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## **Thomistic Response to the Theory of Evolution: Aquinas on Natural Selection and the Perfection of the Universe**

**Mariusz Tabaczek, O.P.**

### **Abstract**

Neither Aristotle nor Aquinas assumes the reality of the evolution of species. Their systems of thought, however, remain open to the new data, offering an essential contribution to the ongoing debate between scientific, philosophical, and theological aspects of the theory of evolution. After discussing some key issues of substance metaphysics in its encounter with the theory of evolution (hylomorphism, transformism of species, teleology, chance, the principle of proportionate causation), I present a Thomistic response to its major hypotheses. Concerning the philosophy of Aquinas I trace what might be seen as a preliminary description of natural selection in his commentary on Aristotle's *Physics*. Turning toward theology, besides addressing the topics that were referred to in the past—such as: Aquinas' reading of Genesis, his account of creation as dependence in being, secondary and instrumental causality, and univocal/equivocal predication of God—I bring into discussion Thomas' concept of the perfection of the universe, which has been virtually unused in this context.

**Key Words:** Aristotle; Aquinas; Natural selection; Chance; Divine causality; Evolution; Hylomorphism; Perfection of the Universe; Teleology

The universe troubles me, and much less can I think  
That this clock exists and should have no clockmaker.

Voltaire, *Les Cabales*

Rare are those mechanists who admit that there may be  
teleology in nature, but exceedingly rare—if they have  
ever existed—are those finalists who deny mechanism  
and its natural function in natural beings.

Étienne Gilson,  
*From Aristotle to Darwin and Back Again*

## Introduction

Is Aristotelian metaphysics obsolete, static, and irrelevant in the context of modern and contemporary science? Is Aquinas' God distant, abstract, unchangeable, insensitive, and detached from the reality of the created world? Does Thomas overly emphasize the transcendence of the Creator, at the expense of his immanence? Is it true that remaining in only an intellectual relation to the world, God is uninterested in what happens to us and cannot respond to our suffering?<sup>1</sup> Contrary to the predominant view among theologians engaged in the science-theology dialogue who question Aquinas' concept of God, I believe that the Aristotelian-Thomistic tradition continues to prove flexible enough to respond to current issues debated in science, philosophy, and theology. Such is the case of the theory of evolution, which caused a revolution in both biological and human sciences. The challenge is considerable, as neither Aristotle nor Aquinas assumes the reality of the evolution of species. Quite the contrary: it is commonly held that they understand species as fixed and enduring essences. Nonetheless, even if they were far from discovering the possibility of the transformation of species as it is defined in contemporary biology, I claim that some of their basic theoretical tools not only leave room for such a possibility, but even suggest it.

The aim of the present paper is twofold. In the first part I will present a reflection on the philosophical aspects of the theory of evolution from the point of view of substance

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<sup>1</sup> The majority of scholars in the science-theology debate replace the classical Thomistic notion of God with the theology of divine limitation and suffering, understood as a voluntary act or an inherent characteristic of God's being. See for instance: Ian Barbour, *Religion and Science: Historical and Contemporary Issues* (San Francisco: Harper Collins, 1997), 295-304; 322-332; Philip Clayton, "Toward a Constructive Christian Theology of Emergence," in *Evolution and Emergence. Systems, Organisms, Persons*, ed. Nancey Murphy and William R. Stoeger (Oxford, New York: Oxford University Press, 2007), 335-337; Niels Henrik Gregersen, "Emergence: What is at Stake for Religious Reflection?," in *The Re-Emergence of Emergence*, ed. Philip Clayton, and Paul Davies (Oxford, New York: Oxford University Press, 2006), 293-297; Nancey Murphy, "Science and the Problem of Evil: Suffering as a By-product of a Finely Tuned Cosmos," in *Physics and Cosmology: Scientific Perspectives on the Problem of Natural Evil*, ed. Nancey Murphy, Robert John Russell and William Stoeger (Berkeley, CA: CTNS, 2007), 141; Arthur Peacocke, *Theology for a Scientific Age. Being and Becoming—Natural, Divine, and Human* (Minneapolis, MN: Fortress Press, 1991), 113-134; John Polkinghorne, *Belief in God in an Age of Science* (New Haven, CT: Yale University Press, 1998), 13-14; Robert J. Russell, *Cosmology from Alpha to Omega: The Creative Mutual Interaction of Theology and Science* (Minneapolis, MN: Fortress Press, 2008), 188-190; 220-221; Gloria L. Schaab, *Creative Suffering of the Triune God: An Evolutionary Theology* (New York: Oxford University Press, 2007), 141-168.

metaphysics. In addition to the argument based on the concept of hylomorphism, which has been brought into consideration in the past by Antonio Moreno and Fran O'Rourke, I will refer to the problem of transformism of Aristotelian species, his understanding of teleology, and the nature and role of chance, which is regarded by many as the key factor of evolutionary changes. I will also consider the problem of the theory of evolution's alleged violation of the principle of proportionate causation; the rule which states that higher effects cannot proceed from lower causes.

The second part of the paper is dedicated to the Thomistic response to the theory of evolution. In terms of the philosophical teaching of Aquinas, I will try to prove that what we find in the *Lectio 12* of his commentary on Aristotle's *Physics* is nothing less than a preliminary description of natural selection. Turning toward theology, I will begin with a short reflection on Aquinas' distinction between creation defined as the origin of being, and change that always occurs in matter already created. Following this reflection I will present an analysis of Aquinas' reading of Genesis, and his suggestion that God, as the primary and principal cause, should be distinguished from the secondary and instrumental causation of creatures. In addition to these considerations I will discuss the concept of the perfection of the universe in Aquinas, which has been left virtually unused in this context.

### **Metaphysics of Evolution**

The main thrust of Aristotle's philosophy of nature is to provide a proper account and description of the causes and mechanisms of the processes of generation, change, corruption, and decay in nature, and to posit the plausible characteristics of both the changing and persistent aspects therein. And so, although the idea of juxtaposing Aristotle and Darwin may appear counterintuitive at first, it is still quite reasonable, given Aristotle's method, to search his philosophy for the metaphysical principles that may help us to better understand evolutionary processes.<sup>2</sup>

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<sup>2</sup> In his letter written on February 22, 1882 to Dr. William Ogle, who had translated Aristotle's *Parts of Animals* and sent Darwin a copy of it, Darwin says: "You must let me thank you for the pleasure which the Introduction to the Aristotle book has given me. I have rarely read anything which has interested me more,

## Hylomorphism and Evolution

The first characteristic of Aristotle's philosophy that may indirectly support the theory of evolution can be found in his most basic metaphysical rule; namely, the concept of hylomorphism. In order to understand this we must first realize that, when introducing the category of "matter," Aristotle refers not only to the stuff out of which things are made, but also to a principle from which they become.<sup>3</sup> The idea of "primary matter" (πρώτη ὕλη) serves in his system as a principle of potentiality, something that persists through all the changes to which a given substance may be exposed. Primary matter constitutes the very possibility of being a substance at all.<sup>4</sup> Form, on the other hand, is not merely an organizing principle arranging the geometrical structure and shape of the constituent parts of an entity (substance).<sup>5</sup> Rather, it is an informing principle of actuality, that, by which a thing is what it is; an intrinsic, determining principle that actualizes primary matter and thus constitutes an individual being. As such, substantial form is distinguished from accidental forms.

