THE METAPHOR OF THE ARCHITECT IN DARWIN: CHANCE AND FREE WILL

by Ricardo Noguera-Solano

Abstract. In *The Variation of Animals and Plants under Domestication*, published in 1868, Darwin used the metaphor of the architect to argue in favor of natural autonomy and to clarify the role of chance in his theory of adaptive change by variation and natural selection. In this article, I trace the history of this important heuristic instrument in Darwin's writings and letters and suggest that this metaphor was important to Darwin because it helps him to explain the role of chance, and gives an argument in favor of the free will.

Keywords: accidental variation; chance; Charles Darwin; free will; metaphor of the architect; natural selection

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The metaphor of the architect was first mentioned by Charles Darwin in *The Variation of Animals and Plants under Domestication* (1868), hereafter referred to as *Variation.* He uses this figure of speech as a cognitive metaphor for explaining the role of chance in the evolutionary process, in my view point, by defending the autonomy of natural laws and defending free will. In the very paragraphs where Darwin clarifies his understanding of the notion of chance,[1] he also considers that the discussion of the origin of accidental variation is similar to that of the origin of free will. The association that Darwin makes between these ideas (chance and free will) can be found in his earliest writings, for example, in his *Metaphysics on Morals and Speculations on Expression* written in 1838, in his *Notebook M,* where Darwin wrote " . . . one well feels how many actions are not determined by what is called free will, but by strong invariable passions—when these passions [are] weak, opposed & complicated one calls them free will—the chance of mechanical phenomena" (Darwin 1838–1840, 25).

Even in his early thought, Darwin thinks of chance and free will as being similar ideas or as having the same meaning: "frame of mind, though perhaps he chooses wrongly, & what is frame of mind owing to. I verily believe free-will & chance are synonymous. Shake ten thousand grains

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of sand together & one will be uppermost: so in thoughts, one will rise according to law" (Darwin 1838–1840, 30–31).

This analogy is even more evident in the following quotation: "the free will (if so called) makes change in bodily organization of oyster, so may free will make change in man" (Darwin 1838–1840, 73). The similarity that Darwin considers in this text seems so great that, on occasion, quoting *Religio Medici*,[2] he considers that it is common to confuse chance, free will, and the Deity: "Curious passages showing how easily chance will of Deity are confounded." However, it is obvious that, for Darwin, both nature and "mankind" are autonomous entities, in such a way that it may be thought that "If so free will is to mind, what chance is to matter" (Darwin 1838–1848, 72). It is plain that in Darwin's analogy, there is a clear similarity between natural autonomy (chance) and mankind's autonomy (free will). From my viewpoint, and this is my main argument, these ideas were fundamental and shaped the history of metaphor of the architect in Darwin's writing.

Darwin explained his ideas with the aid of metaphors. The "entangled bank" (Darwin 1859, 489), the "coral metaphor" (Barrett et al. 1987, 25), and "the tree of life" (Darwin 1859, 129), for example, all help readers to grasp general aspects of the history and diversity of life in the natural world and to understand more deeply the effects of variation and natural selection. Other metaphors, for instance, "the thousands of wedges," "competition," "struggle for existence," and "natural selection," give us an understanding of more particular aspects of life's history. This Darwinian universe of metaphors, including the metaphor of the architect, has been widely explored from different points of view by many Darwin scholars,[3] for instance, in the works of Moore (1981) and Lennox (2010). The former analyzes the use of this metaphor in the context of the discussion of the differences between "Christian Darwinism" and the "secular Darwinism" of the second half of the nineteenth century. The latter author analyzes the role that this metaphor played in the discussion in correspondence between Asa Gray and Darwin, a dialogue related to the possibility (according to Gray) and the impossibility (according to Darwin) of amalgamating theological aspects and chance in evolutionary explanations. Moore (1981) and Lennox (2010) underline the importance of the use of metaphor in the differences between natural theology and evolutionary biological explanations. My aim, in contrast to other historical works, is to reconstruct the history of the metaphor of the architect in Darwin's writing and show the connection he makes between the defense of natural autonomy and free will.

