

A Christian Perspective on Biology

DENNIS R. VENEMA and RICHARD J. L. PAULTON¹

INTRODUCTION: SELECTING KINGS AND MAKING RIGHT DECISIONS

But the Lord said to Samuel, “Do not consider his appearance or his height, for I have rejected him. The Lord does not look at the things human beings look at. People look at the outward appearance, but the Lord looks at the heart.”²

YOU NO DOUBT REMEMBER the story. The handsome, tall king Saul of Israel had disgraced himself by his disobedience to God. Shortly thereafter, God sent the prophet Samuel to select and anoint a new king for Israel from among the sons of Jesse of Bethlehem. In the selection process, God directed Samuel to reject, in turn, each of Jesse’s seven older sons—though they, like Saul, were tall and handsome—and to select David, the eighth and youngest son. The message to Israel was clear: relying on outward appearance is a deceptive guide for finding a leader after God’s own heart.

To study biology as a Christian is both a wonderful journey of investigation and discovery, as well as a potential quagmire of deeply contentious and divisive issues. I recall one of my colleagues in Religious Studies once lamenting that each of his students arrives for the first class already a

1. Richard Paulton wrote the initial version of this chapter; his colleague Dennis Venema has been responsible for updating and revising it. Unless otherwise indicated, all first person statements are to be attributed to Dr. Venema.

2. 1 Samuel 16:7. All Scripture quotations are from Today’s New International Version unless otherwise noted.

theologian.³ So too in biology: far and few between are Christian students with no opinions whatsoever on biological topics such as evolution, stem cell therapies, genetically modified organisms, environmentalism, and the like. Often the approach to the science of biology in evangelical Christian circles is one of suspicion and mistrust. My pastor (at the time when I left home for my first year of university) put it thus: leading the congregation in prayer, he thanked God for all those bound for Bible college, and petitioned that those going to secular schools not lose their faith.⁴

The primary issue for many Christian biology students is that of evolution. This area of biological study has been accused of being incompatible with, and hostile to, Christianity to an extent that few other areas in the sciences experience.⁵ I can recall a time in my own thinking as a youth when the word *evolution* was inextricably linked to *atheism*—and where I viewed any scientific data that was purported to support evolution with deep suspicion.

IN THE BEGINNING: SCIENCE AND THE QUESTION OF BIOLOGICAL ORIGINS

It must have been simpler to have been a biologist long ago. In the absence of relevant scientific evidence⁶ or an understanding of the social and literary contexts for the book of Genesis,⁷ most seventeenth- and eighteenth-century biologists took what the Bible had to say about creation at what they perceived to be its face value. They saw their work as in concert with the principle Paul had in mind when he affirmed, “For since the creation of the world God’s invisible qualities—his eternal power and divine nature—have been clearly seen, being understood from what has been made” (Romans 1:20). Early European biologists thus developed a

3. Having experienced this issue *mutatis mutandis* with biology students, I was naturally empathetic.

4. Perhaps not surprisingly, the choice of Bible college versus secular higher education was not a reliable predictor of “losing one’s faith” for my cohort.

5. Short perusal of a web site such as www.answersingenesis.org will make the point easily.

6. The science of biology for this period was largely descriptive, focusing on categorization rather than experimentation.

7. For an excellent discussion of these issues as they pertain to the Genesis 1 creation narrative, see Watts, “On the Edge of the Millennium: Making Sense of Genesis 1,” and Lamoureux, “Lessons from the Heavens: On Scripture, Science and Inerrancy.”

paradigm of natural theology, viewing the remarkable adaptation of each living organism to its own particular environmental niche as evidence for the wisdom of the Creator. In the creation, they believed, God had designed each living organism for a unique purpose. The concept of design with purpose is known as teleology (Greek: *telos* = end). Many seventeenth- and eighteenth-century biologists also believed that extant organisms were part of the original creation. Their view did not allow for changes in living organisms that might have occurred through time.

