THE THEOLOGICAL FOUNDATIONS OF DARWIN'S THEORY OF EVOLUTION

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Allen Debus has striven to demonstrate that religion, in the early modern period, was not a foreign agent that bent science away from its true course, nor even an extrinsic force that benignly pushed thinkers more quickly along a path they would have otherwise trod. Allen has tried to show that religion was enmeshed within the interstices of scientific thought, that only from our contemporary perspective can we pick out those strands that unrolled toward modern science and those that folded around the Bible. Under this conception it would be foolish to sift out religion from our understanding of early modern science. Among recent historians, some would concede Allen's historiographic axiom, but they would undoubtedly confine its use to the time when Paracelsus commanded attention. I think, however, that Allen's perspective can be useful in trying to understand even that science which was believed to replace religion during the last half of the nineteenth century, namely Darwin's theory of evolution.

Andrew Dickson White found in the confrontation of evolutionary theory with traditional orthodoxy the very archetype of the warfare that he chronicled in his book *History of the Warfare of Science with Theology in Christendom,* which appeared at the end of the nineteenth century. "Darwin's *Origin of Species,*" White declared, "had come into the theological world like a plow into an ant-hill. Everywhere those thus rudely awakened from their old comfort and repose had swarmed forth angry and confused."[1] Many churchmen were indeed angry and confused. The Anglican Bishop of Oxford, Samuel Wilberforce, was a divine in high dudgeon when he inquired of Thomas Henry Huxley, Darwin's champion, whether it was through his grandmother or through his grandfather that he claimed his descent from a monkey.[2] Cardinal Manning, the Catholic primate of England, certainly objected to what he thought "a brutal philosophy—to wit, there is no God and the Ape is our Adam."[3]

Most contemporary thinkers who have reflected on what Darwin wrought would probably agree with the judgment, though surely not the sentiment, of a correspondent at that time for the *Catholic World,* who wrote: "Mr. Darwin is, we have reason to believe, the mouth-piece or chief trumpeter of that infidel clique whose well known object is to do away with all idea of a God."[4] The "infidel clique," which the author decried, has grown ever larger as Darwinian theory has developed toward the present time. Certainly such scientists as Richard Lewontin,

P. H. Theerman and K. Hunger Parshall (eds.), Experiencing Nature, 61–79.

Steven Rose, and Leon Kamin would apparently wish to claim membership. In their book *Not in Our Genes,* they express both intellectual and historical orthodoxy when they avow: "Natural-selection theory and physiological reductionism were explosive and powerful enough statements of a research program to occasion the replacement of one ideology—of God—by another: a mechanical, materialist science."[5] According to the historian of science Susan Cannon—to add one more voice to this contemporary chorus—Darwin's research program drained nature of moral significance; he had shown nature to be, as Cannon put it, "morally meaningless."[6]

Upon closer inspection, however, the war declared by White and apparently concluded by the victory of evolutionary theory even before Darwin's death seems more like ritualized combat: as with bighorn sheep, much head-butting, but no real damage done. That is, if you consider the views of Darwin's colleagues and the next generation of his disciples, you quickly come to two conclusions: first, that evolutionary theory more readily supported metaphysical spiritualism than materialism; and second, that God was made to feel right at home in this evolving universe.[7] Charles Lyell, Darwin's close scientific friend, finally converted to evolutionism, but secured his new belief within a more general theism. Alfred Russel Wallace, co-founder of evolution by natural selection, broke with Darwin on the question of man; he maintained that human mental and moral development was under the aegis of higher spiritual powers. George Romanes, Darwin's anointed disciple, thought materialism to be destroyed by evolutionary theory. And William James employed natural selection to argue for an independent mind, human freedom, moral choice, and divine hegemony. If Darwin's research program required the rejection of God and his replacement by universal mechanism, few later evolutionists seem to have been aware of this.[8]

Maybe, though, they really did not notice what was actually there. Darwin's own inchoately expressed metaphysical views, after all, did seem materialistic—though benignly so, I believe; and he did profess agnosticism in his later years, even going so far as to condemn Christianity. In his *Autobiography* he described his religious trajectory in this way:

> disbelief crept over me at a very slow rate, but was at last complete. The rate was so slow that I felt no distress, and have never since doubted even for a single second that my conclusion was correct. I can indeed hardly see how anyone ought to wish Christianity to be true: for if so, the plain language of the text seems to show that men who do not believe, and this would include my Father, Brother and almost all of my best friends, will be everlastingly punished. And this is a damnable doctrine.[9]

Passages such as this appear to endorse the traditional view of Darwin's accomplishment, namely, that he rejected a universe ruled by divine agency, one in which all of nature works toward the good. Nonetheless, I think the traditional account misses the deeper layers of Darwin's theory, which, I believe, was molded in the forms of nineteenth-century theology. A more perspicuous rendering of Darwin's ideas would find, I think, that Darwin created natural selection in the image of God and that he understood its action to infuse moral values into nature, not to suck them from nature. Had Darwin not theologized natural selection, had he been of the naturalizing mind of, say, Thomas Henry Huxley, I believe his theory would have been constructed quite differently, or so I will argue below.