In this sense, other research with valuable ideas should be mentioned, for instance, the work of Ruse (2003), who analyzes similarities between the argument from design and the complexity of Darwin's work. In his work, Ruse maintains that Darwin made a great contribution to science, and distanced himself from theology (Ruse 2003, 127). Similarly, Beatty

(1990; 2006, 635) and Lennox (1993) note the presence of teleology in Darwin's discourse, though, like Ruse, they consider that Darwin used the metaphor in a radical way, specifically to reject orthodox theology and the direct action of God in favor of evolutionary explanations.[4]

As previously mentioned in this article, my principal aim will be to show that Darwin had a solid intention in using the metaphor of the architect in *Variation* (1868) to argue in favor of naturalistic explanations, and in favor of free will. This is an important point not included in the various analyses of the metaphor of the constructor, which, in my opinion, is also linked to the refutation of ideas of predestination, in favor of free will. In that sense, I consider that this explanation of chance in evolutionary biology shows Darwin's particular interests going beyond the scientific sphere.

Darwin's position on free will, from my point of view, strengthens ideas about his religious transition from theism to deism (according to which God had created natural laws, but never had intervened in the history of the universe). While Darwin's beliefs seem to be very ambiguous with respect to religious subjects, it is clear that his religious views are in agreement with heterodox teleological positions (Lennox 1993, 1994; Beatty 1990, 2006) and with Victorian deist attitudes that questioned orthodox theology (Helmstadter 1990; Larsen 2006), rather than orthodox teleological positions, as defended especially by Paley (1809), Lyell (1830), and Gray (1861). He is not an atheist, although authors such as Aveling (1883) confused Darwin's agnostic ideas with atheism. It is a confusion, that is, to a large extent, deeply rooted in the historiographical Darwinian tradition; however, as van Wyhe (2011) points out, "all the surviving evidence contradicts the assertion that Darwin was an atheist."[5]

The article is in two parts. In the first, I present a brief reconstruction in order to clarify when and why Darwin used the metaphor of the architect. In the second part, I show how the metaphor of the architect explains natural autonomy.

From the Builder of Telescopes to Repair Man

A wide range of authors agree that Darwin was a theist before publishing *On the Origin of Species* in 1859, and that he believed that this "immense and wonderful universe" must have had a First Cause with an intelligent mind in some degree analogous to that of man (Darwin 1909, 92–93). Moreover, Darwin's theism can be detected in the draft of the *Origin*, known as *Natural Selection* (1856), in which Darwin compares the creation of instruments (telescopes and microscopes) to the design of organic forms (the evolution of the eye).[6] In the course of that comparison, Darwin gives a number of factors that help explain how the telescope has been perfected; namely, that there have been external causes that generate change, a selecting agent,

a reproductive capacity (manufacture of many telescopes), and sufficient time for the process to be carried out (Stauffer 1975, 353).

Darwin writes in these paragraphs: "and may we not believe that a living optical instrument might be formed, as much superior to one of glass, as the works of the Creator <Nature> are to those of Man <Art>" (Stauffer 1975, 353). In reflecting on this question, Darwin asked himself if he was being too presumptuous in comparing the work of humans with that of the Creator. However, Darwin continued to make such connections and the comparison is present—albeit with slight modifications—in all editions of the *Origin*. A number of authors have argued that after these flirtations with theism, Darwin chose a nonteleological and nontheological explanation of the natural world and because of that rejected the direct intervention of the Creator in favor of natural laws and chance. In my view, it was to achieve this that Darwin used the metaphor of the constructor.

