Charles Darwin and Asa Gray Discuss Teleology and Design

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If Thomas Huxley earned the title of "Darwin's bulldog," then Asa Gray should be remembered as "Darwin's dove." Whereas Huxley enjoyed a good fight in his defense of Darwin's theory, Gray sought to mediate and bring sides together around a common understanding of "good science." As Darwin's strongest and most vocal scientific ally in the United States, Gray recognized the scientific importance of Darwin's efforts for the growing professionalism of biological researchers. But as an orthodox Christian, a Presbyterian firmly devoted to the faith expressed in the Nicene Creed, he saw in Darwin's theory both evidence for his philosophical commitment to natural theology and support for his opposition to the idealism advocated by Louis Agassiz and the *naturphilosophers* in both Europe and America. Indeed, Agassiz's advocacy of Platonic forms as a basis of biological understanding (e.g., "A species is a thought of the creator"[1]) would be a major source of American opposition to Darwin's theory.

Professor of botany at Harvard during most of the middle half of the nineteenth century, Gray was one of the few members of the scientific community to whom Darwin revealed his theory before the publication of *On the Origin of Species*, and, from what I can tell, the only American. Gray and Darwin met briefly in January 1839 during one of Gray's visits to England. Later, during the 1850s, Darwin wrote Gray on several occasions requesting information—a practice that Darwin frequently employed. In 1854, Darwin's friend and confidant, Joseph Hooker, showed Darwin Gray's review of Hooker's *Flora of New Zealand*, in which Gray had argued strongly against Louis Agassiz's idealism and had raised questions from his own work on the stability of species. Gray was not yet ready to deny their permanence, but hybrids and other observations were beginning to trouble him.

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The next year Gray wrote a lucid and penetrating positive evaluation of Alphonse De Candolle's two-volume *Géographie botanique raisonnée*, a pioneering work dealing with plant geography and distribution from a statistical perspective. Hooker had sneeringly dismissed the work. In A. Hunter Dupree's authoritative biography of Gray, he describes Gray's puzzlement at Hooker's response in these terms:

> Although in the long view Gray's evaluation of the epoch-making nature of De Candolle's book was more justified than Hooker's sneers, [Gray was confused by his response, for] Hooker seemed to be talking with a more comprehensive theory definitely in mind, some reason for taking his position, which he did not divulge and which his friend [Gray] did not possess.[2]

Darwin, however, saw in both Gray's review of Hooker's book and in his comments on De Candolle's tome that Gray was troubled by some of the same empirical data that had been bothering him. In April 1855, Darwin wrote Gray to urge that Gray update his *Manual of the Botany of the Northern United States* first published in 1848, and especially to address the issue of the range of Alpine plants in the United States. Specifically, he said: "Now I would say it is your duty to generalise as far as you safely can from your as yet completed work."[3] Behind this request was Darwin's desire to test his impression that Gray could make a good ally. Gray passed the test, and finally, in July 1857, Darwin let Gray in on his theory of the transmutation of species. Gray was never an uncritical supporter, and there are many evidences in the correspondence between these two scientists that Gray was willing to challenge Darwin and disagree with some of his conclusions. Nevertheless, Gray saw the importance of Darwin's work and the ways in which it provided answers to the troublesome issues that he had confronted in his own botanical efforts.

After considerable interchange—one might even say debate—among Gray, Darwin, and Hooker, Gray wrote to Hooker in October 1859 (one month before the publication of *On the Origin of Species*) saying that he had absolutely no problem with cognate species arising by variation. He did, however, raise a concern that would be the source of much future discussion. He wondered about Darwin's "carry[ing] out this view to its ultimate and legitimate results,—how [do] you connect the philosophy of religion with the philosophy of your science." He added: "I should feel uneasy if I could not connect them into a consistent whole—i.e., fundamental principles of science should not be in conflict."[4]