In what follows, I will first indicate how Darwin constructed his theory of evolution against the doctrine of special creation. In this construction, he cast the familiar God out of the immediate biological sphere, just as he had been rejected from the astrophysical sphere sometime earlier. Second, I will argue that Darwin's description of the process of evolution and the law he formulated to explain the process were yet designed according to theological models. The divine ghost could not be exorcised. Finally, I will try to show how Darwin specifically reconstructed both human nature and Nature writ large with a moral spine.

Darwin's Opposition to Creationism

While on the five-year voyage of the *Beagle,* which began in 1831, Darwin remained both biologically and theologically orthodox. He recalled that while on board, he was "heartily laughed at by several of the officers (though themselves orthodox) for quoting the Bible as an unanswerable authority on some point of morality."[10] His biology was just as bully.

Yet Darwin's biological faith must have swayed as a bending reed. After his return to England in October, 1836, he rapidly concluded that species were not stable, rather that they changed over time. From early spring of 1837 through 1839, he worked out his theory of evolution, and just as steadily the religious creed of his birth ebbed away. He recorded his intellectual development in a series of notebooks in which he pitted

his new theory against the theological and yet scientifically respectable conception of special creation. In his first transmutation notebook, *Notebook B,* he argued that certain useless anatomical structures gave the lie to the belief that the Creator immediately designed each of his creatures. As Darwin put it in this notebook: "When one sees nipple on man's breast, one does not say some use, but sex not having been determined.—so with useless wings under elytra of beetles.—born from beetles with wings & modified—if simple creation, surely would have been born without them."[11] Male nipples seemed to Darwin only a vague biological memory of a time when hermaphrodites, something like Empedocles' round-men, wandered the earth.

In the notebooks and even when he wrote the *Origin of Species,* Darwin had not yet given up theism. But he had reduced God's activity to that assigned by Enlightenment Deism, and indeed, by advanced theology: God might have set the universe rolling as a primary cause, but then he left its particular destiny to the inexorable workings of the secondary causes described by natural law.[12]

Darwin had fair precedent for rejecting the idea that God immediately intervened in the world to set it aright. By the early nineteenth century, British natural theologians had begun to argue that it ascribed a greater intellectual power to the Creator to have formed the world through law than through dim brute force. Charles Babbage, author of the Ninth Bridgewater Treatise on the "Power Wisdom and Goodness of God as Manifested in his Creation," contriver of the analytical engine, and frequent dining companion of the young Darwin[13]—declared that "to have foreseen the changes to occur after the creation and to have provided, by one comprehensive law, for all that should ever occur, either to the races themselves, to the individuals of which they are composed, or to the globe which they inhabit, manifests a degree of power and of knowledge of a far higher order [than that required to intercede at each step]."[14] So when Darwin, in his early notebooks, suggested that it bespoke a grander idea of the Creator to believe that he worked through fixed laws, he merely endorsed the growing modern consensus of theologians of his day.

In his Essay of 1842, in which he brought together his evolutionary ideas for the first time in a coherent and continuous sketch, Darwin even considered some theological justification for making natural law the substitute for God's direct hand: it seemed to him beneath the dignity of God to have directly created every creature, especially the aesthetically unpleasing ones and those of disgusting habits, like sea slugs and maggots. On the other hand, if creation were through law, then God's dignity might be preserved, while the dirty work would be

accomplished through lawful processes—or at least so Darwin suggested.[15]

In the *Origin of Species,* which was published in 1859, Darwin argued, of course, that we ought to regard the particular formation of animals to be the work of evolution by natural selection rather than the result of special creation. Yet in this work of twenty-years maturation, he continued to suggest that the laws of evolution, those secondary laws, ought best be conceived as God's commands. As he concluded in the last chapter of the *Origin:*

> 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. When I view all beings not as special creations, but as the lineal descendants of some few beings which lived long before the first bed of the Silurian system was deposited, they seem to me to be ennobled.[16]

Darwin's remarks about the role of the Creator in establishing laws appears in the *Origin*—though not, I think, in the earlier essays—to have been uttered as much in defense against the rigidly righteous who might quickly slam his book shut before carefully considering his argument—at least as much as that kind of rhetorical defense, as an expression of firm religious conviction. Yet it would be a mistake to think that the *Origin of Species* was composed, as Lewontin and such historians of science as Will Provine believe, in the dead night of atheism; though, perhaps, the twilight of agnosticism was beginning to spread over Darwin's vision. The pall of disbelief fairly exudes from his letter to Asa Gray, an American botanist and divine, in May of 1860:

> 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, and as I should wish to do, evidence of design and beneficence on all sides of us. There seems to me too much misery in the world. I cannot persuade myself that a beneficent and 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, and especially the nature of man, and 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 change. Not that this notion *at all* satisfies me. I feel most deeply that the whole subject is too profound for the human intellect. A dog might as well speculate on the mind of Newton. Let each man hope and believe what he can.[17]

Later, however, even these sentiments gradually eroded, and Darwin came to think himself a miserably weak coward to have capitulated to religious opinion by including references to the Creator in the *Origin.* In the *Descent of Man,* though, he redeemed himself. In that publication of 1871, Darwin guardedly described the evolution of religious sentiment, suggesting that it arose naturally from man's fear and superstition. He even made bold to intimate that religious belief in invisible spirits had the same origins as the apparently similar belief his little dog must have harbored as it went barking after a wind-blown parasol that appeared to be carried aloft by an invisible hand.[18]

The Theological Structure of Darwin's Theory

So Darwin cast out the enemy, slowly but finally, or so it seems. Yet, a more careful examination of the way Darwin constructed his theory reveals, think, that the ghost of the Creator had come to invest the very clever and beneficent hand of natural selection itself. From the time he first began to work on his theory of evolution until he penned the *Origin,* Darwin believed in God's governance; and, as I wish to argue, he thought of natural selection as the mediating instrument of that governance. In the years after 1859, Darwin slipped the grasp of the traditional Creator, but the divine spirit lingered within the very mechanism that seems to represent the golem of modern thought, natural selection.

The device of natural selection, as it has been subsequently refined out of Darwin's theory, expresses his discovery that more creatures are produced within a species than the environment can support. Those born with any accidental modifications giving a slight advantage over others of their kind will stand a better chance of reaching reproductive age and of passing on their heritable modifications. Thus the species

will be gradually altered. For contemporary biologists, "natural selection" is merely the term that expresses these systematic causal relationships obtaining among the environment, an individual, its traits, and its offspring.

This skeletal idea, however, was initially formulated by Darwin in a livelier way, fleshed out and animated by a different spirit. In its original guise, natural selection seemed to have properties that many later Darwinians would wish to deny, and even the elder Darwin reflected with some hesitation on his original conception. In the *Descent of Man,* he recalled how he had portrayed natural selection in the *Origin* as operating with too much omniscience and thus as producing creatures all of whose traits were beneficially adapted. He later wished to acknowledge that many traits displayed by creatures neither worked to their advantage nor to their disadvantage; they were benignly neutral. As he confessed in the *Descent of Man:* "I was not able to annul the influence of my former belief, then widely prevalent, that each species had been purposely created; and this led to my tacitly assuming that every detail of structure, excepting rudiments, was of some special, though unrecognized, service."[19] In this typical crisis of scientific conscience, Darwin thought he had invested natural selection with too much of the wisdom of Paley's God.

In his Essay of 1842, it is even clearer that Darwin theologized natural selection. The essay, really a set of rough notes, shows him struggling with those ideas that appear to have dropped so easily from the pen that composed the *Origin of Species.* When he begins to formulate for himself the process of natural selection, he pictures it, if not as identical to the Creator, then as a supernaturally wise being that has an eternity to work its will. At the end of the following drifting passage, however, Darwin does seem to unmask the being as God himself.

> If a being infinitely more sagacious than man (not an omniscient creator) during thousands and thousands of years were to select all the variations which tended towards certain ends [(or were to produce causes which tended to the same end)], for instance, if he foresaw a canine animal would be better off, owing to the country producing more hares, if he were longer legged and keener sight,—, greyhound produced. . . . Who, seeing how plants vary in garden, what blind foolish man has done in a few years, will deny an all seeing being in thousands of years could effect (if the Creator chooses to do so), either by his own direct foresight or by intermediate means,—which will represent the creator of this universe.[20]

By 1844, Darwin was very sure that his theory of evolution by natural selection was both revolutionary and, more importantly, powerful enough to raze the citadels of orthodoxy. He thought it behooved him, then, to take measures to preserve his theory and his own fame. He wrote out another essay at greater length and had a copyist produce a fair copy. Darwin then made out his will, leaving four hundred pounds for the publication of his essay. He did not wish his ideas to be interred with him.

