

Darwin, the Galapagos and God: A Biologist's Journey and Dilemmas

Patricia T. Bradt and Rev. Peter A. Pettit

Patricia T. Bradt, Associate Professor Emerita, Environmental Science Program, Muhlenberg College
Peter A. Pettit, Assistant Professor, Department of Religion Studies, Muhlenberg College, Allentown

Abstract

Why do fascinating organisms inhabit the Galapagos? Plants and animals colonized these geologically new islands and radiated into open ecological niches. The organisms arrived by chance: enduring swimming, flying or floating across 960 km of open ocean. Giant tortoises occupied the herbivorous mammal niche and the surviving finches and mocking birds exploited new avian niches. The indigenous flora and fauna evolved from those pioneer organisms with genes enabling adaptation to their new environment. These genetically advantaged organisms left more progeny, developed into new species and populated the islands with species found nowhere else on earth. Observing these unique forms causes a biologist to ponder if and how God created these creatures. Did God just initiate the process and let it proceed, as detailed by Darwin and others? The results are the development of the Galapagos biota that provides excitement not only for biologists but also for all who cherish the natural world. Can science or religion answer these questions? Theist biologists and theologians address these dilemmas. An evolutionary theology and metaphysics of the future may provide guidance. However, these questions will continue to challenge those who revere all earth's creations, no matter how they got here.

I. Introduction

A ten day voyage around the Galapagos Islands, Herman Melville's "enchanted isles", reinforced strongly not only admiration for the natural world but also the reason for studying biology. From the moment we landed at Baltra and stepped over a land iguana while waiting for customs, our sense of wonder increased exponentially. There was the opportunity to observe all these famous and weird critters eye to eye, many found no where else on earth. We could also wonder, with Charles Darwin, at the end results of biological evolution. He figured out why the animals and plants were unique, the flora and fauna evolved in geographical isolation, but they were closely related to mainland species. We marveled at Darwin's intellect and how he developed his theory of evolution from the distribution and anatomy of the different plants and animals. He completed his trip on the HMS Beagle in 1836, the first edition of *The Voyage of the Beagle* was published in 1839, followed by several revisions. (The revision referenced in this paper was the last edition revised by Darwin in 1860.) Following Darwin's return to England from the Beagle voyage, it took him twenty-three years and extensive consultation with other researchers and natural historians before he crystallized his evolution theory and published *On the Origin of Species* in 1859.

As the plants and animals, capable of long distance travel, arrived on these newly formed volcanic islands, they radiated into the many vacant ecological niches. The organisms arrived by chance, only those that could endure swimming, flying or floating across 960 kilometers of open ocean colonized the islands. These pioneers that made the journey amassed many new characteristics, adapting to their new environment and developing into new species as they populated the different islands. What are these unusual species, how did they get to the Galapagos and evolve, by natural selection, into species found no where else on earth?

II. Islands Overview

The seventeen islands, close to the equator, were formed by under water volcanoes, such eruptions are still occurring on the islands. Darwin observed over two thousand volcanic craters, some rising to 140 meters.¹ The higher altitude regions are more humid and more heavily vegetated than the lower, more arid areas. The ten principle islands have different English and Spanish names. The Galapagos National Park was created in 1959, 100 years after the publication of *On The Origin of Species*. The first permanent human settlers arrived from Ecuador in 1832.

III. What did Darwin Observe on the Galapagos in September 1835?

He found broken black rocky volcanic lava scorching under the hot sun, Darwin was “astonished at the amount of creative force...displayed in these small, barren and rocky islands”.² Islands geographically close (80 to 95 km apart), geologically and climatically similar supported different species filling the same ecological role. “The natural history of these islands is eminently curious....Most of the organic productions are aboriginal creations, found nowhere else; there is even a difference between the inhabitants of the different islands;...The archipelago is a little world within itself”.³ Darwin observed that the most remarkable feature of the islands was that different islands were inhabited by entirely different species.⁴ The fact that “[S]everal of the islands possess their own species of tortoise, mocking-thrush, finches, and numerous plants, these species having the same general habits, occupying analogous situations, and obviously filling the same place in the natural economy of this archipelago, ... strikes me with wonder.”⁵

Darwin concludes that the islands are geologically recent, and “we seem to be brought somewhat near to that great fact—that mystery of mysteries—the first appearance of new beings on this earth.”⁶

Birds

Darwin noted the “extreme tameness of the birds” and the other land animals; evidently these resident animals never learned to fear humans.⁷ He documented twenty-six different species of land birds. In general the birds were dusky colored and smaller than mainland birds, not typical of most birds of the tropics.⁸

Noteworthy was a unique family of drab, finchlike birds with no known close relatives anywhere in the world except a species on an isolated Pacific island. “All these species are peculiar to this archipelago, and so is the whole group... The most curious fact is the perfect gradation in the size of the beaks in the different species.”⁹

¹ 1. Darwin, C. D. 1860. *The Voyage of the Beagle*, was first published in 1839 followed by several revisions. 1860 edition here referenced was the last edition revised by Darwin. 1962 Edition, annotated and introduction by L. Engel. Anchor Books, Garden City, New York. p. 373.

² 2. Darwin, C. D. 1860. p 398.

³ 3. Darwin, C. D. 1860. pp 378-379.

⁴ 4. Darwin, C. D. 1860. p 394.

⁵ 5. Darwin, C. D. 1860. p 397

⁶ 6. Darwin, C. D. 1860. pp 378-379

⁷ 7. Darwin, C. D. 1860. p 398.