Aristotle notices that substantial form persists through accidental change, but this in no way excludes the possibility of a process in which a thing can change as a whole. It is

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though I have not read as yet more than a quarter of the book proper. From quotations which I had seen, I had a high notion of Aristotle's merits, but I had not the most remote notion what a wonderful man he was. Linnaeus and Cuvier have been my two gods, though in very different ways, but they were mere schoolboys to old Aristotle" (Charles Darwin, "C. Darwin to W. Ogle," in *The Life and Letters of Charles Darwin*, vol. 3, ed. Francis Darwin [London: John Murray, 1887], 251-252).

<sup>3</sup> "[T]hat out of which a thing comes to be and which persists, is called 'cause,' e.g. the bronze of the statue, the silver of the bowl, and the genera of which the bronze and the silver are species" (*Phys.* II, 3 [194b 24-25]). See also *Meta.* V, 2 (1013a 24-25).

<sup>4</sup> "The matter comes to be and ceases to be in one sense, while in another it does not. As that which contains the privation, it ceases to be in its own nature, for what ceases to be—the privation—is contained within it. But as potentiality it does not cease to be in its own nature, but is necessarily outside the sphere of becoming and ceasing to be. ... For my definition of matter is just this—the primary substratum of each thing, from which it comes to be without qualification, and which persists in the result" (*Phys.* I, 9 [192a 25-33]). See also *Phys.* I, 7 (191a 8-12); II, 7 (198a 21-22); *Meta.* VII, 3 (1029a 20-21); VIII, 4 (1044a 15-23); IX, 7 (1049a 19-22, 24).

<sup>5</sup> "Cause' means ... (2) The form or pattern, i.e. the definition of the essence, and the classes which include this (e.g. the ratio 2:1 and number in general are causes of the octave), and the parts included in the definition" [*Meta.* V, 2 (1013a 27-28)]. See also *Phys.* II, 3 (194b 26-27).

possible that a thing may change in a way that brings about not only an alteration of an existent being, but also the coming-to-be of a new substance.<sup>6</sup> In other words, when the primary matter of an already existing being is properly disposed, it may receive a new substantial form in a process of the coming-to-be of a new substance, that is “generation” or “corruption.” What is more, this idea of the proper disposition of matter is related to a natural tendency of matter to be in-formed by more perfect forms. Aristotle recognizes an ascending gradation in the perfection of beings in nature. On his *scala naturae* we can observe a gradual crescendo from non-living, through plant and animal, to human forms.<sup>7</sup>

This reflection on hylomorphism, substantial and accidental change, the disposition of matter and its tendency to be in-formed by more perfect forms, helps us to specify metaphysical aspects of the mechanism of evolution. It can be understood, according to Moreno and O’Rourke, as a series of accidental changes in the structure of genetic material (DNA), having consequences for the disposition of primary matter, and leading to a precise instant at which the primary matter of the egg and sperm, when joined, is not disposed to the old substantial form ( $F_1$ ) of the parents, but to a new substantial form ( $F_2$ ), constituting a new species. It takes many mutations (outcomes of which are regulated by natural selection) to produce such an effect, and its actual occurrence may be extremely difficult to capture. But this does not exclude the possibility of its occurring, especially in a situation where members of a species migrate to a new

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<sup>6</sup> “[T]here is ‘alteration’ when the substratum is perceptible and persists, but changes in its own properties, the properties in question being opposed to one another either as contraries or as intermediates. The body, e.g. although persisting as the same body, is now healthy and now ill; and the bronze is now spherical and at another time angular, and yet remains the same bronze. But when nothing perceptible persists in its identity as a substratum, and the thing changes as a whole (when e.g. the seed as a whole is converted into blood, or water into air, or air as a whole into water), such an occurrence is no longer ‘alteration.’ It is a coming-to-be of one substance and a passing-away of the other—especially if the change proceeds from an imperceptible something to something perceptible (either to touch or to all the senses)” (*De Gen.* I, 4 [319b 10-18]).

<sup>7</sup> “Nature proceeds little by little from things lifeless to animal life in such a way that it is impossible to determine the exact line of demarcation, nor on which side thereof an intermediate form should lie” (*Hist. An.* VIII, 1 [588b 4-6]). See also *Par. An.* IV, 5 (681a 12-15); *Gen. An.* II, 1 (732b 15).

environment and can be modified gradually in subsequent generations, to the point where they can no longer mate with the descendants of their ancestors.<sup>8</sup>

### Transformism and an Aristotelian Concept of Species

Even if Aristotle's hylomorphism turns out to provide a possible ground for the metaphysics of evolutionary changes, one may still object that transformism remains radically foreign to his definition of species. For was it not Aristotle, together with Plato, who proposed a concept of species as eternal, immutable, and discrete? Although the vast majority may answer in the affirmative, in truth, the static Platonic concept of species conceived as immutable forms, separated from matter and existing in the realm of eternal ideas, has little to do with the dynamic Aristotelian understanding of species forging a middle path between the absolute realism of Plato and the pure nominalism of later centuries. For Aristotle, species are real, immutable, and eternal only in the sense that each one of them involves a form that causes a species to be what it is and to exhibit fixed and permanent traits. Yet at the same time, every species exists as realized in concrete, temporal, individual, and contingent organisms. Thus, even though the essential intrinsic traits of species are immutable, their existential realization in nature is not. As a result, we may follow Aristotle by arguing that all representatives of a species have a "common nature" (substantial form), which finds its expression in the variety of interactions and interrelations between unique individuals. In other words, species are the instantiations of forms—forms that cannot exist apart from realization in concrete organisms.

As we have seen, the process of evolution can be explained as a series of existential realizations of forms in nature carried out through the process in which primary matter becomes properly disposed to be informed by new substantial forms. Species can thus be said to gradually change (evolve) in time; but not without qualification. What needs to be clarified is that what actually change are accidental traits and properties of concrete organisms, which brings, in turn, an alteration of the disposition of primary matter,

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<sup>8</sup> Antonio Moreno, "Some Philosophical Considerations on Biological Evolution," *The Thomist* 37 (1973), 429-431; Fran O'Rourke, "Aristotle and the Metaphysics of Evolution," *The Review of Metaphysics* 58 (2004), 26-27.

preparing it to receive the form of a new species. Therefore, strictly speaking, what the complex nexus of evolutionary processes brings about, from the Aristotelian point of view, is an existential realization of species as forms, educed from the potency of primary matter.<sup>9</sup>

### Teleology and Chance in Evolution

Our explanation of evolutionary changes of species in terms of material and formal causes, however, is still neither complete nor sufficient. It does not answer all the questions concerning variability and stability in nature. Anyone who subscribes to the philosophical school of Aristotle has to be concerned with two remaining types of causality. The question needs to be asked especially in reference to the role of teleological explanation in evolutionary theory. John Dudley rightly says that our contemporary debate on the mechanism of biological evolution resembles the ancient struggle between Empedocles and Aristotle.<sup>10</sup> The former would understand evolution as an entirely random process of the coming-to-be of new organisms, without any *per se* or final causes, while the latter, when observing and describing changes in nature, would always refer to final and formal causation.