After the publication of the *Origin* in 1859, the question of whether chance could replace the idea of direct design came to be controversial for several reasons. On the one hand, chance was a difficult idea that challenged long-standing theological beliefs. On the other hand, Darwin's comparison between human art and God's work was ambiguous, as the presence of chance in his example of the telescope and his explanation of natural processes demonstrated. However, I believe that there was another reason why the idea of chance was controversial: Darwin did not give a clear explanation of chance or the idea of accident in the *Origin*, which—along with natural selection—constituted the main elements of his rejection of the direct intervention of the Creator.

Until 1859, there is no textual evidence of Darwin reflecting on the causal disconnection between sets of natural events (variation and natural selection), which suggests that he did not consider this topic at any great length. However, after publishing the *Origin*, Darwin was criticized and questioned about a diverse range of subjects, including chance, or accidental variation, topics which interested Asa Gray, William Henry Harvey, Charles Lyell, Henry Holland, and John Herschel, among others (Burkhardt et al. 1994, 9:135–36). These critics were important in forcing Darwin to reconsider his use of the metaphor of the architect and his understanding of chance. Of these exchanges with his critics, I consider the theological discussion that Darwin conducted with Gray between 1860 and 1862 to be the most important.[7]

In 1860, Gray made some corrections to the second edition of the *Origin* and, in so doing, experienced a number of theological doubts[8] related to the origin of variation and the idea of accidental variation. Darwin provided some answers to these doubts on February 24, 1860 when he told Gray that he had been interested by his theological remarks in the draft of "Natural selection not inconsistent with natural theology," which was published by Gray in 1861. However, as he told Gray, Darwin believed such issues to be

beyond the realm of human understanding and, in this sense, analogous with "necessity & Free will" or the "Origin of evil" and predestination (Burkhardt et al. 1993, 8:102).

In the same letter, Darwin also indicated that he was interested in Isaac Newton and, in particular, on the attack made on his work by Leibniz, who had accused Newton of attacking natural religion (Burkhardt et al. 1993, 8:106–107). Newton had responded to Leibniz's criticisms by arguing that "it is philosophy to explain the movement of the wheels of a clock, though the cause of descent of the weight could not be explained." In this sense, Darwin wrote to Gray, it "seems to me rather to bear on what you say of Natural selection not being proved as a V*era* C*ausa*." Darwin suggests that his proposal, like Newton's, is not an attack on natural religion—a suggestion Darwin confirmed a couple of months later in another letter to Gray where he wrote, "with respect to the theological view of the question; this is always painful to me. I am bewildered. I had no intention to write atheistically" (Burkhardt et al. 1993, 8:223–24).

In June 1860, Darwin began to reflect on the question of how to explain the complex relationship between variation and natural selection and at the same time to make the role of chance clear. His proposal was a scheme in which natural selection is compared to a builder who uses just natural elements in the construction of a building. On June 12, Darwin wrote a letter to Joseph Dalton Hooker[9] where he described the outline of this architect metaphor for the first time:

> The following metaphor gives good view of my notion of relative importance of Variability & Selection. Squared stones, bricks or timber are indispensable for [the] construction of a building; & their Nature will to certain extent influence character of building, but selection I look at, as the architect; & in admiring a well-contrived or splendid building one speaks of the architect alone & not of the brick-maker. (Burkhardt et al. 1993, 8:250–51)

In a letter to Lyell on June 14, Darwin also discussed the problem of the "agency" of natural selection:

> I have expressly stated that I believe physical conditions have more direct effect on Plants than on animals. But the more I study the more I am led to think that natural selection regulates in a state of nature most trifling differences. As squared stones, or bricks, or timber are the indispensable materials for a building & influence its character; so is variability not only indispensable, but influential; Yet, in same manner, as the architect is the all-important person in a Building, so is Selection with organic bodies. (Burkhardt et al. 1993, 8: 253–54)