⁸ 8. Darwin, C. D. 1860. p 381-392.

⁹ 9. Darwin, C. D. 1860. p 379-380.

Reptiles

Darwin marveled at the large indigenous lizards. “The rocks on the coast abounded with great black lizards, between three and four feet long; and on the hills, an ugly yellowish-brown species was equally common.”¹⁰ The “lazy and half torpid” land iguanas live in burrows, climb trees and are “much more numerous in the lower sterile districts near the coast”, but some live in higher, damper parts.¹¹ These creatures are “ugly animals, of a yellow orange beneath, and of brownish red color above; from their low facial angle they have a singularly stupid appearance”.¹²

The marine iguana has a very peculiar life, it “lives exclusively on the rocky sea-beaches”.¹³ “It is a hideous-looking creature, of a dirty black colour, stupid, and sluggish in its movements”.¹⁴ However, “[w]hen in the water this lizard swims with perfect ease and quickness, by a serpentine movement of its body and flattened tail...”.¹⁵ Darwin noted “a group of 6 or 7 of these hideous reptiles may often times be seen on black rocks....basking in the sun with outstretched legs”.¹⁶ The lizard feeds primarily on sea lettuce (*Ulva*) on the sea bottom. These iguanas are strict herbivores with no apparent land predators.¹⁷ According to Darwin they are the “only existing lizard which lives on marine vegetable productions”.¹⁸

The hallmarks of the Galapagos are the giant tortoises, each island having a different type of tortoise.¹⁹ Sailors would stop at the islands to gather the tortoises to provide meat on their long voyages. Darwin²⁰ concluded “There can be little doubt that this tortoise is an aboriginal inhabitant of the Galapagos; for it is found on all, or nearly all, the islands....The tortoise is very fond of water, drinking large quantities, and wallowing in the mud.”²¹ There were “several [tortoises] so large that it required six to eight men to lift themsome afforded as much as two hundred pounds of meat”.²² Because there were no herbivorous mammals that were able to make the hazardous journey to these isolated islands, these large reptiles exploited the large grazer niche.²³ “In the lower altitude arid regions, the giant tortoises feed on and obtain water from succulent cacti, but in the higher, damp areas they eat the leaves of various trees.”²⁴

Darwin describes his encounter with the giants: “As I was walking along I met two large tortoises, each of which must have weighed at least two hundred pounds; one was eating a piece

¹⁰ 10. Darwin, C. D. 1860. p 377.

¹¹ 11. Darwin, C. D. 1860. p 388-389.

¹² 12. *ibid.*

¹³ 13. Darwin, C. D. 1860. p 386.

¹⁴ 14. Darwin, C. D. 1860. p 386.

¹⁵ 15. *ibid.*

¹⁶ 16. Darwin, C. D. 1860. p 387.

¹⁷ 17. *ibid.*

¹⁸ 18. Darwin, C. D. 1860. p 390.

¹⁹ 19. Darwin, C. D. 1860. p 394.

²⁰ 20. Darwin, C. D. 1860. p 385.

²¹ 21. Darwin, C. D. 1860. p 383.

²² 22. *ibid.*

²³ 23. Darwin, C. D. 1860. p390.

²⁴ 24. Darwin, C. D. 1860. p 383.

of cactus, and as I approached, it stared at me and slowly stalked away; the other gave a deep hiss, and drew in its head.”²⁵

Vegetation

One hundred new species of “wonderfully different” flowering plants, probably unique to the Galapagos, were cataloged by Darwin.²⁶ These indigenous plants included twenty genera of the daisy (Compositae) family and seven species of the Euphorbiaceae-family.²⁷ As with the animals, different islands had different, but often closely related, plant species.²⁸

Invertebrates

Briefly discussing the invertebrates, Darwin stated “The insects....are small sized and dull coloured”.²⁹ He counted twenty-five new species of beetles (Coleoptera).³⁰

IV. Influence of the Galapagos on *The On the Origin of Species*

Darwin’s intellect is awe inspiring. He studied the patterns of animal and plant distribution and their structures. However it was many years before Darwin appreciated the significance of the odd Galapagos creatures and figured out why these animals and plants were found nowhere else on earth.³¹ In the barren volcanic Galapagos Islands, Darwin found “a little world in itself”³² and his astute observations formed the basis for his theory of evolution. The isolation of the Galapagos enabled Darwin to study evolution at work in a “with a clarity never possible...on the mainland.”³³ Darwin concluded “...the several islands of the Galapagos Archipelago are tenanted...in a quite marvelous manner, by very closely related species; so that the inhabitants of each separate island, though mostly distinct, are related in an incomparably closer degree to each other than to the inhabitants of any other part of the world.”³⁴ “The really surprising fact in this case of the Galapagos Archipelago...is that the new species formed in the separate islands have not quickly spread to the other islands.”³⁵ Darwin concluded that the organisms of the Galapagos were closely related to those of America.³⁶

It was twenty-three years after Darwin returned from the Beagle voyage in 1836 that he published his theory of evolution, descent with modification, how nature selects for organisms best suited for the environment, etc. in *On the Origin of Species* in 1859. In formulating his theory, he gathered information from many other experts, including natural historians. He wanted to be extremely careful and thorough in his documentation because he knew his theory would cause not only scientific controversy but also great concern in the Christian Church.

²⁵ 25. Darwin, C. D. 1860. p 375-376.

²⁶ 26. Darwin, C. D. 1860. p 392.

²⁷ 27. Darwin, C. D. 1860. p 393, 397.