When *Origins* was published, Gray wrote a clear, positive, yet critical review in *The American Journal of Science*. Aware of mounting religious opposition, he ended his review by arguing that whereas one could use Darwin's theory in support of an atheistic view of Nature, one could use any scientific theory in that way. He wrote: "The theory of gravitation and … the nebular hypothesis assume a *universal and ultimate* physical cause, from which the effects in nature must necessarily have resulted."[5] He did not see the physicists and astronomers who adopted Newton's theories as atheists or pantheists, though Leibnitz earlier had raised such reservations. And a similar situation existed with the origin of species by natural selection. Darwin, Gray continued: "merely takes up a *particular, proximate cause*, or set of such causes, from which, it is argued, the present diversity of species has or may have *contingently* resulted. The author does not say *necessarily* resulted."[6] This far Gray could go with Darwin. But there was a point at which he parted company, and that was the fortuitous randomness of the process that Darwin's theory seemed to imply.

As all good historians of science and of Christian thought know, evangelical Christians in the nineteenth century were generally not biblical literalists, nor did they believe in a young earth. In other words, the religious opposition to Darwin did not arise from perceived problems between Darwin's theory and a literal reading of Genesis. Rather, following the publication of *Origin of Species*, it centered on what seemed to be the randomness of natural selection, the appearance of new organisms by chance, and therefore the exclusion of divine purpose or design in Nature.[7] It was the teleological question that Gray addressed in his review and about which he and Darwin corresponded over many years.

Darwin's response to Gray's review, a copy of which he received prior to its publication, was very positive. Darwin even hoped that it could become a preface in a second American edition of *On the Origin of Species* on which Gray worked. In a letter later in the year to James Dwight Dana, Darwin said: "No one person understands my views & has defended them so well as A. Gray;—though he does not by any means go all the way with me."[8] The "all the way" included teleology, and Darwin wrote this to Gray concerning his attempt to retain design:

> It has always seemed to me that for an Omnipotent & Omniscient Creator to foresee is the same as to preordain; but then when I come to think over this I get into an uncomfortable puzzle *something* analogous with "necessity & Free-will" or the "Origin of evil," or other subject quite beyond the scope of the human intellect.[9]

Three months later he picked up the discussion with these comments:

> 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. But I own that I cannot see, as plainly as others do, & as I sh[d] wish to do, evidence of design & beneficence on all sides of us. There seems to me too much misery in the world. I cannot persuade myself that a beneficent & omnipotent God would have designedly created the Ichneumonidae 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. On the other hand I cannot anyhow be contented to view this wonderful universe & especially the nature of man, & to conclude that everything is the result of brute force. I am inclined to look at everything as resulting from designed laws, with the details, whether good or bad, left to the working out of what we may call chance. Not that this notion *at all* satisfies me …. But the more I think the more bewildered I become; as indeed I have probably shown by this letter.[10]

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Shortly after this letter to Gray, Darwin wrote Charles Lyell on the same subject and said:

> I have said that nat. 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. No astronomer in showing how movements of Planets are due to gravity, thinks it necessary to say that the law of gravity was designed that the planets sh[d] pursue the courses which they pursue.—I cannot believe that there is a bit more interference by the Creator in the construction of each species, than in the course of the planets.—It is only owing to Paley & Co, as I believe, that this more special interference is thought necessary with living bodies.[11]

In mentioning "Paley & Co," Darwin was referring to William Paley and other natural theologians, who had argued that nature—through the organization and adaptations of living organisms—demonstrated the existence of an intelligent creator. Darwin had studied Paley while in university, and Gray had also been influenced by the work of Paley, whose eighteenth-century opus *Natural Theology* was an important component of nineteenth-century American philosophy and was still used as a text at Harvard when Gray began teaching there in 1842. Paley's Argument from Design ultimately boiled down to this:

Premise 1: God's will is for us to be happy in this life and the next.

Premise 2: We can discover God's will either by consulting Scripture or by consulting "the light of nature." Both ways will lead to the same conclusion.

Premise 3: The will of God with regard to any action can be found by inquiring into its "tendency to promote or diminish the general happiness."

Conclusion 1: God creates to promote the general happiness of all creatures.

Conclusion 2: Organisms are perfectly adapted to their environment by the Creator.

The corollary of this last conclusion was that perfect design, from the structure and functioning of an organ to the structure of the universe, is evidence for God.