It was this societal and scientific context that the work of Charles Darwin would change dramatically. It should be noted that Darwin did not set out *a priori* to seek natural explanations for biodiversity, but rather that he was increasingly unable to square his observations with the idea that all species had existed unchanged since their (essentially) simultaneous creation. Rather, the data suggested gradual change over long time periods. In 1859, Charles Darwin published *The Origin of Species*, followed in 1871 by *The Descent of Man*. Darwin's theme was evolution: that populations of living organisms change over time, and that this process accounts for present biodiversity. Darwin based his idea on two key concepts: that there is heritable variation within populations, and that such variation will experience differential reproductive success through natural selection.⁸ Darwin thus offered an alternative interpretation for variation and adaptation. He wrote:

As many more individuals of each species are born than can possibly survive, and as consequently there is a frequently recurring struggle for existence, it follows that any being, if it vary in any manner profitable for itself, under the complex and sometimes varying conditions of life, will have a better chance of survival and thus be naturally selected.⁹

Darwin's ideas, unlike the teleological biology that preceded them, were open to experimentation: they made testable predictions. In the 150 years since *Origin of Species* was published, repeated experimentation has borne Darwin out—with the result that his hypotheses are now consid-

8. Indeed, the biological basis for evolution is so simple that some students feel something of a "letdown" upon learning it, having expected something much more complex, and perhaps sinister.

9. Darwin, "Introduction," in *Origin of Species*, 21.

ered scientific theory.¹⁰ Indeed, evolutionary theory unites biology into a cohesive science¹¹—it would otherwise be mere "stamp collecting" of dissociated facts.¹²

While "Darwin's dangerous idea"¹³ has won great scientific acclaim, it has had much less success in Christian circles. Various theological responses to Darwinism have been formed. Like Samuel before you, you have several options to choose from.

Some Christian groups, including *Answers in Genesis* (AiG)¹⁴ and the *Institute for Creation Research* (ICR),¹⁵ believe that Scripture, as the ultimate authority, is the best source of *scientific* information about the natural world. They espouse a very literal interpretation of the first several chapters of Genesis, including the creation and great flood narratives. They also believe in a young earth and do not accept the evolutionary changes or time scale suggested by the fossil record. They argue that if we erode our view of Scripture, even slightly, subordinating it to science, we are left with non-biblical standards for all of life's decisions.

However, in their attempts to affirm this view of Scripture, these groups are obliged to reject an overwhelming amount of scientific data. For example, Ken Ham of AiG holds that, in accord with Genesis 1, the earth must have been created prior to stellar formation. In a similar vein, he argues that the universe was created less than 10,000 years ago despite being billions of light-years in size—and speculates, as follows, that the speed of light was vastly greater in the past to account for the apparent discrepancy: "It is usually assumed that the speed of light is constant with time. At today's rate, it takes light (in a vacuum) about one year to cover a distance of 6 trillion miles. But has this always been so? If we incor-

10. There is persistent confusion between the scientific use of "theory"—that of a hypothesis that has withstood repeated experimentation—and the popular use of the term "theoretical." I, of course, intend the former. To call evolution "only a theory" is in fact high praise from a scientific viewpoint.

11. Dobzhansky, "Nothing in Biology," is a well-known essay among biologists that makes this point well.

12. The quotation is from physicist Ernest Rutherford: "All science is either physics or stamp collecting." As a biologist, I would contend that biology has collected some very fascinating stamps of late.

13. The allusion is to a book by Daniel Dennett with that title.

14. See www.answersingenesis.org.

15. See www.icr.org.

rectly assume that the rate has always been today's rate, we would end up estimating an age that is much older than the true age."¹⁶

The position that phenomena scientists today observe as constants were once vastly different is also needed to explain why the earth appears so old when using radiometric dating:

It is hypothesized . . . that at some time in the past much higher rates of radioisotope decay have occurred, leading to the production of large quantities of daughter products in a short period of time. It has been suggested that these increased decay rates may have been associated with the rock-forming processes on the early earth, and possibly one of the results of God's judgment upon man following Creation . . . large amounts of radioactive decay may have occurred during the first two and a half days of Creation as part of the supernatural Creation process. The jury is still out and, until we complete our research phase, this thesis remains tentative.¹⁷