²⁸ 28. Darwin, C. D. 1860. p 395.

²⁹ 29. Darwin, C. D. 1860. p 382.

³⁰ 30. Darwin, C. D. 1860. p 392.

³¹ 31. Darwin, C. D. 1860. preface to 1962 edition by L. Engel. p xix.

³² 32. Darwin, C. D. 1860. preface p xviii.

³³ 33. Darwin, C. D. 1860. preface p xix.

³⁴ 34. Darwin, C. D. 1859. *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*. John Murray, London. p. 387.

³⁵ 35. Darwin, C. D. 1859. p 388.

³⁶ 36. Darwin, C. D. 1859. p 386.

Christian thinking at that time was that all creatures, including humans, were created by God in their present form and that humans did not evolve from preexisting organisms. Darwin proposed that humans evolved in the same manner as all other animals.

Darwin concludes in *On the Origin of Species*³⁷ “It is interesting to contemplate a tangled 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 upon each other in so complex a manner, have all been produced by laws acting around us.” His insights about evolution would suggest that the interdependent, complex action of natural laws needed no amendment when he himself, a self-conscious, reflective human, stepped onto that tangled bank.

V. Evolution in Galapagos—Current Thoughts

The organisms that colonized the Galapagos arrived by flying, swimming, or floating on islands of drifting vegetation. These survivors had genes enabling them to adapt to their new environment and they slowly colonized the geologically new islands, then radiated into the vacant ecological niches. Eventually these genetically advantaged pioneers evolved into different species, found nowhere else on earth, as they adapted to the unique environments on individual islands. They produced more progeny to populate each island. No amphibians or large mammals colonized the islands because they were not physically equipped to make the perilous voyage, but certain reptiles and many birds and plants could withstand the journey. Plant seeds could travel on the wind, float or lodge in mud on birds’ appendages. Though the islands appear geographically close, in fact they are isolated by deep water, strong currents and very gentle winds.

The giant tortoises are the ecological equivalents of herbivorous mammals on the mainland. No such mammals reached these islands. The only indigenous mammal Darwin observed was a mouse, now extinct. The few terrestrial finches that survived the open ocean flight radiated into thirteen different species on different islands. Surviving mocking birds, reproduced and developed into four species found only in the Galapagos.

In the *Voyage of the Beagle* Darwin did not mention the unique Galapagos penguins, the only penguins living close to the equator, nor did he mention the rare flightless cormorants, found only in the Galapagos.³⁸ Perhaps Darwin did not observe these rare birds or maybe they had not yet arrived on the islands.

VI. Personal Experience in Galapagos

Hiking over rocky trails and kayaking in isolated coves brought us into close proximity with the Galapagos animals, that have no fear of humans. We stepped over baby blue and masked boobies at their colonial nesting sites and swam with sea lions who appeared to enjoy our company. A baby sea lion crawled into the lap of one tourist! The brown pelicans sat in our kayaks and a ruling male sea lion chased us away from his harem on the beach. The male sea lion barked all day and night as he guarded his harem of females and young. When he tired, he was challenged by a younger, rested male and withdrew to a “bachelors’ colony” to recuperate. We were insulted when basking marine iguanas spat at us as we climbed the rocky shores, but we later learned that

³⁷ 37. Darwin, C. D. 1859. p 459.

³⁸ 38. Jackson, M. H. 1993. *Galapagos. A Natural History*. University of Calgary Press, Calgary, Alberta, Canada. p 128-132, 150-151.

they were just getting rid of the excess salt they imbibed while feeding on the underwater vegetation.

VII. Human Needs for Contact with the Natural World

Why do many theistic humans get such joy and satisfaction from contact with and study of the natural world? Did God arrange for humans to derive solace and delight in the study not only of the natural world, but also of evolutionary processes? Haught theorizes that God is not just a planner; rather, “a God whose very essence is to be the world’s open future is not a planner or designer, but an infinitely liberating source of new possibilities and new life.”³⁹

Do humans need contact with the natural world; is it in our genes? Why do certain humans love and respect the natural world, while others are indifferent or even fearful? Are humans dependent on nature for spiritual needs, beyond our material needs? Do humans have a genetic predisposition to affiliate with and love nature, a “biophilia”? “Biophilia, if it exists...is the innately emotional affiliation of human beings to other living organisms.”⁴⁰ Biophilia is not “hard-wired” into our genes; rather it consists of a “collection of relatively *weak* biological tendencies. All the various strains of biophilia depend on adequate learning and experience”.⁴¹ Nabhan and St, Antoine⁴² propose that a child must be exposed to appropriate environmental triggers for the full expression of the genetic basis of biophilia. Many children pass through a “bug period”, exhibiting strong interests in the natural world and its inhabitants,⁴³ but in many humans this interest atrophies as children grow. Human’s love of nature is “prepared learning”, extending to our easily learned fear of snakes, spiders and bugs.⁴⁴ Iltis (1973)⁴⁵ goes farther stating “Human genetic needs for natural pattern, for natural beauty, for natural harmony, [are] all the results of natural selection over the illimitable vistas of evolutionary time.”

Wilson⁴⁶ proposes that “The more we know of other forms of life, the more we enjoy and respect ourselves. Humanity is exalted not because we are so far above other living creatures, but because knowing them well elevated the very concept of life.” The more you study the natural world and evolution the more admiration and wonder you develop.⁴⁷

The “admiration and wonder” that Carson invokes bring one into the realm of religion, where transcendent experiences of beauty and meaning are often the focus. The discussion of evolutionary theory, however, is not noted for evoking these positive emotions; more often it has engendered conflict and distrust. From its earliest appearance, through the Scopes trial of 1925,

³⁹ 39. Haught, J. 2008. *God after Darwin. A Theology of Evolution*. 2nd Ed. Westview Press. Boulder, CO. p 127-128.