In the 1844 essay, Darwin developed, over several pages, the model of an"imaginary Being," as he called it, who would carefully select advantageous traits.[21] And in the *Origin of Species,* this being reappears, infinitely sagacious and determined to produce the most good possible in creation. Darwin described its activities, now in the guise of natural selection, this way in the *Origin:* "It may be said that natural selection is daily and hourly scrutinising, throughout the world, every variation, even the slightest; rejecting that which is bad, preserving and adding up all that is good; silently and insensibly working, whenever and wherever opportunity offers, at the improvement of each organic being in relation to its organic and inorganic conditions of life."[22]

Now it might be thought that Darwin had merely clothed an entirely cold and bloodless mechanism in some picturesque metaphor in order to make more vivid for his readers the reality of natural selection. Darwin's strategy, of course, was at least this. But the image really did, I think, control the development of his entire theory of evolution, leading him to describe the process in a way differently than he otherwise might have. Let me point to six immediate consequences of his theologized conception of natural selection.

First, from the early notebooks through the essays to the *Origin of Species,* Darwin, while he rejected special creation, retained the notion of creation through law—and his divinized idea of natural selection formed the link joining God as primary cause with biological nature as product. In the Essay of 1842, he emphasized the difficulty of conceiving of law as having the requisite power to fashion the most intricate contrivances. Yet law could conceivably have this power if it were the extended arm of the Deity. As he put it in the essay:

> Doubtless it at first transcends our humble powers, to conceive laws capable of creating individual organisms, each characterised by the most exquisite workmanship and widely extended adaptations. It accords better with [our modesty] the lowness of our faculties to suppose each must require the fiat of a creator, but in the same proportion the existence of such laws should exalt our notion of the power of the omniscient Creator.[23]

The residual of these original considerations appears at the end of the *Origin*'s last chapter, which I have cited above (see text to note 16). For Darwin, natural selection was more than a blind force of nature. It functioned as the surrogate creator operating according to divine command.

As the above quotation from the 1842 essay suggests, this conception of natural selection as a stand-in creator had a facilitating role even in Darwin's convincing himself that a complex of natural causes could produce exquisite adaptations, such as the mammalian eye. From the time he read Paley's *Natural Theology,* Darwin never doubted that organs like the eye—Paley's favorite example—were adaptations of extreme perfection, hardly the sort of thing a machine could produce. Darwin later confessed that whenever he thought of the eye his blood ran cold. But if the agency producing an eye were a lesser God, then such production might well be intelligible.

Darwin's theologized conception of natural selection had a second important consequence. Because natural selection wore the mantle of the Creator, it also took on the wisdom of God: it daily and hourly scrutinized, throughout the world, every variation, even the slightest; not a sparrow fell that it was not aware. If it were like a Manchester spinning loom, the outcome would not have been fine damask. Only a skillful hand could spin that, or the fabric of the eye. Moreover, if like God, natural selection was always working to evaluate every minute variation, selecting always the best, no matter how small, then evolution had to proceed gradually and continuously, rather than hesitatingly and saltationally, the way it would have to proceed if cranked out by a nineteenth-century machine. Indeed, the machine image of natural selection—which comes so easily to us as we reflexively refer to Darwin's *mechanism*—played no role in his own formulation of the "law" of natural selection; the word "mechanism" does not even appear in the *Origin.* The law of natural selection radiated omniscience, power, and exquisite sensitivity. Machines clanked out products stupidly, fitfully, and crudely. They operated in the sink of factories, not on empyrean heights whence the law of natural selection was given.

Huxley thought his friend Darwin to have committed himself to too much by assuming gradual and continual evolution. Huxley was a mutationist—a punctuationist of an earlier vintage. Darwin had briefly entertained the possibility of evolution by sports, as macro-mutations were then called; but he rejected that option. Huxley would have been

even more chagrined had he been aware of one of the important factors leading Darwin to reject saltationism for gradualism.[24]

A third contribution of theological presumption to natural selection theory follows hard on the first two. Since natural selection was comparable to a divine selector, Darwin understood it to work like artificial selection. That is, Darwin could use artificial selection as a model for natural selection—as he does in the *Origin*—only insofar as he conceived them both to be the work of intelligence at some level of expression. This link of artificial with natural selection, made through the assumption of a theologized process, explains one of the very curious claims of the *Origin.* This is a claim that no modern evolutionist would accept: namely, that large numbers of a given species in one location promote faster evolution. In the *Origin,* Darwin first remarks on an important condition for the success of artificial selection, namely, that breeding flocks be large, since "variations manifestly useful or pleasing to man appear only occasionally, the chance of their appearance will be much increased by a large number of individuals being kept; and hence this comes to be of the highest importance to success."[125] He then, some pages later, reintroduces this condition as one necessary for the success of natural selection: "A large number of individuals, by giving a better chance for the appearance within any given period of profitable variations, will compensate for a lesser amount of variability in each individual, and is, I believe, an extremely important element of success."[126] With large flocks, the absolute number of favorable variations will certainly increase, but the proportion of favorable to unfavorable (or neutral) variations should remain constant; and, indeed, large flocks will be even more subject to the phenomenon of swamping-out (when favorable varieties breed with unfavorable). Only if natural selection acts intelligently and with foresight, that is, like a divine selector, will large numbers avail.