Interestingly, the bad reputation of teleological explanations in biology, if not already overcome, has been seriously challenged by those who, following Dobzhansky, notice that “mutation alone, uncontrolled by natural selection, would result in the breakdown and eventual extinction of life, not in the adaptive or progressive evolution,”<sup>11</sup> and thus find natural selection having a teleological character. Francisco Ayala emphasizes that natural selection is not only a purely negative mechanistic end-directed process that promotes the useful and gets rid of harmful mutants, thus increasing

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<sup>9</sup> See Mariusz Tabaczek, “An Aristotelian Account of Evolution and the Contemporary Philosophy of Biology,” in *The 1st Virtual International Conference on the Dialogue between Science and Theology. Dialogo Conf 2014: Cosmology, Life & Anthropology*, ed. Cosmin Tudor Ciocan and Anton Lieskovský (Zilina: Publishing Institution of the University of Zilina, 2014), 63-64.

<sup>10</sup> See John Dudley, *Aristotle’s Concept of Chance: Accidents, Cause, Necessity, and Determinism* (New York: SUNY Press, 2012), 337.

<sup>11</sup> Theodosius Dobzhansky, *Genetics of the Evolutionary Process* (New York: Columbia University Press, 1970), 65.

reproductive efficiency, but also “is able to generate novelty by increasing the probability of otherwise extremely improbable genetic combinations.”<sup>12</sup> Ernst Mayr was more skeptical about teleology. He found it equivalent to goal-directedness and thought that it implies the causal influence of a future goal on a present situation. He considered this unacceptable in Neo-Darwinism. For this reason, he suggested replacing “teleological” with “teleonomic” and “teleomatic.”<sup>13</sup> But Denis Walsh, in answer to Mayr’s concern, emphasizes that teleology is goal-directedness that explains the presence of traits in an organism, manifest as an intrinsic property of a system, and not as unactualized goals acting from the future.<sup>14</sup>

This line of argumentation remains in agreement with the view of Aristotle, who emphasizes that teleology is an intrinsic aspect of nature, both inanimate and animate,<sup>15</sup> and argues that it is inadequate to explain nature in its changeability by means of material causality and chance only. In order to explain chance, Aristotle makes use of the distinction between *per se* and *per accidens* causes. *Per se* causes are fundamental and essential causes that come from nature (φύσις) or intellect (νοῦς). These are formal and final causes, which—in order for nature to act—find their expression in the efficient causality of all natural beings.<sup>16</sup> Accidental causes, on the other hand, are not among the four causes listed by Aristotle. Just as an accident has no existence of its own but is a

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<sup>12</sup> “Natural selection is creative in a way. It does not ‘create’ the genetic entities upon which it operates, but it produces adaptive genetic combinations which would not have existed otherwise. ... Natural selection is teleological in the sense that it produces and maintains end-directed organs and processes, when the function or end-state served by the organ or process contributes to the reproductive fitness of the organisms” (Francisco J. Ayala, “Teleological Explanations in Evolutionary Biology,” in *Nature’s Purposes: Analyses of Function and Design in Biology*, ed. Colin Allen, Marc Bekoff and George Lauder [Cambridge, MA: MIT Press, 1998], 35, 41).

<sup>13</sup> Mayr defines “teleonomy” as a process or behavior “that owes its goal directedness to the operation of a program.” “Teleomatics” refers in his view to “processes that reach an end-state caused by natural laws.” See Ernst Mayr, “Teleological and Teleonomic: A New Analysis,” in *Evolution and the Diversity of Life: Selected Essays* (Cambridge, MA: Belknap Press of Harvard University Press, 1976), 387-390, 403.

<sup>14</sup> See Denis Walsh, “Teleology,” in *The Oxford Handbook of Philosophy of Biology*, ed. Michael Ruse (Oxford: Oxford University Press, 2008), 119.

<sup>15</sup> “It is absurd to suppose that purpose is not present because we do not observe the agent deliberating” (*Phys.* II, 8 [199b 26-27]).

<sup>16</sup> See *Phys.* II, 7 (198a 23-26).

function of a substance, similarly an accidental cause has to be related to a *per se* cause.<sup>17</sup> To give an example taken from Aristotle, the essential efficient cause of a house is its builder. If he happens to be a pale man and a musician as well, then it seems to be justified to say that a musician or a pale man built a house. But his musical skills and the fact that he is pale are only accidental (coincidental) causes related to the *per se* cause of him being a builder.<sup>18</sup>

Having this distinction in mind, Aristotle says that chance is an unusual accidental cause, and as such it is inherently unpredictable and purposeless. Chance events are due to nothing in the substance or *per se* cause that happens to concur with these unexpected occurrences.<sup>19</sup> And yet, as an accidental cause, chance occurs always and only in reference to a *per se* cause.<sup>20</sup> Therefore, chance for Aristotle is posterior and inherently related to nature (φύσις) and intellect (νοῦς), and thus it is associated with formal and final causality rather than with material necessity.<sup>21</sup>

Applied to the Neo-Darwinist evolutionary theory, Aristotle's explanation of causality and chance helps us to understand that although mutations, regarded as the necessary condition for the possibility of natural selection, are truly unpredictable and

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<sup>17</sup> See *Phys.* II, 3 (195a 26-195b 6); II, 5 (196b 24-29). "It is important to note that an event for Aristotle has the same metaphysical status as a substance in which many accidents inhere. There can be only one *per se* cause of a substance and likewise also of an event. Therefore, an event cannot be explained in terms of Aristotle's metaphysics as the meeting or interaction of two chains of causality, as held by Mill. For Aristotle only one cause (or chain of necessary causes) is the *per se* cause, whereas the second chain could only provide an accidental cause in relation to the first" (Dudley, *Aristotle's Concept of Chance*, 308).

<sup>18</sup> *Phys.* II, 3 (196b 25-29). Aristotle uses a similar example of a sculptor in *Phys.* II, 3 (195a 34-195b 6). See also *Phys.* II, 3 (195b 24); II, 5 (196b 27-29).

<sup>19</sup> "[C]hance is an incidental cause. But strictly it is not the cause—without qualification—of anything" (*Phys.* II, 5 [197a, 12-14]).

<sup>20</sup> Thus we can see that for Aristotle chance is not only of an epistemological nature. It is not described merely as an unexpectedness due to the limitations of human understanding. Chance has for him primarily an ontological character.