⁴⁰ 40. Wilson, E. O. 1993. Biophilia and the Conservation Ethic. In. Kellert, S.R. and E. O. Wilson (Eds.), *The Biophilia Hypothesis*. Island Press, Washington, D.C. p 33

⁴¹ 41. Kellert, S. R. 1997. *Kinship to Mastery: Biophilia in Human Evolution*. Island Press, Washington, D.C. p 4. Italics in original.

⁴² 42. Nabham, G. P. and S. St. Antoine. 1993. The loss of Floral and Faunal Story: The Extinction of Experience. In. Kellert, S.R. and E. O. Wilson (Eds.), *The Biophilia Hypothesis*. Island Press, Washington, D.C. p 233.

⁴³ 43. Wilson, E. O. 1994. *The Naturalist*. Warner Books, New York. p 56.

⁴⁴ 44. Ulrich, R. S. 1993. Biophilia, Biophobia, and Natural Landscapes. In Kellert, S.R. and E. O. Wilson (Eds.), *The Biophilia Hypothesis*. Island Press, Washington, D.C. pp 75-76.

⁴⁵ 45. Iltis, H. 1973. Can one love a plastic tree? *Bull. Ecol. Soc. Amer.* 54 (5): 7,19.

⁴⁶ 46. Wilson, E. O. 1984. *Biophilia: The Human Bond with Other Species*. Harvard University Press, Cambridge, MA. P. 115.

⁴⁷ 47. Carson, R. 1952. Letter to James E. Bennet 11/1/1952. Quoted in Lear, Linda. 1997. *Rachel Carson: Witness for Nature*. Henry Holt, New York. p 227.

to the litigation of *Kitzmiller et al. vs. Dover District School Board* eighty years later⁴⁸, the theory has been challenged by those claiming that religious revelation asserts a countervailing, and even disqualifying, truth about the creation of the universe and life on Earth.⁴⁹ Scientific truth and religious truth differ in their natures, so we should not expect that either one will account for all the assertions that the other makes. On the one hand, faith is not amenable to the testing essential to scientific method; “science’s tools will never prove or disprove God’s existence”.⁵⁰ On the other hand, the same author says, “I do not find the wording of Genesis 1 and 2 to suggest a scientific textbook but a powerful and poetic description of God's intentions in creating the universe.”⁵¹ Such a description cannot be expected to hew to the standards of a scientific report. “Genesis was written in a prescientific age, in the language of the day and in an attempt to communicate great truths to the people of that age. Those truths include above all the notion that we are here along with all other existence as the result of the creative power of God. They do not include an attempt to teach science.”⁵²

Nevertheless, both science and religion address the origins of such wondrous, varied, functional, beautiful, and inspiring flora and fauna as Darwin discovered in the Galapagos. Their overlap in attempting to account for its splendor and specificity bring the two realms of discourse into an unavoidable encounter. For those who experience the magnificence of nature and understand its complex mechanisms while also believing in God as “creator of heaven and earth,” that encounter cries out for a compatible resolution that goes beyond the stand-off at which most public debates have arrived.

No matter how the Galapagos critters got there our sense of wonder continues its exponential increase as we learn more about the ecosystems that comprise not only the Galapagos Islands, but all the fascinating creatures and plants on the planet. There are so many weird and wonderful living things, keeping biologists constantly amazed and seeking answers. Is this admiration and reverence for the natural world and all its outlandish inhabitants in our genes or is it ‘turned on’ by childhood experiences?⁵³ How might we resolve a reverence for the natural world with Christian Faith?

VIII. Starting Points

We might begin by considering the traditional approach of biblical faith, which asserts that creation exists as it does through the direct and specific action of God.⁵⁴ Each species has its own place in the natural order because God placed it there and organized creation in such a way as to provide for its harmonious interaction. For one who knows the record of life on earth, this

⁴⁸ 48. Bradt, P. T. 2006. *Darwin versus Intelligent Design in U.S. Courts: Does Teaching Intelligent Design in Biology Classes Violate the U.S. Constitution?* www.forumonpublicpolicy.com/archive06/bradt.pdf.

⁴⁹ 49. The conflict has been particularly sharp within Christian circles. Armstrong maintains there are fewer conflicts among Muslim and Jews. (Armstrong, K. 1994. *A History of God*. Alfred A. Knopf, Inc. New York. p. 355). Since Jews use the same creation scriptures as do Christians, we might ask whether there is something in Jewish tradition that allows for an easier accommodation to the science of evolution that Christianity has overlooked or obscured.

⁵⁰ 50. Collins, F. 2005. Can you believe in God and Evolution. *Time* 8/7/05. www.time.com/time/magazine/article/0,9171,1090921,00.html accessed 6/4/2009.

⁵¹ 51. Ibid.

⁵² 52. Miller, Kenneth R. 2008. *Only a Theory: Evolution and the Battle for America’s Soul*. Viking Press. p 159.

⁵³ 53. Nabhan and St. Antoine. 1993 p 233.

⁵⁴ 54. Haught, J. 2008. p 10.

view comes up quickly against several obstacles, each of which is particularly evident in the Galapagos ecosystems.