The fourth real difference Darwin's theologized version of natural selection made to the general idea of species descent concerned his assumption about the utility of traits exhibited by organisms. The infinite wisdom accorded natural selection meant that it produced only traits that were useful, real adaptations. Darwin probably exaggerated, in that passage from the *Descent of Man,* the degree to which he found only useful adaptations in biological organisms. His conception of natural selection as having a wisdom that passeth understanding meant, nonetheless, that most all traits exhibited by an organism should work to that organism's benefit—all should be useful. In later editions of the *Origin,* Darwin had to retreat a bit from that presumption.

Fifth, not only would natural selection endow creatures with only useful traits, as befitting the surrogate creator, it would crown them with only perfect adaptations, adaptations that could not be better. This was the view, as Ospovat has cogently argued, that Darwin held up to the time he composed the *Origin of Species.*[27] For instance, in the large manuscript he was working on in the mid-1850s, when he received the letter from Alfred Russel Wallace announcing a theory virtually identical to his own, he still argued for perfect adaptation: "Can we wonder then, that nature's productions bear the stamp of a far higher perfection than man's product by artificial selection. With nature the most gradual, steady, unerring, deep-sighted selection,—perfect adaption to the conditions of existence,—the direct action of such conditions—the long-continued effects of habit & perfect training, all concur during thousands of generations."[128] In the *Origin,* Darwin moderated this conception. He recognized that "[n]atural selection tends only to make each organic being as perfect as, or slightly more perfect than, the other inhabitants of the same country with which it has to struggle for existence."[129] Yet, he still conceived of natural selection's work as really quite divine, as he maintained in a passage in the *Origin* comparable to the one just cited from his large manuscript: "Can we wonder, then, that nature's productions should be far 'truer' in character than man's productions; that they should be infinitely better adapted to the most complex conditions of life, and should plainly bear the stamp of far higher workmanship?"[130]

Finally, if natural selection really were tacitly identified by Darwin with nature's God, then we might expect it to work only for the good, for the moral good of creation. Man's selection of animals was vain and selfish; he chose whimsically and only to suit himself, whereas natural selection was unselfish, at least Darwin so judged in the *Origin,* where he observed: "Man can act only on external and visible characters: nature cares nothing for appearances, except in so far as they may be useful to any being. She can act on every internal organ, on every shade of constitutional difference, on the whole machinery of life. Man selects only for his own good; Nature only for that of the being which she tends."[131]

Theologians from very ancient times have had to conjure with the paradox of a morally good God creating a universe of pain and suffering. Darwin considered, as every thinking religious person must, the deep difficulty this presented. Initially he attempted to mitigate the moral responsibility of the Creator by shifting the blame to contingency: God created perfect and good laws, but an intractable matter introduced evil. Ultimately, of course, this explanation will not do. After all,

it is an infinitely powerful God that triumphs in the Christian tradition. Darwin, like many theologians before him, attempted another kind of explanation of evil: namely, that a certain amount of evil was necessary to bring forth good; it was thus only apparent evil. At the end of his chapter on the "Struggle for Existence," chapter three of the *Origin,* Darwin splashed the oil of consolation on his reader: "When we reflect on this struggle, we may console ourselves with the full belief, that the war of nature is not incessant, that no fear is felt, that death is generally prompt, and that the vigorous, the healthy, and the happy survive and multiply."[32] It is a good universe after all.

Human Moral Nature

Darwin not only reinfused nature with value, he was especially keen not to leave man morally naked to the world, or so I have argued in a recent book.[33] But this is not the general view of Darwin's construction of morality, as the quotation from Susan Cannon (cited in the introduction, above) suggests. Michael Ghiselin also makes the easy and usual assumption about Darwinian morals. Darwin, he declares, recognized that "since it furthers the competitive ability of the individual and his family, an 'altruistic' act is really a form of ultimate self-interest."[34] This evaluation of Darwin's position certainly makes him a forerunner of Ghiselin's brand of sociobiology; but it completely misses what Darwin himself thought to be distinctive of his biology of morality, namely, that it overturned utilitarianism.

During his five-year voyage on H.M.S. *Beagle,* Darwin experienced the extremes of moral behavior, from the brutality he frequently observed among the South American gauchos to the nobility of the Indians whom they slaughtered. Darwin yet perceived within this moral diversity some common principles of conduct, principles that his Cambridge reflections on Paleyan moral theory helped him to recognize. While an undergraduate, Darwin had to get up for his exams William Paley's *Moral and Political Philosophy.* The position worked out in this book provided him with a framework through which to weave his emerging biological theory of behavior.