For Paley, Nature provided the evidence for the existence of God, but Darwin had difficulty with this argument. His difficulty centered on what might best be referred to as issues surrounding theodicy, i.e., are natural selection and its results consistent with design by a benevolent God or do they imply that, if designed, God is capable of malevolent intent. In a July 3, 1860, letter to Gray, Darwin explicitly raises the issue. He writes:

> One word more on "designed laws" & "undesigned results." I see a bird which I want for food, take my gun & kill it, I do this *designedly*.—An innocent & good man stands under tree & is killed by flash of lightning. Do you believe (& I really sh[d] like to hear) that God *designedly* killed this man? Many or most person do believe this; I can't & don't.—If you believe so, do you believe that when a swallow snaps up a gnat that God designed that that particular swallow sh[d] snap up that particular gnat at that particular instant? I believe that the man & the gnat are in same predicament.—If the death of neither man or gnat are designed, I see no good reason to believe that their *first* birth or production sh[d] be necessarily designed. Yet, as I said before, I cannot persuade myself that electricity acts, that the tree grows, that man aspires to loftiest conceptions all from blind, brute force.[12]

What Darwin wanted was Design without suffering, teleology without agony, purpose without pain.

This issue becomes the focus of discussion following the third article of a series that Gray published in *The Atlantic Monthly* in July, August, and October of 1860. When these articles were reprinted as a chapter in Gray's *Darwiniana*, the chapter was titled "Natural Selection not Inconsistent with Natural Theology." The passage that focused the discussion for Darwin was this: "We should advise Mr. Darwin to assume, in the philosophy of his hypothesis, that variation has been led along certain beneficial lines."[13]

After stating that the article was "admirable," Darwin responded to Gray in these words:

> But I grieve to say that I cannot honestly go as far as you do about Design …. [Y]ou lead me to infer that you believe "that variation has been led along certain beneficial lines."—I cannot believe this; & I think you would have to believe, that the tail of the fan-tail was led to vary in the number & direction of its feathers in order to gratify the caprice of a few men.[14]

In September, Darwin responded to a question from Gray and informed him of his correspondence with Lyell on the subject of Design. In a lengthy passage, he wrote:

> Your question of what would convince me of Design is a poser. If I saw an angel come down to teach us

> good, & I was convinced, from others seeing him, that I was not mad, I sh[d] believe in design. If I could be convinced thoroughly that life & mind was in an unknown way a function of other imponderable forces, I sh[d] be convinced …. I have lately been corresponding with Lyell, who, I think, adopts your idea of the stream of variation having been led or designed. I have asked him (& he says he will hereafter reflect & answer me) whether he believes that the shape of my nose was designed. If he does, I have nothing more to say. If not, seeing what Fanciers have done by selecting individual differences in the nasal bones of Pigeons, I must think that it is illogical to suppose that the variations, which Nat. Selection preserves for the good of any being, have been designed. But I know that I am in the same sort of muddle (as I have said before) as all the world seems to be in with respect to free will, yet with every supposed to have been foreseen or preordained.[15]

Finally, in December, Darwin sent up the white flag, conceding that "[i]f anything is designed, certainly Man must be; one's 'inner consciousness' (though a false guide) tells one so; yet I cannot admit that man's rudimentary mammae … & pug-nose were designed …. I am in thick mud;—the orthodox would say in fetid abominable mud."[16] From this point on, the topic is not as central in their correspondence.

Following the publication of Darwin's book on orchids, however, he asked Gray to look at the last chapter, since Darwin believed that it bore on the design question. Gray's response was found in both his review of the book and in a letter to Darwin. In his review, he praised Darwin for having "brought back teleological considerations into botany." He concluded:

> We *faithfully* believe that both natural science and natural theology will richly gain, and equally gain, whether we view each varied form as original, or whether we come to conclude, with Mr. Darwin, that they are derived:—the grand and most important inference of *design in nature* being drawn from the same data, subject to similar difficulties, and enforced by nearly the same considerations, in the one case as in the other.[17]

Gray may have believed that Darwin "brought back teleological considerations into botany," and Darwin may have swung that way in his book on orchids, but by 1867 Darwin had definitely swung back to the other side. In his concluding remarks for *The Variation of Animals and Plants Under Domestication*, he wrote:

> However much we may wish it, we can hardly follow Professor Asa Gray in his belief that "variation has been led along certain beneficial lines," like a stream "along definite and useful lines of irrigation." If we assume that each particular variation was from the beginning of all time preordained, then that plasticity of organisation, which leads to many injurious deviations of structure, as well as the redundant power of reproduction which inevitably leads to a struggle for existence, and, as a consequence, to the natural selection or survival of the fittest, must appear to us superfluous laws of nature. On the other hand, an omnipotent and omniscient Creator ordains everything and foresees everything. Thus we are brought face to face with a difficulty as insoluble as is that of free will and predestination.[18]

An "Insoluble" Question for Darwin

Imbedded in this refusal to follow Gray is the question of theodicy to which I referred earlier. How could an omniscient, omnipotent, *benevolent* God set up a process that led to "injurious deviations of structure"? How could such a Being design a struggle for existence, a survival of the fittest—war for all and death for some? For Darwin, a doctrine of design that included evil and suffering was not worth embracing.

But Darwin still had to explain beauty and goodness, so he continued to waiver. In 1874 Gray wrote an article for *Nature* that was essentially a tribute to Darwin. After discussing his contributions, Gray said:

> Apropos to these papers, which furnish excellent illustrations of it, let us recognise Darwin's great service to Natural Science in bringing back to it Teleology: so that, instead of Morphology *versus* Teleology, we shall have Morphology wedded to Teleology.[19]

Darwin's response showed pleasure. He wrote: "What you say about Teleology pleases me especially, and I do not think any one else has ever noticed the point. I have always said you were the man to hit the nail on the head."[20] And near the end of his life, Darwin wrote to his friend T. H. Farrer these words: "[I]f we consider the whole universe, the mind refuses to look at it as the outcome of chance—that is, without design or purpose. The whole question seems to me insoluble, …."[21]

Why was this an "insoluble" question for Darwin and not for Gray? I believe that there were two closely related factors upon which they disagreed and which led to their different viewpoints. First, as Michael Roberts has insightfully pointed out,[22] Darwin followed the traditional Paleyean view of design and tried to go from design in Nature to belief in God. Gray began with a belief in God and saw design in Nature as a result of that belief.[23]

Another way to say it is that for Darwin, design would be evidence *for* God, whereas for Gray, design would be evidence *from* God. Since Darwin believed that Nature provided examples that would give evidence for a God that either could not or would not eliminate suffering, he preferred to withhold total commitment to design. Gray, on the other hand, knew from Scripture the attributes of God, and therefore could accept the errors, evil, and suffering of Nature within the same theological context that he did for humans. And that explanation relates to the second factor upon which they disagreed: the relationship of free will and predestination or, as Gray put it in the title of one of his articles, design versus necessity.[24] As Darwin's questions about the man killed by lightning and the gnat eaten by a swallow had indicated, Darwin could not reconcile the seeming randomness of certain particular events with an overall, foreordained plan. Either everything was determined or nothing was.

For Gray, the options were not so mutually exclusive. First, Gray took a more global view of design than Darwin did. Gray saw design providing the overall, general plan, but not requiring specific details. Darwin, on the other hand, understood design to be *in* the details. Gray argued that just as not all actions of human beings, who are purposeful agents, are "'products of design'; many are contingent or accidental,"[25] so he could view some phenomena in Nature to be the result of contingent or accidental forces. Thus Gray could accept the elimination of unfavorable variations, for example, in the same way he could accept that, for the elect, God could work through suffering. God caused neither—they are simply a part of a fallen world—but he can use both.

Lessons We Can Learn

I believe that there are at least two lessons that those of us involved in current debates about these matters can learn from this discussion about evolution and design that took place between Darwin and Gray. First, we need to be cognizant of which way we are arguing: are we arguing *from* design *to* God or *from* God *to* design? If the former, then we must be careful to include the whole of Nature—physical and biological, "good" and "bad," ugly and beautiful—and be prepared to answer questions of suffering, evil, and the like. If the latter, then, it seems to me, we must be prepared to accept the fact that science may be done identically by the Christian and the non-Christian, with identical "results," but the connotative meaning will be different. For the non-Christian, the results may be either ends in themselves or the starting points for future work. For the Christian, they are evidences that lead us to greater praise of God.