The first is the wide variety of distinctive species on the Galapagos and even among the several islands of the archipelago. Particular ecological niches are filled in this island group by critters that are very different from those that fit those niches on larger land masses. The giant tortoises are a prime example, as these reptiles fill the role of large herbivore that would elsewhere be taken by large land mammals. Even among the islands, Darwin was able to identify distinct species that were particular to one island or another and that fit into the ecology of each island in essentially the same way.

A biblically-based account of their creation would assume that God is endlessly imaginative and chose to multiply the life-forms that interact in nearly identical natural systems, while also ensuring that these more or less interchangeable forms would not change places but remain in their respective domains. Such an explanation is possible, to be sure, but it is not as economical as one that discerns in the patterns of wind, tide, accessibility, adaptation, and natural selection the unique fitness of each of these species to its own locale and the extreme difficulty of other species, even those that fill an equivalent ecological role, displacing or complementing one another.

A second obstacle can be seen in the fearlessness of the sea lion pup that crawled happily into the lap of a human visitor. This is remarkable for its exceptionality, since virtually all sea lions will flee from human contact. Did God instill this particular sea lion with an uncommon level of trust, or create sea lions that are comfortable around humans just here in the Galapagos? Or is it more likely that the long development of this sea lion's genetic heritage in the absence of human enemies accounts for the absence of an instinctive flight response seen in most other animals?

Moreover, the exceptional tameness of this pup, contrasting so markedly with the wariness of other wild animals, highlights the "long, haphazard, and often cruel way" of nature. For most beings in the history of the world, life has been the "nasty, brutish, and short" struggle that Hobbes asserted of humans in a natural state.⁵⁵ The vast numbers of plants and animals that exist apparently for the sole purpose of becoming food for others, the variations on ideal design that constitute the "deviant" examples in every species, and the trillions of non-reproducing gametes that are generated by the world's animal population are all examples of the "suffering, aimless wandering, and obscene waste" that characterize our world's history.

"How could a lovingly concerned God tolerate the struggle, pain, cruelty, brutality, and death that lie beneath the relatively stable and serene surface of nature's present order?"⁵⁶ The proposition that the God traditionally portrayed as the cosmic creator could indulge in an activity so fraught with violence and waste raises the problem of theodicy in especially pointed ways. Moreover, it stretches to incredulity to the limit to assert that special creation, requiring intense focus and enormous divine attention, is accompanied by phenomena that apparently prevail by the laws of nature and that can account for the features of the created order, and yet that these phenomena and their lawful operation do not feature at all in the emergence of species. As Edward O. Wilson has asked, "Would God have been so deceptive as to salt the earth with so much misleading evidence?"⁵⁷

⁵⁵ Hobbes, J. 2008. *The Leviathan*. Part 1. Oxford Univ. Press, Oxford, UK.

⁵⁶ Haught, J. 2008. p 22.

⁵⁷ Wilson, E. O. 2006. *The Creation*. An Appeal to Save Life on Earth. W. W. Norton, New York. p 166.

These considerations, which seem to doom the traditional biblical cosmology to inadequacy as a basis for understanding the natural world as we know it, also call into question a prevalent approach that would portray God as using evolution as the mechanism of creation. This may have been Darwin's own approach, which has been devilishly difficult to pin down. Nevertheless in *On the Origin of Species*, he says, "there is grandeur in this view of life; with its several powers having been originally breathed by the Creator into a few forms or into one; and that ... from so simple a beginning endless forms most wonderful and beautiful have been, and are being evolved".⁵⁸ It is also the perspective expressed by Collins, when he asks, "The mechanism of creation is left unspecified [in Genesis 1, 2]. If God...chose to use the mechanism of evolution to create you and me, who are we to say that wasn't an absolutely elegant plan?"⁵⁹ Or again, Rachel Carson: "Believing as I do in evolution, I merely believe that is the method by which God created and is still creating life on earth".⁶⁰

Merely to designate evolution as God's mechanism of creation, however, does not resolve the issues raised by nature's waste, violence, and gratuitous inventiveness. Whether these be understood as the result of a direct divine creative act or the characteristics of a creative method or mechanism, they remain hallmarks of God's creation and therefore problematic in view of a traditional view of God's benevolent and omnipotent character.

To deal adequately with these dimensions of nature as we know it, we must look to a perspective that radically recasts the character of God from this traditional view. For those who adopt such a perspective, there is a profound continuity with, amounting to a rediscovery of, a central biblical theme that has been neglected.

IX. John Haught's Evolutionary Theology and a Metaphysics of the Future

Drawing on the work of Pierre Teilhard de Chardin, the school of process theology launched by Alfred North Whitehead and Charles Hartshorne, and Taoist thought, John Haught has developed a compelling approach to theology that moves beyond the stand-off we have characterized in the typical evolution-religion debate.⁶¹ Both sides of that debate, Haught argues, are rooted in a static worldview.

The evolutionist view is typically grounded in the past, recognizing only those precedent phenomena that can be traced in the historical or fossil record as effective causes in the development of new forms. "Everything that occurs in cosmic or biological evolution is simply the unfolding of what has already gone before."⁶² But that foundation is inadequate to account for the genuinely novel, contingent possibilities that bring evolutionary change. "What has already been consigned to the fixed past is not itself enough to explain the novelty of evolutionary occurrences."⁶³ Something that allows for the random mutation or the cataclysmic accident must attend the inexorable outworking of past patterns according to natural laws, else nothing truly new can emerge to move development along different lines.