The following day, Lyell replied to Darwin's letter and wrote that this metaphor reinforced "the deification of Natural Selection" (Burkhardt et al. 1993, 8:255). Indeed, Darwin should recognize, Lyell wrote that he personified nature when he called it "an intelligent power"—an idea

that Darwin tried to smooth over by indicating at various moments that by nature he recognized, "only the aggregate action and product of many natural laws,—and by laws only the ascertained sequence of events" (Darwin 1868, 1:6). Two days later, Darwin wrote to Lyell that this "intelligent power" has a concrete relationship with more general laws, and to explain why he compared man with nature:

> I have said that natural selection is to the structure of organised beings, what the human architect is to a building. The very existence of the human architect shows the existence of more general laws; but no one in giving credit for a building to the human architect, thinks it necessary to refer to the laws by which man has appeared. (Burkhardt et al. 1993, 8:258)

In the same letter, Darwin also defended the idea of natural autonomy by comparing the work of natural selection with human labor but carefully rejecting the direct intervention of a Creator. Furthermore, in commenting on how the planets are not moved by the direct intervention of a Creator, Darwin affirmed that " . . . species neither was created directly by him . . . ," in reference to God.

In October 1860, W. H. Harvey[10] answered a letter from Darwin. In that letter Harvey wrote that questions relating to the beginning of chapter five of the *Origin,* in particular the cause of variation, had yet to be answered. While Harvey understood that Darwin had made explicit the causes of variation, he did not understand why Darwin referred to chance or unknown causes because Harvey considered that the causes of variation are of two kinds: direct and indirect causes. Direct causes include, for example, the influence of environment, the use and disuse of organs, food, and so on; and indirect causes, congenital change. Harvey, therefore, asked himself how he should consider "chance," if it was not to be understood as a cause (Burkhardt et al. 1993, 8:415–20). Darwin did not answer this last letter. One month previously he had received another letter from Hooker, with Harvey's letter enclosed, in which Harvey discusses the theological implications of natural selection. Darwin replied to Hooker that he would keep Harvey's letter a little longer (Burkhardt et al. 1993, 8:230).

It seems to me that Harvey's question was similar to questions asked by Darwin's friends, Lyell, Gray, and others, and that therefore, Darwin used the analogy of the builder to clarify the role of chance in the evolutionary process.

Before and after the publication of the *Origin* there was an explosion of interest in the argument from design and organic forms.[11] Darwin immersed himself in discussions of these issues with his friends. In 1862, he published his work *On the Various Contrivances by which British and Foreign Orchids are Fertilised by Insects*. Based on the structure of the book and a letter that Darwin sent to the editor (Stauffer 1975, 278–79), Ruse

and several other authors have indicated that this publication was a defense of natural selection and an illustration of how natural history worked at the same time to reject theology.[12] According to Browne (2002), *On the Various Contrivances* is a work in which Darwin chose the word "contrivance" to indicate that there was no purposeful design in the natural world.

Darwin argues that adaptations of orchids are a series of slight modifications of types, in which structures used for a particular function are renewed and are used for another function in another type. On the same principle, if a man were to make a machine for some special purpose, but were to use old wheels, springs, and pulleys, only slightly altered, the whole machine, with all its parts, might be said to be specially contrived for that purpose (Darwin 1862, 348).

In this account, the idea of chance is implicit. However, Darwin did not make the suggestion that he had considered with his friends two years earlier, and for this reason the metaphor can be interpreted in a number of ways. Thus, it was not difficult for some authors to see his work as valuable for natural theology. Among them was George Douglas Campbell, 8th Duke of Argyll, who first considered the explanation of first causes upon development of forms, beauty, and design in orchids vague because it was an unsatisfactory conjecture (Campbell 1867, 44). For this reason, he concluded that the use of the metaphor of the architect made a superior agent implicit because "the very essence of a metaphor is that it expresses the resemblances of things" (Campbell 1868, 41). Moreover, Alfred R. Wallace believed that Darwin gave his opponents a powerful weapon by frequently using the metaphor when describing the wonderful coadaptation of organic beings (Wallace 1867, 474).