Creationist groups such as these have little if any credibility with the vast majority of scientists, who conclude that there simply is no science in so-called "scientific" creationism. At worst, AiG and ICR bring Scripture itself into question. Given the choice between this interpretation of Genesis and the broad sweep of current scientific consensus, it is not surprising that most scientists choose the latter. In so doing, many understand themselves to have rejected Scripture altogether. This is regrettable, and as one commentator has put it, "a literal mistake."¹⁸

Other Christians claim a high regard for science as well as Scripture. They affirm that God is Creator, and see evolution as the mechanism used by God in the creation process. Known as *theistic evolution*,¹⁹ this viewpoint affirms the scientific method and is a respected worldview paradigm among many educated Christians. Many Christian biologists are theistic evolutionists. A notable theistic evolutionist is Kenneth Miller, a cell biologist and Roman Catholic. His book, *Finding Darwin's God*, is both an

accessible read for a lay audience and a thoroughgoing presentation of theistic evolution. Miller makes a strong case, contending that theistic evolution does not diminish God's role as Creator but rather celebrates it. Miller's God (and, he argues, Darwin's God) is not a watered-down deity with nothing left to do, but a master architect who set in place the conditions and mechanisms required for evolution. If Darwin can be credited with allowing for "intellectually fulfilled atheism,"²⁰ Miller has made good progress towards a theologically fulfilled Darwinism.

Perhaps the most well-known theistic evolutionist in Protestant circles is Francis Collins, the former head of the Human Genome Project. In his recent book, *The Language of God*, Collins rightly brings his obvious expertise to bear in discussing recent genomic findings based on whole-genome sequence comparisons between mammals. One striking example is comparisons between the human genome and the chimpanzee genome, the latter having been available since 2005.²¹ The scientific facts are not in dispute: the chimp genome is nearly identical to our own, including non-functional, repetitive sequences that are present at the same locations in both genomes. Collins concludes that the simplest explanation for this genome-wide correspondence is that we share a common evolutionary ancestor with chimpanzees. Also present in the human genome are *pseudogenes*²² that retain function in the chimp. To suggest that genetic errors were independently created in us but not in chimps is a proposition Collins finds difficult from a theological point of view.²³ Recent comparative genomic analyses continue to amass evidence for common ancestry between mammals. An example is the discovery of egg yolk *vitellogenin* pseudogenes in placental mammals, replete with identical inactivating mutations present in armadillos, dogs, and humans.²⁴

20. Dawkins, *Blind Watchmaker*, 6.

21. The Chimpanzee Sequencing and Analysis Consortium, "Initial Sequence of the Chimpanzee Genome."

22. A *pseudogene* is a DNA sequence that is easily recognizable as once having been a functional gene but that has been inactivated through mutation.

23. See Collins, *Language of God*, 133–41. The likelihood of the remaining option, that these striking correspondences are the result of mere chance, is of course tiny to the point of absurdity. For an excellent overview of the challenges that chimpanzee–human genomic comparisons present to the thesis of *de novo* creation of humans, see Wood, "The Chimpanzee Genome."

24. Brawand, Wali, and Kaessmann, "Loss of Egg Yolk Genes in Mammals."

16. Retrieved from <http://www.answersingenesis.org/articles/nab/does-starlight-prove>.

17. Vardiman, et al., "Radioisotopes and the Age of the Earth." An excellent overview of the trustworthiness of several dating techniques can be found in a two-part review by Young entitled "How Old Is It? How Do We Know?"

18. Fischer, "Young-earth Creationism."

19. Recently, Denis Lamoureux has put forward the term *evolutional creation* as an alternative label for this view. His approach has appeal in that it avoids the common misconception that theistic evolution is in fact *deistic* evolution. See Lamoureux, *Evolutionary Creation*.