<sup>21</sup> "[N]o incidental cause can be prior to a cause *per se*. Spontaneity and chance, therefore, are posterior to intelligence and nature. Hence, however true it may be that the heavens are due to spontaneity, it will still be true that intelligence and nature will be prior causes of this all and of many things in it besides" (*Phys.* II, 6 [198a 8-13]). "Since nothing accidental is prior to the essential, neither are accidental causes prior. If, then, luck or spontaneity is a cause of the material universe, reason and nature are causes before it" (*Meta.* XI, 8 [1065b 2-4]). For more information about the exegesis and doctrine of Aristotle's *Phys.* II, 4-6 see Dudley, *Aristotle's concept of Chance*, 19-57.

occur by chance, they have a *per accidens* character in reference to the *per se* cause of living beings that strive to survive and produce offspring. The acceptance of this plural notion of causality helps us understand that the absence of a direct efficient cause of mutations does not exclude other kinds of causality from being active. Aristotle's philosophy of nature reminds us that we need to take formal and final causality into account in our attempt to explain the nature of evolutionary changes.<sup>22</sup>

### Principle of Proportionate Causality and Evolution

The Aristotelian response to the theory of evolution faces yet another important metaphysical problem. It seems to violate the classical philosophical principle of proportionate causation, which states that the higher effects cannot proceed from lower causes.<sup>23</sup> To deal with this difficulty, we should first notice a fundamental difference between the metaphysical order of various degrees of perfection of different "essences" and the biological order of different forms of life, which is based on a historical and phenomenological analysis. Metaphysical categories of "higher" and "lower" should not be equated with biological concepts describing organisms as "more complex" and "better adapted." In other words, "more complex" and "better adapted" do not presuppose a higher perfection of "essence." Insects, for instance, are certainly not the highest organisms in terms of the metaphysical perfection of their "essence," but they can be regarded as a culmination of an evolutionary line in terms of adaptation to their environmental niche. That is why, when biology speaks about different species, it does not

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<sup>22</sup> See *Phys.* II, 4-6 (195b 31-198a 13). It should be noticed at this point that, contrary to what is often thought, Aristotle's notion of final cause does not presuppose that the entire process of changes in nature (scientifically described as evolution) has a goal or a final end. This assertion, typical of Hegelian metaphysics, is foreign to the philosophy of Aristotle, for whom ends and goals can be predicated only of individual substances. According to him, species exist only as realized in concrete, temporal, individual, and contingent organisms.

<sup>23</sup> "[T]he begetter is of the same kind as the begotten" (*Meta.* VII, 8 [1033b 30]). "Effects must needs be proportionate to their causes and principles" (*ST* I-II, 63, 3, co.). "[W]hatever perfection exists in an effect must be found in the effective cause" (*ST* I, 4, 2, co.). "[N]o effect exceeds its cause" (*ST* II-II, 32, 4, obj. 1). "[E]very agent produces its like" (*SCG* II, 21, no. 9). "[T]he order of causes necessarily corresponds to the order of effects, since effects are commensurate with their causes" (*SCG* II, 15, no. 4). "[E]very agent acts according as it is in act" (*SCG* II, 6, no. 4).

mean to speak about different “essences,” as it is not concerned with levels of ontological perfection.

Moreover, the mechanism of biological evolution does not necessarily coincide with the philosophical notion of efficient causality. To “descend from,” or to “be produced out of,” differs in meaning from the philosophical notion of being “caused” or “produced by.” In addition, the emphasis on the historical aspect of the development of various species helps us to see it as a complex result of many causal influences. The mechanism of evolution would then seem to involve a matrix of various causes. But can this matrix of causes, or any one of them individually, be considered the efficient cause of the eventual product of evolution? In Aristotle’s understanding, an efficient cause always acts for a particular end. But none of the factors involved in evolution is understood as intending its eventual product. That is why we may conclude emphasizing one more time that the proportionate cause of the emergence of the new species is not a single law or force, but a concurrence of many causal influences constitutive for an evolutionary event, or rather a history of evolutionary changes. In other words, whatever is present in the effect of evolutionary changes, must be present in its “total” cause rather than in one of the particular causal factors.<sup>24</sup>

## Creation and Evolution

So far, I have demonstrated that the natural philosophy of Aristotle, far from being obsolete, stands as relevant and even plausible in its encounter with contemporary biology. What is more, it provides biology, in turn, with helpful conceptual tools useful for

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<sup>24</sup> See Benedict Ashley, “Causality and Evolution,” *The Thomist* 36, (1972), 215; Norbert Luyten, “Philosophical Implications of Evolution,” *New Scholasticism* 25 (1951), 300-302; Leo J. Elders, “The Philosophical and Religious Background of Charles Darwin’s Theory of Evolution,” *Doctor Communis* 37 (1984), 56. Debating the principle of proportionate causation Feser adds that it does not entail that the effect must be present in its cause “formally.” It can be present in it “virtually” or “eminently,” since, as notices Aquinas, “a natural agent does not hand over its own form to another subject but reduces the passive subject from potency to act” (*SCG* III, 69, no. 28). Feser gives an example of giving somebody twenty dollars. One can do it “formally” by handing a twenty dollar bill, “virtually” by making a transfer from a bank account, or “eminently” by having an access to a U.S. Federal Reserve Bank printing press and getting a twenty dollar bill printed on demand. In the third case, even if one does not have money formally, or even virtually, one has a power to “make” twenty dollar bills. See Edward Feser, *Scholastic Metaphysics. A Contemporary Introduction* (Heusenstamm: Editiones Scholasticae, 2014), 154-159.

explaining the character of natural selection and the role of teleology and chance in evolutionary processes. Consequently, the theory of evolution must necessarily enrich both the philosophy and the natural theology of Thomas Aquinas, whose thought follows the legacy of Aristotle's metaphysics. In what follows, I will consider a Thomistic response to the principles of evolutionary theory.

### Natural Selection in Aquinas

First, let us begin with Thomas's philosophy. In his careful study of Aristotle's *Physics*, Aquinas encounters the Philosopher's peculiar reference to some thinkers who, rejecting teleology, suggest that everything in nature happens out of necessity. It may seem, they say, that things in nature come to be for an end; yet, in spite of appearance, they are actually organized "spontaneously in a fitting way," which helps them to survive, unlike those things or organisms that grew otherwise, which "perished and continue to perish."<sup>25</sup>

This passage from Aristotle, which already looks like a primitive description of natural selection, was commented on by Aquinas, whose own description is even closer to the one formulated by Darwin and modern evolutionary theory. Referring to the same group of thinkers who rejected teleology and argued for the necessity of natural events, Aquinas says that

they say that from the beginning of the formation of the world the four elements [earth, water, air, fire] were joined in the constitution of natural things, and thus the many and varied dispositions of natural things were produced. And in all these things only that which happened to be suitable for some utility, as if it were made for that utility, was preserved. For such things had a disposition which made them suitable for being preserved, not because of some agent intending an end, but because of that which is *per se* vain, i.e., by chance. On the other hand, whatever did not have such a disposition was

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<sup>25</sup> *Phys.* II, 8 (198b 29-32).

destroyed, and is destroyed daily. Thus Empedocles said that in the beginning things which were part ox and part man were generated.<sup>26</sup>

Both descriptions are striking. Clearly, to assume *prima facie* that Aristotle and Aquinas either developed or accepted a theory of evolution would be anachronistic. The empirical scientific data, both in antiquity and in the Middle Ages, did not provide sufficient arguments for such a conclusion. On the other hand, our analysis shows that both Aristotle and Aquinas, carefully observing changes and processes in nature, developed a metaphysics that serves as a philosophical foundation for evolutionism and the rule of natural selection.

Assuming that their analysis does introduce a preliminary description of natural selection, we ought to acknowledge that neither Aristotle nor Aquinas say plainly whether they find the very idea plausible. In fact, they seem to reject it. Why? Interestingly, the thinkers quoted by Thomas as first describing such a process did so while intending to prove that, in natural processes, the necessity of chance is the rule; a rule that would nowadays be described as a “blind” or “absolute” chance. This stood in stark contrast to the philosophical principle that nature always acts for an end. For Aristotle and Aquinas this end, or final cause, is natural and intrinsic to things and organisms. Simply put, they found the rejection of teleology to be unacceptable.