In a letter to Lyell of August 4, 1863, Darwin laid out a new version of the metaphor of the architect where he commented on the accidental variations that appear in pigeons bred by pigeon fanciers. In describing his new book to Lyell, Darwin explained that he had been comparing variation to the shapes of stones fallen from a cliff and natural or artificial selection to the architect. However, Darwin told Lyell, "I cannot at all work a metaphor like you do" (Burkhardt et al. 1999, 11:581–84).

In that same year Darwin wrote a letter to Patrick Matthew in which he recognized Matthew as the discoverer of the principle of natural selection, published in 1831 (Matthew 1831, 308). Furthermore, Darwin commented that he had a good argument to defend and should fortify it (natural selection). To illustrate that meaning, Darwin said this through his wife, Emma Wedgwood:

> He says you will understand what he means by the following metaphor. Fragments of rock fallen from a lofty precipice assume an infinitude of shapes—these shapes being due to the nature of the rock, the law of gravity &c— by merely selecting the well-shaped stones & rejecting the ill-shaped an

> architect called Nat. Selection could make many & various noble buildings. (Burkhardt et al. 1999, 11:672)

This letter was written by Emma since Darwin was indisposed. In November 1863, Darwin was finishing *Variation* and had written an explanation of the complex interactions between variation and natural selection, and was, at the same time, outlining an answer to important questions about free will.[13]

The Constructor Metaphor

Meta-Metaphor. Darwin uses the metaphor of the architect in *Variation* (1868), a book dedicated to the issue of variation in the organic world. Given the subject, this book was the natural place for Darwin to discuss what he understood by "accidental variation." Moreover, the book was also a suitable place for Darwin to offer his views about free will and the question of evil in the world. Darwin explored these issues in a section entitled "The question whether each particular variation has been specially pre-ordained" (Darwin 1868, 2:405), where he answered the questions that had arisen during his exchanges with Lyell and Gray during the early 1860s. Many of these questions were also found in Lyell's response to the *Origin*, which he had published in a series of essays entitled *Natural Selection Not Inconsistent with Natural Theology* (1860).

Darwin used the metaphor of the architect three times in *Variation*. First, Darwin compared natural selection and the practices of animal breeders.

> When several breeds have once been formed, their intercrossing aids the progress of modification, and has even produced new sub-breeds. *But as*, in the construction of a building, mere stones or bricks are of little avail without the builder's art, so, in the production of new races, selection has been the presiding power. (Darwin 1868, 1:224)

Darwin subsequently extended the metaphor to the natural world when he wrote that "the progress of selection almost inevitably leads to the neglect and ultimate extinction of the earlier and less improved forms, as well as of many intermediate links in each long line of descent" (Darwin 1868, 1:224).

The second time Darwin uses the metaphor of the architect in *Variation* is to reinforce the efficacy of human practices (artificial selection) in the creation of new varieties and to defend natural autonomy or the efficacy of natural selection. In both processes, Darwin considers selection to be the paramount power but he also recognizes that its action depends on what we—in our ignorance—call spontaneous or accidental variability. To illustrate what he meant, Darwin returned to the metaphor of the architect:

> Let an architect be compelled to build an edifice with uncut stones, fallen from a precipice. The shape of each fragment may be called accidental; yet the shape of each has been determined by the force of gravity, the nature of the rock, and the slope of the precipice,—events and circumstances, all of which depend on natural laws; but there is no relation between these laws and the purpose for which each fragment is used by the builder. (Darwin 1868, 2:248–49)

Next, to support the idea of the autonomy of the natural world, Darwin transfers this image to the organic world: "the variations of each creature are determined by fixed and immutable laws; but these bear no relation to the living structure which is slowly built up through the power of selection, whether this be natural or artificial selection" (Darwin 1868, 2:249).