Theistic evolution is not without its theological tensions, of course. One of note is its seeming rejection of the Genesis 2–3 narrative concerning the creation of Adam and Eve and their subsequent Fall into disobedience. As Newman points out, the theistic evolutionist is obliged to consider what appears to be historical narrative in these chapters as myth.²⁵ Even among theistic evolutionists there is considerable variation in belief at this and other points. In their recent book, *Origins: A Reformed Look at Creation, Design and Evolution*, Deborah and Loren Haarsma discuss various theistic evolutionary positions on Genesis in a balanced way.²⁶

In the mid-1990s, a third approach arose to the question of origins that sits in opposition to both young-earth creationism and theistic evolution.²⁷ The principal doctrine of this group was the evidence of intelligent design throughout the natural world; as such, these scholars are commonly referred to as exponents of the “Intelligent Design” (or simply “ID”) movement. The principal spokespersons for this group are Phillip Johnson,²⁸ Michael Behe, and William Dembski. Dembski’s work is primarily mathematical in nature,²⁹ whereas Behe, as a biochemist, has carried the brunt of the biological argument for design. Behe outlined his argument in two books: *Darwin’s Black Box: The Biochemical Challenge to Evolution* and *The Edge of Evolution: The Search for the Limits of Darwinism*. Briefly stated, the biochemical argument for ID is that biological systems exist that cannot be accounted for by naturalistic mechanisms. These systems (protein complexes comprised of numerous interrelated parts dependent

25. Newman, “Some Problems for Theistic Evolution,” 124. Of course, seeing Genesis 1–3 as “mythic literature” is not equivalent to viewing it as false. See also Watts, “On the Edge of the Millennium: Making Sense of Genesis,” and especially Lamoureux, *Evolutionary Creation*, for a thorough treatment of these issues.

26. See especially chapter 12. This book is an excellent overview of creation science, Intelligent Design (see below) and theistic evolution, outlining the theological strengths and weaknesses of each.

27. Early on, the ID movement attempted to include young-earth creationists within its ranks through its so-called “Big Tent” policy, though apparently with only minimal success.

28. Johnson’s book, *Darwin on Trial*, published in 1991, was a seminal book for the ID movement.

29. For example, Dembski, *The Design Inference*. Dembski, like Behe, has had little success in winning a hearing for his arguments in his area of expertise. For thorough critiques of Dembski accessible to non-specialists, see Nichols, “Scientific Content, Testability, and Vacuity of Intelligent Design Theory,” and especially Felsenstein, “Has Natural Selection Been Refuted?”

on each other for function) are rendered functionless by the removal of any one component. Such an “irreducibly complex” system, Behe argues, cannot arise by the successive accumulation of parts (i.e., by Darwinian gradualism) since only the complete complex has function that can be selected for.³⁰ Furthermore, irreducibly complex systems cannot acquire a new function through random mutation and selection.³¹

The question of ID as science literally had its day in court in 2005 as Kitzmiller versus Dover Board of Education.³² The trial, in some respects, was akin to a scientific peer review of the central claims of ID. Specifically, Behe’s assertion that irreducibly complex biological systems cannot arise or be modified to acquire new functions by natural selection³³ was countered effectively with several examples, most notably in the testimony of Kenneth Miller.³⁴ Interspersed between the scientific details presented in the Kitzmiller case, a larger issue consistently arose: defining the nature of scientific inquiry and evaluating ID in light of that definition.³⁵ The testimony of several ID advocates during the trial asserted that the intent of the ID movement was to broaden the definition of science to accept supernatural causation, and that such a re-definition was necessary for ID to be considered science. Under cross-examination, Scott Fuller, an expert witness in the philosophy of science for the defense, put it thus:

Q. And here you’re talking about broadening that definition beyond natural causation . . . to supernatural causation?

30. The main thesis of *Darwin’s Black Box* is the argument for irreducible complex-ity.

31. This idea is defended at length in Behe, *The Edge of Evolution*.

32. Complete transcripts of the Kitzmiller case are available online at several locations including http://www.talkorigins.org/faqs/dover/kitzmiller_v_dover.html and <http://www2.ncsweb.org/kvd/>. Chapman’s *40 Days* is both a popular account of the Kitzmiller affair (authored by the great-grandson of Darwin himself) and a useful guide to orient oneself within the court transcripts.