In spite of Aristotle’s and Thomas’ initial rejection of the primal description of natural selection, might we still find room to justify it within their philosophy? The question poses a difficulty, but it is not insurmountable. As we have seen within more recent reflection on the philosophical aspects of evolutionary biology pursued by Dobzhansky, Ayala, and Walsh, chance events occurring at the bottom level of

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<sup>26</sup> *In phys.* II, lect. 12, § 253. We find similar ideas in *Lectio 14*. Referring to errors in arts and in nature, Aquinas says that “The very fact ... that there happens to be error in art is a sign that art acts for the sake of something. The same thing also happens in natural things in which monsters are, as it were, the errors of nature acting for the sake of something insofar as the correct operation of nature is deficient. And this very fact that error occurs in natural things is a sign that nature acts for the sake of some thing. The same thing is true of those substances which Empedocles said were produced at the beginning of the world, such as the ‘ox-progeny’, i.e., half ox and half man. For if such things were not able to arrive at some end and final state of nature so that they would be preserved in existence, this was not because nature did not intend this [a final state], but because they were not capable of being preserved” (*In phys.* II, lect. 14, § 263).

evolutionary processes take place in organisms that by definition strive to survive and produce offspring. Yet, in this account, is not survival itself an end? Is not reproduction a goal or *telos* that determines the creature? Though there are chance events in nature, these chance events must be related to regularity and teleology intrinsically present in it. Might we be so bold as to hypothesize that, if Aristotle and Thomas philosophized within the milieu of contemporary biology, far from finding natural selection to be a threat to their philosophy, they would rather have found within their philosophy a fitting place for it? I answer yes: they would have found such a fitting place. May we not, therefore, say that Darwin's theory, far from being a nineteenth century *deus ex machina*, instead has philosophical precedence as early as ancient Greece and Medieval Paris? Far from being antithetical to ancient philosophy, Darwin seems to develop it. Was not Qoheleth right when he said that "nothing is new under the sun?"<sup>27</sup>

### Aquinas on Creation and Genesis

Next, turning toward theology, we find Thomas' teaching concerning creation a perfect example of his genius, revealing an amazing clarity and consistency of his philosophical theology, and proving the effectiveness of his method. The secret of this method is very simple: Aquinas never leaves philosophy behind him. Rather, he constantly holds to it as an indispensable conceptual tool for any theological reflection. Therefore, it is not a coincidence that Thomas does not begin his treatise on creation with an analysis of the account of the cosmogony in Genesis. In order to interpret it properly, one must be equipped with the right philosophical terminology. That is why Aquinas first explains the nature of *creatio ex nihilo* from the perspective of metaphysics. He points to the necessary distinction between creation and change. To create is to cause the very existence of what is. Thus, creation is neither change nor motion, but the production of the whole being.<sup>28</sup>

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<sup>27</sup> Eccl. 1:9, *The New American Bible* (Iowa Falls: Catholic World Press, 1997).

<sup>28</sup> "Creation is not change" (*ST I*, 45, 2, ad 2). "[T]he proper effect of God creating is what is presupposed to all other effects, and that is absolute being" (*ST I*, 45, 5, co). "[C]reation is not a motion. Hence, no substance besides God can create anything" (*SCG II*, 21, no. 5). "[C]reation in the creature is only a certain relation to the Creator as to the principle of its being" (*ST I*, 45, 3, co). "[B]eing is the most common first effect and more intimate than all other effects: wherefore it is an effect which it belongs to God alone to produce by his own power" (*De pot.* 3, 7, co). "[T]he being of every creature depends on God, so that not for

That is why, says William Carroll, there is no conflict between the doctrine of creation in Aquinas and any physical theory. While science deals with changes and their causes, a theological account of creation deals with the metaphysical dependence of all creatures on God at every moment of their existence, regardless of their stability and/or variability.<sup>29</sup> With respect to the theory of evolution, just as it is wrong to claim that evolutionary biology contradicts the doctrine of creation, so it is also incorrect to appeal to the biblical cosmogony as the final proof of creation.<sup>30</sup>

It is only after specifying the philosophical meaning of creation *ex nihilo* that Thomas reflects on the opening narrative from Genesis. His explanation is based on the general rule that applies to all truths of faith:

It should be said that what pertains to faith is distinguished in two ways, for some are as such of the substance of faith, such that God is three and one, and the like, about which no one may licitly think otherwise. ... [O]ther things are only incidental. ... On such matters even the saints disagree, explaining scripture in different ways. Thus with respect to the beginning of the world something pertains to the substance of faith, namely that the world began to be by creation, and all the saints agree in this. But how and in what order this was done pertains to faith only incidentally insofar as it is treated in scripture, the truth of which the saints save in the different explanations they offer.<sup>31</sup>

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a moment could it subsist, but would fall into nothingness were it not kept in being by the operation of the Divine power” (*ST I*, 104, 1, co.).

<sup>29</sup> William E. Carroll, “At the Mercy of Chance? Evolution and the Catholic Tradition,” *Revue des Questions Scientifiques*, 177 (2006), 186; *Creation, Evolution, and Thomas Aquinas*,

<http://www.catholiceducation.org/articles/science/scoo35.html> (accessed January 28, 2015), section: “Thomas Aquinas’ Understanding of Creation”; “Creation in the Age of Modern Science,” *Tópicos* 42 (2012), 118-119.

<sup>30</sup> Although correct ontologically, Carroll’s position seems to neglect the aspect of temporal contingency which that Russell sees as a secondary contribution to the meaning of *creatio ex nihilo*. He defines finitude in terms of a Lakatosian research program in a series of auxiliary hypotheses and claims that it serves as “a bridge between the core theory, ontological origination, and the data for theology, here seen in terms of the origin of the universe at  $t=0$ ” (Robert John Russell, “Finite Creation Without a Beginning: The Doctrine of Creation in Relation to Big Bang and Quantum Cosmologies,” in *Quantum Cosmology and the Laws of Nature*, ed. Robert John Russell, Nancey Murphy and C. J. Isham [Berkeley, CA: CTNS, 1999], 306).

<sup>31</sup> *In II Sent.*, dist. 12, I, 2, co. Similar is Aquinas’ opinion offered in his *De potentia Dei*: “[T]his incorporeal agent by whom all things, both corporeal and incorporeal are created, is God, as we have proved above (*De pot.* 3, articles 5, 6, 8), from whom things derive not only their form but also their matter. And as

Thomas had good reason to say this. In trying to explain the biblical account of creation he encountered two traditions. The first one, coming from Augustine, claimed that only some things—that is, elements, celestial bodies and spiritual substances—were made at the very beginning of creation. The rest (animals, plants, and men) existed in seminal notions (*rationes seminales*) that are gradually transformed into actuality.<sup>32</sup> The other opinion, held by Ambrose and other fathers of the Church, would argue that the order of time described in Genesis is saved literally in the distinction of things. Having said that creation is defined as dependence on God in being, and its actual order is only accidental to faith, Thomas accepts and defends both positions as hypothetically true.<sup>33</sup>

Paradoxically, although the idea of the gradual appearance in time of various forms and genera that were already present in the first creation seems to be relevant, to some extent, with the theory of evolution, Charles Darwin rather distances himself from Augustine's theory.<sup>34</sup> Nevertheless, some theologians still claim that Augustine's teaching makes plausible the concept of evolution.<sup>35</sup> But apart from this discussion, we find another interesting argument suggesting that Aquinas' system might be open to the evolutionary hypothesis. The argument in question is based on the differentiation and explanation of the work of creation, distinction, and adornment, that Thomas introduces

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to the question at issue it makes no difference whether they were all made by him immediately, or in a certain order as certain philosophers have maintained" (*De pot.* 5, 1, co.).

