and Classical Metaphysics." *Studia Gilsoniana* 9, no. 4 (October–December 2020): 551–585. DOI: 10.26385/SG.090424.

Pope John Paul II. "Message to the Pontifical Academy of Sciences: On Evolution." October 22, 1996. Available online at: https://humanorigins.si.edu/sites/default/files/MESSAGE%20TO%20THE%20PONTIFI-CAL%20ACADEMY%20OF%20SCIENCES%20(Pope%20John%20Paul%20II).pdf. Accessed Sept. 21, 2021.

Pope Pius XII. *Humani Generis*. August 12, 1950. Available online at: https://www.vatican.va/content/pius-xii/en/encyclicals/documents/hf_p-xii_enc_12081950_humani-generis.html. Accessed Sept. 21, 2021.

Pospíšil, Ctirad V. "Joseph Knabenbauer SJ (1839–1911) a otázka evolučního vzniku člověka." *Acta Universitatis Carolinae Theologica* 7, no. 1 (January 8, 2017): 143–155. DOI: 10.14712/23363398.2017.6.

Rodriguez-Pereyra, Gonzalo. "Nominalism in Metaphysics." In *Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta. Summer 2019. Available online at: https://plato.stanford.edu/entries/nominalism-metaphysics/. Accessed Nov. 5, 2021.

Shanley, Brian J. "Analytical Thomism." *The Thomist* 63, no. 1 (1999): 125–137. DOI: 10.1353/tho.1999.0046.

Tabaczek, Mariusz, "The Metaphysics of Evolution: From Aquinas's Interpretation of Augustine's Concept of *Rationes Seminales* to the Contemporary Thomistic Account of Species Transformism." *Nova et Vetera* 18, no. 3 (Summer 2020): 945–972. DOI: 10.1353/nov.2020.0048.

Wasmann, Erich. "Catholics and Evolution." In *The Catholic Encyclopedia*, Vol. 5. New York: Robert Appleton Company, 1909. Available online at: http://www.newadvent.org/cathen/05654a.htm. Accessed Nov. 5, 2021.

Weiss, Madeline C., Filipa L. Sousa, Natalia Mrnjavac, Sinje Neukirchen, Mayo Roettger, Shijulal Nelson-Sathi & William F. Martin. "The Physiology and Habitat of the Last Universal Common Ancestor." *Nature Microbiology* 1, 16116 (25 July 2016). DOI: 10.1038/nmicrobiol.2016.116.

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.

Willis, John R. *The Teachings of the Church Fathers*. San Francisco: Ignatius Press, 1966.