33. Behe’s assertion that irreducibly complex biological systems cannot arise through evolutionary mechanisms has been critiqued in detail in the literature as well. See Gishlick, “Evolutionary Paths,” and Musgrave, “Evolution of the Bacterial Flagellum.”

34. “Kitzmiller et al. v. Dover Area School District,” Trial Transcript: Day 1 (September 26), AM Session Part 1–AM Session, Part 2. Nonetheless, Behe went on to publish *The Edge of Evolution* in 2007, to be met with several scathing reviews, e.g., Levin, “The Edge of Evolution.”

35. Indeed, both the plaintiffs and the defense requested that Judge John Jones III rule on the question of whether ID was science.

A. Yes. And what I'm talking about . . . is going beyond the taken-for-granted categories . . . [T]his has happened in the history of science and does periodically, where things that people regard as occult forces and things that cannot be observed and are not detectable by ordinary experimental means, people postulate them, use them as the basis for research, and eventually you do come up with something that can then be assimilated within naturalistic science.³⁶

Fuller thus seems to value ID as a sort of “fringe science”—on the edge, exploring new avenues of productive research that eventually may find a home within naturalistic science. It is interesting to note that Fuller sees the value of ID as (eventually) contributing to *natural* explanations, which is hardly the intent of the ID movement. Also noteworthy is that the ID movement, to date, has not produced original research but has focused on reinterpreting work published by others.³⁷ Fuller's view is an interesting one. ID certainly has prodded evolutionary science to clarify its arguments, more carefully define its terms, and close gaps in evolutionary understanding. Still, I question Fuller's readiness to deliberately include something non-naturalistic within science to further science's naturalistic aims.³⁸

The Kitzmiller case ended badly for proponents of ID. In his ruling, Judge Jones ruled that ID was not science but inherently creationist in content, and thus unconstitutional to teach in the Pennsylvania public school system.³⁹ He also chastised the defendants for holding to a false dichotomy with respect to evolutionary science and theology:

Both Defendants and many of the leading proponents of ID make a bedrock assumption which is utterly false. Their presupposition is that evolutionary theory is antithetical to a belief in the existence of a supreme being and to religion in general. Repeatedly

36. “Kitzmiller et al. v. Dover Area School District,” Trial Transcript: Day 15 (October 24), PM Session Part 1.

37. This has led to the accusation that the ID community is more concerned about gaining scientific status than doing science.

38. I have made every effort to read Fuller's comments in the context of his complete and rather nuanced testimony. Fuller, called as an expert witness to defend ID as science, nonetheless openly described ID as not yet a full-fledged scientific theory. His testimony strikes me as among the least biased of the Kitzmiller expert witnesses.

39. The complete Kitzmiller decision is available online at http://www.pamd.uscourts.gov/kitzmiller/kitzmiller_342.pdf.

in this trial, Plaintiffs' scientific experts testified that the theory of evolution represents good science, is overwhelmingly accepted by the scientific community, and that it in no way conflicts with, nor does it deny, the existence of a divine creator.⁴⁰

It is over the issue of redefining science that most scientists (Christian, atheist or otherwise) reject ID. Science demands no philosophical or theological allegiance; furthermore, it is by convention barred from asserting philosophical or theological positions. Science, by its very nature, is limited in scope and cannot empirically investigate the supernatural.⁴¹ Broadening the definition of science to consider the supernatural *scientific* cannot limit which theological or philosophical positions are acceptable. When pressed on this point under cross-examination, Behe conceded that astrology could count as acceptable scientific inquiry under the ID definition of science.⁴² The conclusion that atheism—itsself a theological position—would thus also qualify as acceptable science is inescapable. To accept the ID definition is in fact to open science to all comers of any philosophical or theological bent, and to simultaneously deprive scientists of the means to falsify their claims. Small wonder most biologists (and prominent Christian biologists among them) resist such a redefinition.