<sup>32</sup> Augustine, *De Gen. Ad lit.* See also *De pot.* 4, 2, ad 28; *ST I*, 69, 2, co.

<sup>33</sup> "The first explanation of these things namely that held by Augustine is the more subtle, and is a better defense of Scripture against the ridicule of unbelievers: but the second which is maintained by the other saints is easier to grasp, and more in keeping with the surface meaning of the text. Seeing however that neither is in contradiction with the truth of faith, and that the context admits of either interpretation, in order that neither may be unduly favored we now proceed to deal with the arguments on either side" (*De pot.* 4, 2, co.).

<sup>34</sup> In his excellent study *From Aristotle to Darwin And Back Again*, Étienne Gilson shows that Darwin did not regard himself originally as a herald of evolutionary theory. In fact, in *On the Origin of Species* the word "evolution" appears only once, in the last of the six editions of the book published during Darwin's lifetime. Darwin was skeptical about Augustine claiming that after creation nothing has been added to the world, and that everything originally contained in nature in the form of seminal notions (*rationes seminales*) gradually "e-velops," "un-folds," or "en-velops" in time. He would also reject Herbert Spencer's definition of evolution with its philosophical overtones. His was the idea of "transmutation of species" or "change of species by descent," which he would propose and defend as a biological hypothesis. See Étienne Gilson, *From Aristotle to Darwin and Back Again: A Journey in Final Causality, Species, and Evolution* (San Francisco: Ignatius Press, 2009), 59-61.

<sup>35</sup> See for instance Moreno, *Some Philosophical Considerations*, 419.

in his reflection on the six days. Speaking about the nature of primary matter, supposedly devoid of any form, Thomas comes to the conclusion that as the outcome of the work of creation, it did not come into being “altogether formless, nor under any one common form, but under distinct forms.”<sup>36</sup> Later on, in the same article of his *Summa Theologiae*, he mentions first differentiations that followed the act of creation, preceding the work of distinction and adornment. These are the differentiation of heaven and earth, and “of the elements according to their forms, since both earth and water are named.”<sup>37</sup> Following this comment is Thomas’ reflection on the production (*productio*) of plants, heavenly luminaries, and animals in the work of distinction and adornment.

From this I infer that forms of heavenly bodies, plants, and animals, are educed out of the matter that is already in-formed. This is relevant to Aquinas’ teaching on the hierarchy of degrees in substantial transformation, which is also in agreement with the similar idea of Aristotle described above.<sup>38</sup> What is more, Thomas calls this process “production,” not “creation.” Without exaggerating this terminological difference, one may notice that it seems to resonate with Aquinas’ claim that, as created in time, all objects and organisms depend on God for their being, while the way in which they are instantiated is of secondary importance and belongs to faith incidentally. It may be the

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<sup>36</sup> *ST I*, 66, 1, co.

<sup>37</sup> *ST I*, 66, 1, ad 2.

<sup>38</sup> Aquinas follows Aristotle’s concept of the *scala naturae*. He thus speaks of the disposition and tendency of primary matter to be informed gradually by more perfect forms: “[T]he more posterior and more perfect an act is, the more fundamentally is the inclination of matter directed toward it. Hence in regard to the last and most perfect act that matter can attain, the inclination of matter whereby it desires form must be inclined as toward the ultimate end of generation. Now, among the acts pertaining to forms, certain gradations are found. Thus, prime matter is in potency, first of all, to the form of an element. When it is existing under the form of an element it is in potency to the form of a mixed body; that is why the elements are matter for the mixed body. Considered under the form of a mixed body, it is in potency to a vegetative soul, for this sort of soul is the act of a body. In turn, the vegetative soul is in potency to a sensitive soul, and a sensitive one to an intellectual one. ... So, elements exist for the sake of mixed bodies; these latter exist for the sake of living bodies, among which plants exist for animals, and animals for men. Therefore, man is the end of the whole order of generation” (*SCG III*, 22, 7). “[F]rom the fact that matter is known to have a certain substantial mode of existing, matter can be understood to receive accidents by which it is disposed to a higher perfection, so far as it is fittingly disposed to receive that higher perfection” (*De an.* 9, co.). Cf. *In de an.* II, lect. 7 (§ 315); *De pot.* 5, 1, co., ad 5.

reason why Thomas distinguishes between “creation” and “production.”<sup>39</sup> But those who are eager to look for an indisputable proof for evolution in this thought of Aquinas, may be disappointed with another argument that we encounter in the preceding question of his *Summa Theologiae*:

But in the first production of corporeal creatures no transmutation from potentiality to act can have taken place, and accordingly, the corporeal forms that bodies had when first produced came immediately from God, whose bidding alone matter obeys, as its own proper cause. To signify this, Moses prefaces each work with the words, “God said, Let this thing be,” or “that,” to denote the formation of all things by the Word of God, from Whom, according to Augustine, is “all form and fitness and concord of parts.”<sup>40</sup>

On first sight, Aquinas seems to be excluding here radically the possibility of evolution. A closer examination of the passage shows, however, that, when referring to matter’s obedience to God’s bidding and the concordance of parts in organisms, Thomas alludes again indirectly to the idea that corporeal creatures were made of an already informed matter. If that is the case, then Aquinas’ system leaves open the possibility of transformism.

### Causation of God

If one feels overwhelmed with the complex nuances of Aquinas’ exegesis of the creation story in Genesis, and its possible applications in the discussion about the theory of evolution, one may find it more useful to refer to Thomas’ philosophical theology, which offers some crucial distinctions between primary and secondary, principal and instrumental causation, and univocal/equivocal predication of God.

Following Aristotle’s notion of causation in nature, Aquinas notices that one efficient cause can work through another in order to achieve an end that is proportionate to the natural capacity of the latter. Referring to Aristotle’s science, Thomas generalizes

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<sup>39</sup> Thomas’ differentiation between *creatio* and *productio* seems to be related to the standard (though contested) distinction between the Hebrew *bara* (בָּרָא, to create) and *asah* (עָשָׂה, to make or do). It is suggested that while *bara* refers to *creatio ex nihilo*, *asah* should be understood as generation or evolution out of previously created things.