The religious view is most often grounded in an eternal present, an idyllic, Edenic vision of what reality is and should be. In this worldview, "the natural world is the always deficient

⁵⁸ Darwin, C. D. 1859. p 459.

⁵⁹ Collins, F. 2005.

⁶⁰ Carson, R. 1952. In Lear, L, 1997. *Rachel Carson: Witness for Nature*. Henry Holt and Co., New York. p 227.

⁶¹ Haught, J. 2008. pp 81-90, 134-140.

⁶² Haught, J. 2008. p 99.

⁶³ Haught, J. 2008. p 98.

reflection of—if not a perverse deviation from—a primordial perfection of ‘being’ that exists forever in a fixed realm generally pictured as ‘above’ creation, untouched by time”.⁶⁴ With a proper nod to the occasional apocalyptic hope for radical change, Haught sees in virtually all contemporary Western religious thought “some residue of the pre-evolutionary prejudice that cosmic time can bring about nothing that has not already been fully realized in a perfection existing from all eternity”.⁶⁵ No less than with the evolutionist, this religious worldview precludes the emergence of a future that is not already known, in some inchoate or implicit way, in the truth of the religious vision. The development of life is reduced to “meaningless straying from a timeless completeness,” “relegated easily to the same order of relative unimportance that pertains to all temporal occurrence”.⁶⁶

Finding that both the fixed past of evolution and the timeless present of most Western religion fail to explain the sheer novelty that we observe in nature, Haught points to a metaphysics of the future as the basis for a theology that is fully up to the task of embracing evolutionary science. Granting that such thinking will be tough going both for scientists of materialist inclination and for theologians of traditional bent, he nevertheless draws out the biblical images of hope and promise as foundational to his “metaphysics of the future”.⁶⁷ It has, he grants, “an irreducibly religious origin”⁶⁸ and he asserts that it “is the ultimate metaphysical explanation of evolution”.⁶⁹ This is so because “[b]y urging us to ‘wait upon the Lord,’ to live in trust and hope, the biblical vision inevitably locates the fulfillment of being in an arena that we can locate only ‘up ahead’ and not ‘up above’ in a timeless heaven of total perfection, nor behind us in the fixed routines of past physical causation”.⁷⁰

The orientation to the future that is central to biblical faith and hope arises in no small part because the character of God is not to impose, order, and control, but rather to invite, empower, and persuade. “The image of a vulnerable, defenseless, and humble deity may seem shocking to some, but it is crucial to the primordial Christian sense of the nature of ultimate reality”.⁷¹ The image was largely abandoned by Christian theologians who served in imperial cathedrals, but its authenticity is witnessed in numerous reform movements throughout the church’s life, and it has become central to the process theology that emerged in the late 20th century.

Only a God who allows the creation to find its own course can be a God of love and grace. Such grace “brings with it a longing for the independence of that which is loved. Without such ‘letting be’ of its beloved, the dialogical intimacy essential to a loving relationship is impossible.”⁷² By letting the creation be, in order to be an authentic subject in relation to God’s own subjectivity, the randomness, contingency, and undirected features of evolutionary development become “essential features of any world created by a gracious God”.⁷³

⁶⁴ 64. Haught, J. 2008. p 92.

⁶⁵ 65. *ibid*

⁶⁶ 66. *ibid*.

⁶⁷ 67. Haught, J. 2008 pp 102-103.

⁶⁸ 68. Haught, J. 2008 p 96.

⁶⁹ 69. Haught, J. 2008 p 97

⁷⁰ 70. Haught, J. 2008 p 106.

⁷¹ 71. Haught, J. 2008 p 51.

⁷² 72. Haught, J. 2008 p 43.

⁷³ 73. Haught, J. 2008 p 44.

This withdrawal of God from filling the creation with God's own plenitude is also familiar in a kabbalistic Jewish image of creation. "*Tzimtzum*" is the term for contraction that God undertakes in order to give room in the universe for the creation to come into being.⁷⁴ Haught suggests that "the arena into which God 'withdraws' in order to allow for the relatively autonomous self-creation of evolution is that of the unavailable but infinitely resourceful future".⁷⁵ It is from that future, then, or even as the future, as one inviting and supporting the creation in its movement toward fulfillment, that God draws creation forward through the emergence of the really new, whether it leads directly to some future fulfillment or turns out to be a by-way on the evolutionary journey.

God's withdrawal into the future that is the world's fulfillment entails a measure of suffering-with-creation on the part of God, who continues fully in relationship to the world without exercising coercive control over it. As the creation experiences novelty and adventure that is not always purposive or productive, and so suffers, God suffers along with it. But this image is not inimical to biblical faith. Rather, "at the center of Christian faith lies a trust that in the passion and crucifixion of Jesus we are presented with the mystery of a God who pours the divine selfhood into the world in an act of unreserved self-abandonment".⁷⁶ Haught's evolutionary theology "expands this picture of God's suffering so as to have it embrace also the struggles of the entire universe and not just our own species' brief history here. God's empathy enfolds not just the human sphere but the whole creation"⁷⁷ Or, as William Jennings describes it in his discussion of pantheism, "God and all parts of the universe are understood as a continuously interacting and interpenetrating cosmic community. All is related to all else, just as all relates to God and God to all".⁷⁸