On 8 September 1838, about three weeks before he read Malthus, who inflamed the idea of natural selection in his imagination, Darwin reread Paley, who also sparked an idea. In his *Notebook M,* he considered "Paley's Rule." In *Moral and Political Philosophy,* Paley offers his rule of "expediency" as the central axiom of his ethics. He states it this way: "Whatever is expedient is right. But then it must be expedient on

the whole, at the long run, in all its effects collateral and remote, as well as in those which are immediate and direct."[35] Darwin gave this rule a biological interpretation: "Sept 8th. I am tempted to say that those actions which have been found necessary for long generation, (as friendship to fellow animals in social animals) are those which are good & consequently give pleasure, & not as Paley's rule is then that on long run *will* do good.—alter *will* in all such cases to *have & origin* as well as rule will be given."[36]

In this construction, Darwin has done something quite typical. He has given a biological interpretation to a principle that seems, on the surface, adequately to capture a certain phenomenon. To understand this particular interpretation, though, it must be borne in mind that Darwin had not yet, in early September, formulated his principle of natural selection. Prior to reading Thomas Malthus, who supplied him the insight that coagulated his speculations into the form of his chief principle, Darwin had a different device by which to explain the evolution of species. He believed that the habits an animal might adopt to meet survival needs in its environment would eventually become instinctive, that is, innate and heritable. This conviction expressed an idea that Darwin harbored quite early on and never relinquished, namely, that acquired characteristics could be inherited. The usual medium for such inheritance he understood, like Lamarck, to be habit. In Darwin's early theory, he supposed that habits practiced with regularity over a life-time and by succeeding generations would gradually reform the inheritable substance and become expressed as instincts. In this version of Paley's rule, he suggested that those useful and expedient habits which have been necessary to preserve animal groups, allowing them over long periods to propagate and protect their young (such habits as friendship, parental nurture, etc.) were what we had come to call morally good. The continued practice of such useful behaviors would produce moral instincts that conformed to a temporally readjusted rule of expediency: what has been good will become interred in an animal's bones, and thus will continue to be what animals and their offspring, including man, regard as good. The Paley of his youth was preserved as the biologized Paley of his later evolutionary theory of morals.

The difference between the earlier theory and the later, however, was just natural selection, which Darwin believed eliminated any residual utilitarian selfishness from morals. In the *Descent of Man,* which he saw published in 1871, Darwin urged that the moral sense—the motive feeling which fueled intentions to perform altruistic acts and which caused pain when duty was ignored—would be considered a species of social instinct. He conceived social instincts as the bonds forming

animal groups into social wholes. Social instincts comprised behaviors that nurtured offspring, secured their welfare, produced cooperation among kin, and organized the clan into a functional unit. The principal device of their evolution, in Darwin's view, was community selection—that kind of natural selection operating at levels of organization higher than that of the individual.

Darwin discovered the device of community selection—or what we would call kin-selection—while studying the social insects, the bees and ants that occupied his growing interest from the 1840s through the publication of the *Origin of Species*. Initially, before he quite understood how selection might produce apparently 'altruistic' behavior in bees—when, for instance, the soldier bees disembowel themselves in defending the hive—he was at a loss. How could it happen that a soldier bee might sacrifice its life for the group? Such behavior would not contribute to generating more offspring; and, of course, worker bees were neuters and could not produce offspring in any case. So the problem which Darwin faced in the mid-1840s was acute. After some conceptual struggle, however, he finally understood that natural selection could be applied to the whole community or hive, rather than only to the individual. Those hives that by chance had individuals whose traits varied in a beneficial direction would have the advantage over competing hives. And so it would be with men, as Darwin explained in the *Descent:*

> It must not be forgotten that although a high standard of morality gives but a slight or no advantage to each individual man and his children over the other men of the same tribe, yet that an advancement in the standard of morality and an increase in the number of well-endowed men will certainly give an immense advantage to one tribe over another. There can be no doubt that a tribe including many members who, from possessing in a high degree the spirit of patriotism, fidelity, obedience, courage, and sympathy, were always ready to give aid to each other and to sacrifice themselves for the common good, would be victorious over most other tribes; and this would be natural selection.[37]

Darwin's theory of moral sense was taken by some of his reviewers, as well as some modern biologists such as Ghiselin, to be but a species of utilitarianism, one that gave scientific approbation to the morality of selfishness. But this was expressly not Darwin's understanding. He believed his theory rather different from that of the utilitarians Bentham and Mill. Individuals, Darwin argued, acted instinctively to avoid

vice and to seek virtue without any rational calculations of benefit. Bentham believed pleasure to be the sole motivating spring of human action, including moral action. But Darwin held that pleasure was neither the usual motive nor the purpose of moral acts. Rather, moral behavior, arising ultimately from community selection, was directed to the vigor and health of the group, not to the pleasure of its individual members. This meant, according to Darwin, that the criterion of morality—that highest principle by which we judge our and others' behavior in a cool hour—was not the general happiness, but the general good. The general good, though, he understood in distinctly biological terms; it was the welfare and survival of the group. This was no crude utilitarian theory of morality dressed in biological guise. Darwin's theory cast moral acts as bred in the bone, as intrinsically altruistic.