<sup>40</sup> *ST I*, 65, 4, co.

his example of man being begotten by man and by the sun as well, and says that “lower bodies act through the power of the celestial bodies.”<sup>41</sup> To make this idea more accessible for a contemporary reader, Michael Dodds uses an example of the orchestra: “Though none of the musicians is producing an effect beyond his or her own skill and training, they could not produce the combined sound of the symphony without the influence of the conductor.”<sup>42</sup> Such is in principle the idea of primary and secondary causation. This idea is also related to the concept of instrumental causality. In this case, a principal cause (e.g. myself typing this sentence) uses a thing (a keyboard) to produce an effect that exceeds the capacity of the thing used (a keyboard cannot produce a sentence by itself). The thing is then an instrumental cause in reference to a principal one.<sup>43</sup>

These philosophical assertions prove to be very useful when applied to the causation of God. Nature consists of beings which, due to their forms, generate other beings. However, they can only cause the production of beings like themselves by causing forms like their own to be educed from properly disposed matter. They are not the cause of the form as such (by which they also are particular kinds of being), nor of the act of being, by which they also exist. As secondary causes, they can make a thing “become” what it is, by educing its form from the potentiality of primary matter, but they cannot make it exist (*causa fiendi* is distinct from *causa essendi*). Only God is the source of the absolute *esse*.<sup>44</sup> If we can speak of one creature as a source of being of the other in the process of generation, it is only because it acts as an instrumental cause “in the hands of God” who creates the being of a new organism.<sup>45</sup> That is why our predication about the causality of

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<sup>41</sup> SCG III, 67, no. 5. See also *Phys.* II, 2 (194b 13).

<sup>42</sup> Michael J. Dodds, *Unlocking Divine Action: Contemporary Science and Thomas Aquinas* (Washington, DC: Catholic University of America Press, 2012), 30.

<sup>43</sup> “A thing is said to work toward the production of an effect instrumentally if it does not do so by means of a form inherent to it but only in so far as it is moved by an agent that acts of itself. ... It is in this way, for instance, that a saw works upon a bench” (*De ver.* 27, 4, co.).

<sup>44</sup> “[T]he proper effect of God creating is what is presupposed to all other effects, and that is absolute being [*esse absolute*]” (*ST I*, 45, 5, co.).

<sup>45</sup> “Therefore, the act of being is what secondary agents produce through the power of the primary agent. ... [B]eing is the proper effect of the primary agent, and all other things produce being because they act through the power of the primary agent. Now, secondary agents, which are like particularizers and

God is not univocal. He is not just one more cause among other natural causes; he is a transcendental cause of the being of all things and organisms. With the help of the notion of secondary and instrumental causation, we can understand that there is no contradiction between these two important texts in Thomas' *Summa Contra Gentiles* and *Summa Theologiae*:

[I]t is impossible for any creature to create, either by its own power or instrumentally—that is, ministerially.<sup>46</sup>

[B]eing is the proper product of the primary agent, that is, of God; and all things that give being do so because they act by God's power.<sup>47</sup>

In reference to the theory of evolution, we can say that new species (forms) are educed from the potentiality of primary matter, in the processes engaging organisms existing and operating in specific physical and biological circumstances. They act as secondary and instrumental causes “on behalf” of the Creator, who is the source of the being of new forms. Before he embraced agnosticism, Darwin thought of creation and divine action in terms of secondary causation.<sup>48</sup> However, his understanding of this

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determinants of the primary agent's action, produce as their proper effects other perfections which determine being” (SCG III, 66, no. 5-6).

<sup>46</sup> ST I, 45, 5, co.

<sup>47</sup> SCG III, 66, no. 4. A number of authors have discussed these issues. John Wippel, for instance, notes that “[F]or Thomas, whenever a new substance is efficiently caused by a natural or created agent, that agent's causation applies both to the act of being itself (esse) of the new substance and to a particular determination of esse as realized in that substance. Causation of the particular determination (this or that kind of form) is owing to the created efficient cause insofar as it operates by its own inherent power as a principal cause. Causation of the act of being itself (esse) is assigned to it as an instrumental cause acting with the power of God and to God himself as the principal cause of the same. From this it follows that one should not maintain that Thomas denies that created causes can efficiently cause the act of existing or the act of being, at least in the process of bringing new substances into being (John F. Wippel, “Thomas Aquinas on Creatures as Causes of Esse,” *International Philosophical Quarterly* 40 [2000], 213). See also Gregory T. Doolan, “The Causality of the Divine Ideas in Relation to Natural Agents in Thomas Aquinas,” *International Philosophical Quarterly* 44 (2004), 400-408; Étienne Gilson, *Thomism: The Philosophy of Thomas Aquinas* (Toronto: Pontifical Institute of Medieval Studies, 2002), 210-212.

<sup>48</sup> “To my mind it accords better with what we know of the laws impressed on matter by the Creator, that the production and extinction of the past and present inhabitants of the world should have been due to secondary causes, like those determining the birth and death of the individual” (Charles Darwin, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* [London: John Murray, 1859], [http://en.wikisource.org/wiki/On\\_the\\_Origin\\_of\\_Species\\_\(1859\)](http://en.wikisource.org/wiki/On_the_Origin_of_Species_(1859)) [accessed January 28, 2015], 488). See also an article by Maurer in which he refers to some thinkers commenting on

concept was rather close to deism. He saw God as withdrawn from the created world, and did not refer to the concept of his immanent presence in nature. The analysis of Aquinas proves to be more theologically adequate and correct, while still open to the possibility of evolution.

### Evolution and the Perfection of the Universe

Finally, I would like to present one more argument from the theology of Thomas that may be used in support of the theological reflection on the theory of evolution—namely, the one concerning the perfection of the universe. In his early works, Aquinas asks the question whether the world created by God is perfect, or whether God could have made it better. In *De potentia*, he answers that “the universe which has been produced by God is the best with respect to those things that are, but not with respect to those things that God can do.”<sup>49</sup> In the *Commentary on the Sentences*, Thomas discusses three possibilities for the perfection of the universe. With regard to the parts of the universe, it can be made better by the addition of new parts—that is, new species.<sup>50</sup> According to Aquinas’ teaching in this particular work, it is still possible:

If [we look at the problem] with regard to the parts in themselves, then it can be understood that the universe can be made better, either through the addition of many parts, that is to say, so that many other species would be created, and that many degrees of goodness that can exist would be complete, since the distance between the highest creature and God is still infinite; and thus God could have made [in this way] the universe better and can still do it.<sup>51</sup>

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Darwin’s philosophical and theological claims: Armand Maurer, “Darwin, Thomists, and Secondary Causality,” *The Review of Metaphysics* 57 (2004), 492-503.

<sup>49</sup> *De pot.* 3, 16, ad 17.

<sup>50</sup> Olivia Blanchette explains in reference to Albert the Great that in thirteenth-century discussions about the universe, the somewhat technical term “part” was understood as species: “Pars universi non sunt individua, sed species” (Albert the Great, *Quaestiones super de Animalibus*, 13, ad 1). See Olivia Blanchette, *The Perfection of the Universe According to Aquinas* (University Park, PA: Pennsylvania State University Press, 1992), 100 n. 13.

<sup>51</sup> “Si quantum ad partes ipsas, tunc potest intelligi universum fieri melius, vel per additionem plurium partium, ut scilicet crearentur multae aliae species, et implerentur multi gradus bonitatis qui possunt esse, cum etiam inter summam creaturam et Deum infinita distantia sit; et sic Deus melius

Following the principle of the continuity, Thomas adds that the universe enriched with new species would not be exactly the same nor radically different from the present one. It would be related to it as a whole to part. The addition of goodness would occur by mode of discrete quantity.<sup>52</sup>

While the first way of perfection of the universe assumes the possibility of the addition of new parts different in form, the second one consists of the possibility of the mutation of all parts of the universe to a better proportion and harmony—a finer tuning, so to speak:

Or, it [the universe] can be understood to be made better quasi-intensively, as it were through the mutation of all its parts for the better, because if some parts were made better while other were not made better, the goodness of order would not be as great; as it is seen with the lyre, if all strings are made better, its harmony becomes sweeter, but if only some of them are made better, there is dissonance.<sup>53</sup>

This higher proportion and harmony of the universe might be an outcome of an action or interaction among already existing parts of it. In this case an essential goodness of the universe remains unchanged. But God is able to make it still more perfect in what may be characterized as an instantiation of an accidental perfection, increasing and enhancing the original order in nature.