Later on, Darwin was more precise—as he had been earlier with his friends—about the election of the architect and different fragments: "the rough wedge-shaped fragments for the arches, the longer stones for the lintels, and so forth" (Darwin 1868, 2:249). Darwin then made a comparison:

> So it is with selection, whether applied by man or by nature; for though variability is indispensably necessary, yet, when we look at some highly complex and excellently adapted organism, variability sinks to a quite subordinate position in importance in comparison with selection, in the same manner as the shape of each fragment used by our supposed architect is unimportant in comparison with his skill. (Darwin 1868, 2:248–49)

In this use of the architect metaphor, Darwin highlighted two important ideas: the efficacy of both the natural world and animal breeders' practices, and the autonomy of variation and natural selection.

On the one hand, Darwin suggested that there is no connection between the causes that generate variations (as is the case in the production of different shapes of rocks) and those that generate what he calls natural selection (or the architect's work). Darwin argued that accidents cannot be part of a cause–effect relationship (variation production and variation selection). Instead, chance or accident resides for Darwin in the interaction of those two sets of causal chains, understanding accident as the effect of the concurrence of two causal sequences.

When Darwin wrote about the elements involved in the generation of natural objects he distinguished between chance or accident and natural causes. Darwin did clarify, though, that sometimes the action of natural causes, like accidents or chance, are confused. When this confusion occurs, we must put it down, Darwin argued, to our ignorance, because development is generated by natural causes or natural laws. Such interaction is sufficient to give an account of the greatness of life (Darwin 1868, 2:430).

Darwin used the metaphor of the architect for the third time in *Variation* in the final paragraphs. Here, he is thinking over philosophical and scientific

ideas, including variation and natural selection. I consider that Darwin's use of the metaphor shows a clear position on free will.

> Some authors have declared that natural selection explains nothing, unless the precise cause of each slight individual difference be made clear. Now, if it were explained to a savage utterly ignorant of the art of building, how the edifice had been raised stone upon stone . . . , and if the use of each part and of the whole building were pointed out, it would be unreasonable if he declared that nothing had been . . . made clear to him, because the precise cause of the shape of each fragment could not be given. (Darwin 1868, 2:430)

In this use of the metaphor, it is hard to understand the causal disconnection between various sets of natural events and seeing the results measured in architectural or structural beauty and in an organic step forward. This apparent causal disconnection, which is at the same time an organic step forward, has been interpreted as a teleological trait of the theory (Gillespie 1979 :116–17).[14] Gillespie comments on Darwin's use of the metaphor where, although Darwin relates the lack of objectives or direct design to ideas about its being an "infallible" process and the "continued accumulation of beneficial variations" (adaptations), he retains directionality and progress in the explanation.[15]

Once again, Darwin insists that the shapes of the fragments of stone at the base of the precipice are not accidental. Although this process could be called accidental, Darwin wrote, "we should recall that such a description is not strictly correct," because each shape depends on a long sequence of events, which all obey natural laws: on the nature of the rock, on the lines of deposition or cleavage, on the form of the mountain, which depends on its upheaval and subsequent denudation, and finally on the storm or earthquake which threw down the fragments. But the use to which the fragments may be put by their shape in the construction, write Darwin, "may be strictly said to be accidental."

Free Will or Predestination

In the comparison between nature and the architect, Darwin suggests a further notion. If we assume that there is design in the constitution of rocks then we must assume that there is predesign in variation. This idea presents us with a double dilemma: on the one hand, that natural selection and natural laws are superfluous; on the other, free will is replaced by predestination (Darwin 1868, 2:432). The acceptance or rejection of free will (or the acceptance or rejection of predestination), has been the subject of a central debate between theists and deists, and is not possible to ascertain precisely what kind of deism Darwin defended, but his concerns and reflections make it clear that he was in favor of the existence of free will.

In my view, the validity that Darwin gives to the metaphor of the architect reveals his heterodox position, with respect to predestination, free will, evil, and justice.

When Darwin uses the metaphor of the architect for the third time, in my view point, the boundaries between the scientific and the philosophical spheres are blurred and the metaphor has a double meaning—both scientific and humanistic.