Conclusion

Should we regard morality as grounded in our biology rather than in soul? Today the idea that morality is ultimately based in biology strikes fear and loathing into the bowels of the most diverse groups. Contemporary creationists, for example, find this an horrendous notion; it appears to authorize all manner of monkey behavior in man. On the other hand, many biologists and philosophers of biology, such as Stephen Jay Gould, Richard Lewontin, and Philip Kitcher, are no less dismissive: deep in the bosom of every sociobiologist, they believe, beats the cold heart of a conservative Republican. Behind E. O. Wilson stands Newt Gingrich. Neither group perhaps suspects the historical roots of Darwin's conception, nor appreciates its strengths. But Darwin did understand, in that intuitive and poetically expressive way of his, the profoundly religious bearing of his theory. The last paragraph of the *Origin of Species* echoes those lines from Milton's *Paradise Lost,* which Darwin read constantly while on the *Beagle.* In one passage, Satan is approaching Eden, but is stopped by an entangled bank; he finally jumps the bank and alights in the Tree of Good and Evil, where he readies death for man. The passage from Milton reads:

> Now to the ascent of that steep savage hill
> Satan had journeyed on pensive and slow,
> But further way found none, so thick entwined,
> As one continued brake, the undergrowth
> Of shrubs and tangling bushes had perplexed
> All path of man or beast that passed that way. . . .

Thence up he flew, and on the Tree of Life,
The middle tree and highest there that grew,
Sat like a cormorant, yet not true life
Thereby regained, but sat devising death
To them who lived, nor on the virtue thought
Of that life-giving plant, but only used
For prospect what, well used, had been the pledge
Of Immortality.[38]

For Darwin, the pledge of immortality and morality was realized in the laws of evolution, which brought life out of death—a reversal of that Old Testament view that Milton depicts. Darwin's biology was Christian—out of death comes life more abundantly. In the last paragraph of the *Origin,* he reflects:

> It is interesting to contemplate an entangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent on each other in so complex a manner, have all been produced by laws acting around us [such as the struggle for life]. . . . Thus, from the war of nature, from famine and death, the more exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved.[39]

Notes

1. Andrew Dickson White, *History of the Warfare of Science with Theology in Christendom,* 2 vols. (New York: Macmillan, 1896), 1:70.

2. This version of the confrontation between Wilberforce and Huxley is given in "Grandmother's Tale," *Macmillan's Magazine* 78 (1898): 425–435. See the discussion of various accounts of the interchange in Robert Richards, *Darwin and the Emergence of Evolutionary Theories of Mind and Behavior* (Chicago: University of Chicago Press, 1987), pp. 549–551.

3. Edward Manning, quoted in White, *History of the Warfare,* 1:71.

4. Anonymous, "Dr. Draper and Evolution," *Catholic World* 26 (1878): 774–789, quotation from p. 782.

5. Richard C. Lewontin, Steven Rose, and Leon Kamin, *Not in Our Genes: Biology, Ideology, and Human Nature* (New York: Pantheon, 1984), p. 51. See also Richards, *Darwin and the Emergence of Evolutionary Theories of Mind and Behavior,* pp. 404–407.

6. Susan Faye Cannon, *Science in Culture: The Early Victorian Period* (New York: Science History Publications, 1978), p. 276.

7. James Moore has charted the accommodation of Protestant religious thinkers to Darwinian theory in his continuously interesting *The Post-Darwinian Controversies: A Study of the Protestant Struggle to Come to Terms with Darwin in Great Britain and America, 1870–1900* (Cambridge: Cambridge University Press, 1979). Jon Roberts focuses a like concern on Protestant America in his *Darwinism and the Divine in America* (Madison: University of Wisconsin Press, 1988). And Frederick Gregory charts comparable relationships in his *Nature Lost? Natural Science and the German Theological Traditions of the Nineteenth Century* (Cambridge: Harvard University Press, 1992).

8. I discuss these above mentioned evolutionary "spiritualists" in *Darwin and the Emergence of Evolutionary Theories of Mind and Behavior,* chaps. 8–10.