Finally, from the standpoint of the order of all things to the final end, as they draw closer to it, creatures can attain greater similitude to the divine goodness, and thus contribute to the greater perfection of the universe as a whole:

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universum facere potuisset et posset” (*In I Sent.*, dist. 44, I, 2, co.). The translation of this and the following passages from *In I Sent.* is my own.

<sup>52</sup> “[T]hat universe would be related to the present one as whole to part, and so it would be neither completely the same nor completely different, and this addition of goodness would be by way of discrete quantity” (*ibid.*).

“[I]llud universum se haberet ad hoc sicut totum ad partem; et sic nec penitus esset idem, nec penitus diversum; et haec additio bonitatis esset per modum quantitatis discretæ.”

<sup>53</sup> “Vel potest intelligi fieri melius quasi intensive, quasi mutatis omnibus partibus ejus in melius, quia si aliquae partes meliorarentur aliis non melioratis, non esset tanta bonitas ordinis; sicut patet in cithara, cujus si omnes chordae meliorantur, fit dulcior harmonia; sed quibusdam tantum melioratis, fit dissonantia” (*ibid.*).

[S]o far as the goodness of the parts of the universe and their order to one another would increase, the order to the end might improve as well, because they would come closer to the end, and they would attain more similitude to the divine goodness, which is the end of all things.<sup>54</sup>

This analysis is striking. Nowhere else in Aquinas' works can we find a direct suggestion concerning the possibility of the addition of new species. Nevertheless, we need to emphasize once again that this argumentation is by no means a definitive proof for the presence of the seeds of the modern concept of evolution in Aquinas. The *Commentary on the Sentences* is one of the earliest works written by Thomas,<sup>55</sup> and the idea of the creation of new species will never return in his mature theological writings. In *Summa Theologiae*, he does allude one more time to the possibility of the origination of new species under the primary causality of God and through the secondary causality of nature. However, Aquinas does not use the verb "create" anymore, and this omission reflects his understanding of Augustine's notion of *rationes seminales*. New species, whether they are produced by putrefaction or through the crossbreeding of other species, pre-existed in their causes, "in the work of six days:"

Nothing entirely new was afterwards made by God, but all things subsequently made had in a sense been made before in the work of the six days. ... Species, also, that are new, if any such appear, existed beforehand in various active powers; so that animals, and perhaps even new species of animals, are produced by putrefaction by the power which the stars and elements received at the beginning. Again, animals of new kinds arise occasionally from the connection of individuals belonging to different species, as the mule is the offspring of an ass and a mare; but even these existed previously in their causes, in the

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<sup>54</sup> "[E]t sic secundum quod cresceret bonitas partium universi et ordo earum ad invicem, posset meliorari ordo in finem, ex eo quod propinquius ad finem se haberent, quanto similitudinem divinae bonitati magis consequerentur, quae est omnium finis" (*ibid.*).

<sup>55</sup> Aquinas wrote his *Commentary on the Sentences* during his first teaching years in Paris between 1252/53-1254/55, although its composition was not fully complete even when Thomas began his activities as a master in 1256. The authorization permitting public teaching of the Aristotelian corpus, approved at this time at the University of Paris, was a great inspiration for Aquinas as a beginning scholar. Torrell notes that "The young bachelor did not hide his aims, and his choices show up immediately. There are more than 2000 quotations from Aristotle in the commentary on Lombard's four books" (Jean-Pierre Torrell, *Saint Thomas Aquinas. Vol. 1: The Person and His Work* [Washington, DC: The Catholic University of America Press, 2005], 41, 332).

works of the six days. Some also existed beforehand by way of similitude, as the souls now created.<sup>56</sup>

Once again, even if this reflection may suggest the possibility of emergence of new species in Aquinas, it must be considered that in the science of his age there was no evidence for transformism. Faithful to the scientific data, Thomas would rather say that “In its beginning the universe was perfect with regard to its species.”<sup>57</sup> For this reason, “To the perfection of the universe there can be added something daily with regard to the number of individuals, not, however, with regard to the number of species.”<sup>58</sup> It is only with regard to Aquinas’ hylomorphism, which makes him describe reality in terms of primary matter and form, and potency and act, that we may see him distinguishing between things created *actualiter* and things created only *causaliter* or *potentialiter*, and leaving a space for the possibility of the perfection of the universe, occurrence of new species, and evolution:

The universe in its beginning was perfect ... as regards nature’s causes from which afterwards other things could be propagated, but not as regards all their effects.<sup>59</sup>

[W]hen he [God] made things out of nothing he did not at once bring them from nothingness to their ultimate natural perfection, but conferred on them at first an imperfect being, and afterwards perfected them, so that the world was brought gradually from nothingness to its ultimate perfection.<sup>60</sup>

God in bringing all creatures into being out of nothing, himself instituted the first perfection of the universe, consisting in the principal parts thereof, and the various species of things: and that in order to give it its final perfection, consisting in the completion of the ranks of the blessed, he ordained the various movements and operations of creatures, some of which are natural, for instance, the movement of the heavens and the activities of the elements, whereby matter is prepared to receive rational souls, while others are

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<sup>56</sup> *ST I*, 73, 1, ad 3.

<sup>57</sup> *De pot.* 4, 2, ad 22.

<sup>58</sup> *ST I*, 118, 3, ad 2.

<sup>59</sup> *De pot.* 3, 10, ad 2.

<sup>60</sup> *De pot.* 4, 2, co.

voluntary such as the ministrations of the angels who are sent to minister for them who shall receive the inheritance of salvation.<sup>61</sup>

## **Conclusion**

I believe I have shown, through the course of this article, that, despite an ever-present skepticism toward classical philosophy and theology, the longstanding legacy of the Aristotelian-Thomistic tradition remains vigorous and ready to enter into a fruitful conversation with contemporary philosophy and science. Both Aristotle and Thomas present systems of thought that are not only coherent and consistent, but also flexible and open to the new data and current ways of understanding of the universe, its structures and processes.

When confronting the evolution debate in particular, the Aristotelian-Thomistic tradition offers an essential contribution to the results achieved by science, in the form of a metaphysical foundation of the mechanism of evolutionary changes and a preliminary description of natural selection. The theology of Thomas Aquinas, for its part, helps not only in the proper exegesis and interpretation of the account of the cosmogony in Genesis, but also enables us to propose a coherent and plausible way of understanding God's action in the processes of the differentiation of species. Thus I would like to emphasize that in the context of the ongoing discussion of scientific, philosophical, and theological approaches to the theory of evolution, the Aristotelian-Thomistic tradition offers an essential contribution that has a considerable explanatory power, and therefore should not be neglected.

## **Acknowledgments**

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<sup>61</sup> *De pot.* 5, 5, ad 13.

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