If God relates to the world as its future and from its future, then "ultimate reality lies off-limits to any scientific verification oriented toward the past alone".⁷⁹ This would account for the inability of science to provide any ultimate explanation of evolution or to invest the evolutionary process with meaning. But one must forego any hope of meaning only if one rests content with a materialist metaphysics that ignores the reality of the future and its influence on the past and present. For those who take seriously the biblical testimony about God as the world's future, meaning can be drawn from both the biblical witness and the natural world in relation to that future. This is what Haught means when he says that "the 'power of the future' is the ultimate metaphysical explanation of evolution".⁸⁰

In this explanation, the three constituents of evolution take on particular meaning in the horizon of the future that God promises. Contingency, law, and time, distributed in particular proportions, are widely regarded as the necessary framework within which evolutionary development is possible. "The fascinating evolutionary story of life could never have taken place in a world where, for example, chance wiped out all regularity, or where lawfulness allowed no room for contingency, or where sufficient time for adaptational experimentation was

⁷⁴ 74. Scholem, G. 1974. *Kabbalah*. Keter Publishing House, Jerusalem, pp. 129-135.

⁷⁵ 75. Haught, J. 2008 p 105.

⁷⁶ 76. Haught, J. 2008 p 52.

⁷⁷ 77. Haught, J. 2008 p 55.

⁷⁸ 78. Jennings, W. H. 2007. *Storms over Genesis. Biblical Battleground in America's Wars of Religion*. Fortress Press, Minneapolis, MN. p 64.

⁷⁹ 79. Haught, J. 2008 p 105.

⁸⁰ 80. Haught, J. 2008 p 97.

not abundantly available.”⁸¹ Yet evolutionary theory in itself gives no account of the formation of this framework. Rather, it is to theology that one may rightly turn for “explaining in an *ultimate* way why the universe has these generic features”.⁸²

Contingency, the emergence of nonnecessary developments such as genetic mutations and recombinations, take on meaning in a theological sense “as signals of nature’s fundamental openness to new creation”. “The very same events that appear purely random or absurd when viewed only in terms of a scientific method oriented toward the fixed causal past can be understood theologically as openings to the incoming of an indefinitely renewing future in the presently unfinished and perishable cosmos.”⁸³ “The remorseless regularity of laws of nature, which appear to science as neutral descriptions of impersonal and directionless processes, likewise would take on meaning, in that the laws of nature assure the dependable order of the past and present against which the novel can be discerned. A universe devoid of the predictable routines that modern science has uncovered... would be so utterly bereft of order and identity that no *new* emergence would be possible at all, since there would be nothing definite enough to undergo transformation.”⁸⁴ Thirdly, time, takes on meaning only when “the consistent and faithful coming of the future ... push[es] the present into the past, and consequently [generates] the temporal sequence of moments in which evolution could occur.”⁸⁵

Haught does not propose this metaphysics or his evolutionary theology as a substitute for science or as a theory in competition with science. Rather, he argues, “science, limited as it is in its method of inquiry, does not ask about [metaphysics] as such”.⁸⁶ Evolutionary science yields the observations that lead us to recognize the necessity of contingency, law, and time in proper proportions, but it in no way explains them. It is “when we look for an *ultimate* explanation of evolution [that] we must account for th[is] cosmic blend,” and Haught contends “that the metaphysics of the future entailed by the biblical vision of a cosmos sustained by the promise of an Absolute Future provide a most plausible metaphysical grounding of these three aspects of our world. Without in any way intruding into the specifics of scientific work itself, such a vision of reality provides us with an *ultimate* explanation of evolution”.⁸⁷

In developing this metaphysics of the future and the evolutionary theology that can be built on it, Haught resonates with others who have argued that only a fully theological engagement with the evidence of evolution can orient one spiritually in the world as we know it today. Thus Kenneth Miller of Brown University, who notes that “the irony is that only those who embrace the scientific reality of evolution are adequately prepared to give God the credit and the power [God] truly deserves. By recognizing the continuing force of evolution, a religious person acknowledges that God is every bit as creative in the present as...in the past”.⁸⁸ Moreover, says Miller, “an accurate and complete understanding of that [natural] world, even in

⁸¹ 81. Haught, J. 2008 pp 107-108.

⁸² 82. Haught, J. 2008 p 108, emphasis in the original.

⁸³ 83. Haught, J. 2008 p 108.

⁸⁴ 84. Haught, J. 2008 p 110-111, emphasis in the original.

⁸⁵ 85. Haught, J. 2008 p 112.

⁸⁶ 86. *ibid*

⁸⁷ 87. *ibid.* emphasis in the original.

⁸⁸ 88. Miller, K. R. 1999. *Finding Darwin’s God. A Scientist’s Search for Common Ground Between God and Evolution.* Harper/Perennial, New York. p 258.

purely material terms, should deepen and strengthen the faith of any religious person”.⁸⁹ Templeton, of Washington University, speaks even more strongly in this vein:

“Evolution also has spiritual implications. The unity of life can lead to a more humble and respectful attitude towards all life....People of faith have a choice: we can worship the God of the Gaps whose role in creation is continually diminished as ignorance is dispelled, or we can worship the God who created the miracle of life that is self-renewing and is itself a participant and shaper of an ongoing creation.”⁹⁰

The full embrace of evolutionary science and theory by theology can thus be a most constructive engagement and move the encounter of evolution and religion beyond the stand-off that is so frequently portrayed and performed. The two do not stand in opposition to one another, nor must each politely cede some portion of the creation to the other as its exclusive domain. Rather, as science discerns more and more about the mechanisms and possibilities of the natural world, theology can take its findings into account and continue its own developmental process in continuity with the biblical and theological witness that has gone before.