Secondly, the Intelligent Design movement as well as those opposed to the ID approach need to examine and learn the history of Natural Theology and design, reading both the advocates and the opponents. We have much to learn from Augustine, Ray, Paley, Hume, the authors of the Bridgewater Treatises, Lord Kelvin, and others. These thinkers will help us strengthen our arguments, refine our logic, and understand the limitations of our perspectives.

Finally, we can follow the pattern of civility and humility that both Gray and Darwin displayed as they sought to understand each other's position, to acknowledge strengths in argumentation and to point out weaknesses in reasoning—possibly resulting in part from their knowledge of the history to which I just referred. Their letters were filled with words like "dear" and "friend," and signed with such words as "cordially" and "affectionately." Differences of opinion—clearly and forcefully stated—did not distort or disrupt their relationship. Gray's testimony was respected by Darwin, and Darwin's real confusion was accepted by Gray. They continued to reach out to each other, and their relationship actually served as a bridge that each could cross in their journey toward Truth. We could do worse than emulate their pattern of debating vigorously yet lovingly genuinely as we interact with one another on this subject that has yet to be fully resolved. ✳

Notes

[1] Cited in A. Hunter Dupree, *Asa Gray: American Botanist, Friend of Darwin* (Baltimore: The Johns Hopkins Press, 1959), 151.
[2] Ibid., 236.
[3] Charles Darwin, *More Letters of Charles Darwin*, ed. Francis Darwin, (New York: D. Appleton and Company, 1903), 252.
[4] Dupree, *Asa Gray*, 266.
[5] Asa Gray, "The Origin of Species" in *Darwiniana* (Cambridge, MA: The Belknap Press of Harvard University, 1963), 44.
[6] Ibid.
[7] Following the publication of *Descent of Man*, a second problem arose for evangelicals, centered on how humans could be moral beings, created in the Image of God, if they were continuous with the animal kingdom. I will not be addressing that issue in this paper.
[8] Charles Darwin, *The Correspondence of Charles Darwin* 8, 1860 (Cambridge: Cambridge University Press, 1993), 303.
[9] Ibid., 106.
[10] Ibid., 224.
[11] Ibid., 258.
[12] Ibid., 275.

[13]Asa Gray, "Natural Selection not Inconsistent with Natural Theology" in *Darwiniana* (Cambridge, MA: The Belknap Press of Harvard University, 1963), 121–2.
[14]Darwin, *The Correspondence of Charles Darwin* 8, 496.
[15]Charles Darwin, *The Correspondence of Charles Darwin* 9, 1861 (Cambridge: Cambridge University Press, 1994), 267–8.
[16]Darwin, *The Correspondence of Charles Darwin* 9, 369.
[17]Cited in Darwin, *The Correspondence of Charles Darwin* 9, note 11, 430.
[18]Charles Darwin, *The Variation of Animals and Plants Under Domestication* (New York: D. Appleton and Company, 1896), 428.
[19]Asa Gray, "Scientific Worthies: Charles Darwin," *Nature* 10 (June 4, 1874): 81.
[20]Charles Darwin, *The Life and Letters of Charles Darwin*, ed. Francis Darwin (New York: Basic Books, Inc., 1959), 367.
[21]Darwin, *More Life and Letters of Charles Darwin,* 395.
[22]Michael Roberts, "Darwin's Doubts About Design" in *Science & Christian Belief* 9 (2 October 1997): 126.
[23]See also Gray's argument against Agassiz in "Natural Selection not Inconsistent with Natural Theology," 126.
[24]Asa Gray, "Design versus Necessity: Discussion between Two Readers of Darwin's Treatise on the Origin of Species, upon its Natural Theology" in *Darwiniana,* 51–71. The article was originally printed in *American Journal of Science and Arts* 30 (1860): 226–39. The two readers were Daniel Treadwell and Asa Gray.
[25]Asa Gray, "Evolutionary Teleology" in *Darwiniana,* 299.

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