9. Charles Darwin, *The Autobiography of Charles Darwin,* ed. Nora Barlow (New York: Norton, 1958), p. 87.

10. Darwin, *Autobiography,* p. 85.

11. Charles Darwin, *Notebook B,* MS 84, in *Charles Darwin's Notebooks, 1836–1844,* ed. Paul Barrett et al. (New York: Cornell University Press, 1987), p. 192.

12. Charles Darwin, *Notebook D,* MS 36–37, in *Charles Darwin's Notebooks,* p. 343.

13. When he lived in London, in the years just after his return from his voyage, Darwin saw Babbage frequently, as he noted in his *Autobiography:* "I used to call pretty often on Babbage and regularly attended his famous evening parties. He was worth listening to, but he was a disappointed and discontented man; and his expression was often or generally morose" (p. 108).

14. Charles Babbage, *The Ninth Bridgewater Treatise, A Fragment,* 2d ed. (London: Murray, 1838), p. 46.

15. Charles Darwin, *Essay of 1842,* in *The Foundations of the Origin of Species,* ed. Francis Darwin (Cambridge: Cambridge University Press, 1909), p. 51. See also similar remarks made in *Notebook D,* MS 36–37, *Notebooks of Charles Darwin,* p. 343.

16. Charles Darwin, *On the Origin of Species* (London: Murray, 1859), pp. 488–489. See also the comprehensive and instructive discussion of Darwin's conception of natural law and its relation to God's design in Neal Gillespie, *Charles Darwin and the Problem of Creation* (Chicago: University of Chicago Press, 1979), pp. 54–55.

17. Charles Darwin to Asa Gray (22 May 1860), in Francis Darwin, ed., *Life and Letters of Charles Darwin,* 2 vols. (New York: D. Appleton, 1891), 2:105.

18. See Richards, *Darwin and the Emergence of Evolutionary Theories of Mind and Behavior,* pp. 199–200.

19. Charles Darwin, *The Descent of Man and Selection in Relation to Sex,* 2 vols. (London: Murray, 1871), 1:153.

20. Darwin, *Essay of 1842,* in *Foundations of the Origin of Species,* p. 6. Bracketed phrase was erased in original manuscript.

21. Darwin, *Essay of 1844,* in *Foundation of the Origin of Species,* pp. 86–87.

22. Darwin, *Origin of Species,* p. 84.

23. Darwin, *Essay of 1842,* in *Foundations of the Origin of Species,* p. 52. Bracketed phrse was erased in original manuscript.

24. As an historian who adopts an evolutionary-epistemological method, I would not wish to suggest that any aspect of Darwin's theory had only one cause. Darwin's ideas evolved within a complex conceptual environment, which had many intellectual pressures being applied simultaneously though with varying force. Another obvious source of Darwin's gradualism was his dependence on Lyellian uniformitarian theory. Lyell maintained that great geological changes could be explained by appealing to causes that operated insensibly and continually over vast stretches of time. Darwin was a Lyellian geologist and, I believe, brought the same principles to explain great zoological changes. But geology and zoology different in a significant way. Animal morphology exhibited, while rock morphology did not, minute and exquisite features of design. To explain the former, some agents of creative intelligence had to be implicitly assumed, which believe Darwin did in the case of natural selection.

25. Darwin, *Origin of Species,* p. 41.

26. Ibid., p. 102. See also similar claims on pp. 105, 107, and 125.

27. See Dov Ospovat, *The Development of Darwin's Theory* (Cambridge: Cambridge University Press, 1981).

28. Charles Darwin, *Charles Darwin's Natural Selection,* ed. R. C. Stauffer (Cambridge: Cambridge University Press, 1985), p. 225.

29. Darwin, *Origin of Species,* p. 201.

30. Ibid., p. 84.

31. Ibid., p. 83.

32. Ibid., p. 79.

33. The discussion in this section is based on my *Darwin and the Emergence of Evolutionary Theories of Mind and Behavior,* pp. 71–242.

34. Michael Ghiselin, "Darwin and Evolutionary Psychology," *Science* 179 (1973): 964–968; quotation on p. 967. See also Richards, *Darwin and the Emergence of Evolutionary Theories of Mind and Behavior,* p. 218.

35. William Paley, *Moral and Political Philosophy,* in *The Works of William Paley* (Philadelphia: Woodward, n.d.), p. 40.

36. Charles Darwin, *Notebook M,* MS 1 32e, in *Charles Darwin's Notebooks,* p. 552.

37. Charles Darwin, *The Descent of Man and Selection in Relation to Sex,* 2 vols. (London: Murray, 1871), 1:166.

38. John Milton, *Paradise Lost,* book 4, ll. 172–201.

39. Darwin, *Origin of Species,* pp. 489–490.

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