Not only, or perhaps not even, in its particulars, but especially in its method, an evolutionary theology will therefore honor its heritage by engaging and expressing itself in the contemporary idioms of its own day. As Pope John Paul II said in regard to the biblical heritage,

“The Bible itself speaks to us of the origin of the universe and its make-up, not in order to provide us with a scientific treatise, but in order to state the correct relationships of [humanity] with God and with the universe...and in order to teach this truth it expresses itself in the terms of the cosmology in use at the time of the writer.”⁹¹

The fullest possible understanding of cosmology (and other science) in use at the time of our writing of theology can therefore be understood as a gift by which not only our insight into the natural order is advanced but also our theology is challenged to develop more adequate and effective language for what we know of God, ourselves, and the creation. It too, after all, remains incomplete and in development, insofar as it participates in a creation that is so.

X. An imaginative extension

There have been two key dilemmas in this encounter between religion and the evolutionary wonders of the Galapagos. The first is the perceived tension between evolution and biblical creation—the question of how the Galapagos got to be the way they are. The second is the source of the wonder that a visit to the Galapagos engenders—the place of biophilia and its well-springs. As we have pressed beyond both opposition and accommodation between evolution and religion to explore the productive engagement between the two which John Haught and others have envisioned, the two dilemmas have given way to two images that may convey a resolution of some satisfaction.

The first image is that of biophilia as an evolutionary development within the human organism, given meaning by the promise of fulfillment that religion conveys. That fulfillment, for many religious people, either involves or is approached by an *imitatio dei* in which humanity

⁸⁹ 89. Miller 1999. p 169.

⁹⁰ 90. Templeton A. R. 2006. God of the Gaps versus Life is a Miracle: Two Perspectives on Evolution and Religion. Paper delivered at Oxford Round Table, Oxford, UK. 10 pp.

⁹¹ 91. From *Discourses of the Popes from Pius XI to John Paul II to the Pontifical Academy of Sciences, 1936-1986*. [Vatican City, Pontificia Academia Scientiarum 1986] pp 161-164).

embodies the characteristics of God. Since God in an evolutionary theology is fundamentally humble, vulnerable, and defenseless, a healthy imitation of God will render humans similarly modest and devoid of arrogance. Given the place of humans in any hierarchical ordering of living beings, however, arrogance and a tendency to exercise coercive control over nature has proven quite irresistible, with sometimes devastating consequences for others in the biosphere.

The image we might consider is one that understands biophilia as an adaptively effective development of humans to maintain some empathy with the rest of the natural world and particularly with other living things in it. Thereby we are drawn toward a future that is both more sustainable for the whole creation and displays a greater degree of *imitation dei*.

The second image relates to the power of evolutionary science and theory to reorient metaphysics toward the future, from the fixed past of materialist science or the eternal present of theistic, imperial religion that have characterized nearly all modern discourse. This image suggest that it was an evolutionary moment of the most classical type that happened to bring Charles Darwin, with his particular background and learning and 19th-century cultural context, into contact with the highly distinctive ecology of the Galapagos Islands, so that he could subsequently develop the theory of evolution. Another man, in another time, at another archipelago—well, there have been thousands or millions of such combinations on earth through the ages, and none of them resulted in just this advance in the human species' capacity to understand and advance its place in the natural world.

Two images—one focusing on the metaphysics of the future and the other on the necessary coalescence of contingency, law, and time—and both gain meaning in a theological perspective that is fully consonant and continuous with the biblical and theological heritage of western Christianity.

XI. Conclusion

Evolution continues, as a new pink species of land iguana has been found in the Galapagos.⁹² New species are continually arising and exciting biologists. Evolution among microbes leads scientists to work diligently to produce solutions for evolving diseases such as the H1N1 virus and for insect pests, to name a few. The world goes on as it has for billions of years, with novelty emerging unannounced and unaccounted for and pressing evolutionary development in new directions.

The confidence that many theologians and biologists have articulated regarding God's role in the natural world is increasingly finding more articulate expression in evolutionary theology. As God has withdrawn into a limitless and unbounded future in order to give the creation its own place in the universe to live out its subjective existence, God continues to engage with the world from and as its future, a God of promise and faithfulness. Inviting, empowering, and persuading God lets the world be what it will be, suffering with it as it makes its wayward path toward its promised fulfillment.

Contingency, law, and time, the necessary components of evolution, gain their meaning from the metaphysics of the future that this biblical vision entails, and the passionate response of the biologist to all the amazing critters of the earth assures that theology will continue to have a growing understanding of the natural world with which to express more and more adequately what it all means and where we might hope to be going. Exploring evolution will unfold not only the natural world but also our understanding of God. Perhaps we need to enlarge our concept of

⁹² 92. *Galapagos News*. 2009. Spring/Summer. New color for land iguana. Galapagos Conservancy, Fairfax, VA. p 4.

our Creator. “We can never have too big a conception of God, and the more scientific knowledge (in whatever field) advances, the greater becomes our idea of His vast and complicated wisdom.”⁹³ This, Haught suggests, is what biblical religion has always sought from the natural world. “From a biblical perspective...the whole point of the universe is to manifest God’s glory”.⁹⁴ The more fully and fearlessly we understand the universe, then the more expansively we will be able to perceive that glory. “The heavens are telling the glory of God; and the firmament proclaims God’s handiwork.”⁹⁵

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⁹³ 93. Phillips, J. B. 1961. *Your God is Too Small*. Macmillan, New York. p 123.

⁹⁴ 94. Haught, J. 2008. p 127.

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