Darwin questioned and rejected God's providence and omniscience—qualities that are incompatible with free will. Darwin rejected the direct intervention of the Creator because he saw no evidence of beneficent design. In a passage well known as a place in which he distanced himself from theology, Darwin left traces of his discussion of the interaction of chance and causes through his use of the metaphor of the architect:

> Although I did not think much about the existence of a personal God until a considerably later period of my life, I will here give the vague conclusions to which I have been driven. The old argument from design in Nature, as given by Paley, which formerly seemed to me so conclusive, fails, now that the law of natural selection has been discovered. (Darwin 1909, 1:309)

It is not a coincidence that in this same passage Darwin made reference to a discussion in the last chapter of *Variation* in which he explored the subject of natural autonomy, the role of chance in design, and the problems that can lead to a belief in predetermination. In the passage above, Darwin establishes his position with respect to Divinity (a personal God) and eloquently rejected Paley's design argument. In this rejection there are two important points: one, the acceptance of role of chance in natural processes and, two, a disagreement with predestination.

In spite of the fact that Darwin considers predesign and predestination to be two insoluble problems,[16] by his use of the metaphor of the constructor he clearly established his position on free will and predestination.

Darwin assumes that if we accept predestination, then we must have accepted predesign in variation. I would rather suggest that when he rejects predestination, he is rejecting the direct intervention of God in the world. Similar ideas are related in different questions he had previously sent to his friends Lyell and Gray, and which he used again in the comparison between nature and the architect in *Variation,* but this time he asked his readers: "Did He [God] cause the frame and mental qualities of the dog to vary in order that a breed might be formed of indomitable ferocity, with jaws fitted to pin down the bull for man's brutal sport?"[17]

Darwin had asked a different version of this question in the letters he exchanged with his most important friends, including Gray and Lyell. For instance, Darwin wrote: "One word more on 'designed laws' and 'undesigned results.' I see a bird, which I want for food, take my gun and kill it, I do this designedly." Moreover, Darwin also wrote: "An innocent

and good man stands under a tree and is killed by a flash of lightning. Do you believe (and I really should like to hear) that God designedly killed this man? Many or most persons do believe this; I cannot and do not" (Darwin 1887, 1:313–15).

In these questions, we can see that Darwin cannot find reasons for accepting that a Deity is the Being direct responsible for those acts that imply varying degrees of evil. With respect to acts that cannot be attributed to the Creator and those that appear to negate the idea of His direct intervention, Darwin wrote to Gray in 1860 that:

> I cannot persuade myself that a beneficent & omnipotent God would have designedly created the *Ichneumonidæ* with the express intention of their feeding within the living bodies of caterpillars, or that a cat should play with mice. Not believing this, I see no necessity in the belief that the eye was expressly designed. (Darwin 1887, 1:309)

Via the metaphor of the architect, Darwin questions and rejects both predestination and the evil that is attributed to the Creator because he could not be persuaded that an omnibenevolent, omnipotent, and omniscient God was capable of cruel or unjust acts, such as the death of a good and innocent man who is standing under a tree that is struck by a lightning.

Explaining chance and design Darwin rejects predestination and predesign in nature, and accepts the possibility of free will in man. Darwin used chance to solve the problems of the lack of design in naturalistic explanations, and to explain causal disconnection between the origin of variation and the process of selection, that is to say, the origin of the variation does not arise in order to resolve the organism's needs to adapt. On the other hand, in the same explanation Darwin reflects on justice, evil in the world, and predestination, and via his metaphor of the architect he also establishes his vision of these subjects. In sum, conclusions in *Variation* form part of a scientific discourse to explain chance and natural processes and constitute a defense of free will.

Conclusion

The metaphor of the architect was the culmination of Darwin's attempts to compare the works of nature with those of an artisan. His first attempt to do this was his comparison of the manufacture of telescopes during human history and the progressive design of the eye. Darwin used this metaphor in *Natural Selection* (1856) and in all editions of the *Origin*. Later, in *On the Various Contrivances* (1862), Darwin developed the metaphor of the constructor without providing any deeper explanation of chance. He then re-elaborated the metaphor in a new version: the metaphor of the architect published in *Variation* in 1868. This final metamorphosis or re-elaboration of the metaphor responded to two significant questions. In my view, the

metaphor of the architect was an instrument to explain the role of chance in evolutionary process, and at the same time, a means of rejecting predesign in the natural world.

Via this metaphor, Darwin traces his view of the natural origin of species and his view about theological discussion on free will and predestination.

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Notes

1. There are basically two kinds of "chance" in Darwin's explanations (see Haufe 2012).
2. *Religio Medici* (*The Religion of a Doctor*) is a book by Sir Thomas Browne, published in 1643.
3. On the connection between Darwin's ideas and their sociopolitical context: Young (1985). On Darwin's beliefs about the meaning of "natural world": Sloan (2005). On cognitive symbolism in Darwin's metaphors: Al-Zahrani (2008). On efficacy or inefficacy in Darwin's metaphor to explain natural selection: Richards (1997). On metaphors as an analogical resource for the comparative analysis of artificial and natural selection: Hodge (1992). On the interrelation of scientific and literary practices: Beer (1983, 1986). For analysis of the heuristic value of Darwin's metaphors: Ruse (2005), Gould (1980, 2002), and Ayala (2004).
4. This point has been discussed frequently in the Darwinian historiography. See, for instance, Ghiselin (1969), Hull (1973), Mayr (1982), Desmond and Moore (1991), and Bowler (1990), among others.
5. http://publicdomainreview.org/2011/06/28/was-charles-darwin-an-atheist/.
6. Brown (1986) considers that Darwin uses a theistic phraseology in this metaphor.
7. An important analysis of design and chance by Asa Gray and Darwin is analyzed in Lennox (2010) and Hunter (2012).
8. Theological questions, in particular the issue of the direct participation of God, were not new subjects in Darwin's reflections. In 1838, Darwin wrote against direct design. "The whole universe is full of adaptations. But these are, I believe, only direct consequences of still higher laws." He concluded that "the explanation of types of structure in classes, as resulting from the will of the deity, to create animals on certain plans, is no explanation; it has not the character of a physical law & is therefore utterly useless. It foretells nothing/ because we know nothing of the will of the Deity" (Barrett 1974, 154, 162).
9. Hooker had commented to Darwin that he had been in agreement with William Harvey on the deficiency of logic in the relationship between natural selection and variation, and the question of the "personality" of natural selection (Burkhardt et al. 1993, 8:248–49).
10. In August, William Harvey had written him asking about the Unknown Laws of Variation (see Burkhardt et al. 1993, 8:322–334). Darwin did not make clear the Unknown Laws ideas on pages 198 and 209 in *The Origin*. He answered Harvey's letter in September (see Burkhardt et al. 1993, 8:370–74).
11. See England 2003. Several works during the 1860s were published relating to the questions of how the Creator works—in a direct or indirect way, or through natural laws. In this

context of discussion Darwin published his book on orchids in 1862. See also Topham (1992, 1998).

12. Ghiselin (1969), Allan (1977), Gould (1980, 2002), Browne (2002), and Levine (2006), among others, have defended this publication as a defense of natural selection versus "the divine objectives." A similar interpretation is in Hoquet (2010).

13. After 1860, Darwin had an extensive exchange of letters with Asa Gray and, to a lesser extent, with Charles Lyell, concerning theological dilemmas (free will, predestination, evil) related to variation.

14. Other authors have suggested more radical interpretations; see, for instance, Southgate (2002) and Dilley (2012).

15. On the ideas of progress in Darwin's thought, see, for instance, Radick (2000) and Shanahan (2004).

16. Letter 8837, in http://www.darwinproject.ac.uk (accessed March 18, 2012).

17. Letter 7273, in http://www.darwinproject.ac.uk (accessed March 18, 2012).

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