ALREADY/NOT YET: FAITHFUL LIVING IN THE AGE OF GENOMICS

Certainly the question of origins is a topic of much debate among Christians, but it is by no means the only issue of concern to Christian biologists (nor even, I would contend, the most important). In the last decade, scientific advances in biology and biotechnology have engendered many ethical issues on which, for obvious reasons, there is no direct biblical teaching. As we have seen with respect to origins, a simple cut-

40. Kitzmiller decision, 136.

41. The Kitzmiller testimony of Barbara Forrest provides an excellent discussion of this issue. See “Kitzmiller et al. v. Dover Area School District,” Trial Transcript: Day 6 (October 5), AM Session–PM Session.

42. “Kitzmiller et al. v. Dover Area School District,” Trial Transcript: Day 11 (October 18), AM Session Part 1. Behe has since argued that he was misinterpreted—that he intended to assert merely that astrology was once considered science before maturing into astronomy. The context does not seem to support Behe's claim; indeed, it would seem to follow from Behe's interpretation that ID should not yet be considered science until, like astrology, it “matures” by divesting itself of supernatural explanations.

and-paste approach will cause more harm than good; we require responses deeply rooted in both the relevant science and the Christian faith that speak to the issues of the day. New Testament scholar N. T. Wright analogizes faithful Christian living in the present age as an act of Spirit-inspired improvisation.⁴³ Wright asks us to imagine a scenario where the fourth act of a five-act play is missing. How might the missing act be improvised? Quite simply: the first three acts set the stage for the fourth, and the fifth act shows where the entire play is going. What is required are actors, thoroughly versed in the available material, who faithfully improvise the intervening act.⁴⁴ This is a useful analogy as we consider what “faithful improvisation” might mean in light of recent biological advances.

As a graduate student, I remember watching the movie *Gattaca*⁴⁵ and chuckling at the Hollywood characterization of the process by which an individual “got sequenced”—his or her genomic secrets laid bare in a matter of minutes, replete with the knowledge of how the details would play out in life. In 1997, such an idea truly was in the realm of science fiction. In the intervening decade, this technology has increasingly moved from fiction to fact,⁴⁶ bringing with it a host of ethical issues. The key advances in this area were the sequencing of the human genome⁴⁷ and the International HapMap project,⁴⁸ which sought to identify all common single-nucleotide sequence variations in the human genome. Simply put, we now know where to look for genetic differences between humans, and where we can be quite certain no common differences exist—at a genome-wide level. This simplifies genomic analysis considerably, to the point where whole-genome analysis of an extended family now can be accomplished in a matter of days⁴⁹ (since it is not necessary to sequence the entire genome of any given individual). This powerful method has already identified numerous variations correlated with disease by a whole-

43. Wright, “Creation and New Creation in the New Testament.”

44. Wright of course notes that what counts as *faithful* improvisation may be contentious among the actors, who then examine the extant acts to argue their case.

45. Released October 24, 1997, by Columbia Pictures.

46. Blow, “The Personal Side of Genomics.”

47. More properly, the first sequencing of a representative human genome: the initial sequence was determined from a randomized sample of several donors.

48. See www.hapmap.org for an overview of the HapMap project.

49. Gibbs and Singleton, “Application of Genome-wide Single Nucleotide Polymorphism Typing.”

genome statistical approach: by simply examining the entire genome of numerous affected individuals, comparing them to the genomes of non-affected individuals, and looking for variations that are significantly over-represented in the affected group. Examples of early successes include the identification of risk factors for common cancers⁵⁰ and macular degeneration, among others.⁵¹ The rate at which such discoveries will take place will almost certainly grow exponentially in the next few years—and, in the not-too-distant future, likely result in the technological capacity effectively equivalent to the scene in *Gattaca*. Already it is possible to have one’s genome evaluated privately for approximately \$1000, the results of which may be compared against current knowledge of disease risk factors as well as future discoveries.⁵² As Christians, we have much to celebrate here, not least that those at risk of genetic diseases may learn of their predispositions long before disease onset and alter their lifestyles to mitigate their risks. Moreover, we can expect this approach to greatly advance human understanding of many common diseases, especially since it requires no *a priori* hypotheses about what genes might contribute to a specific condition.⁵³

As with any new discovery, however, this knowledge is open to abuse. At its most elementary level, genomic technology is a discriminatory tool—discriminating between what genes influence a given condition and what genes do not, for example—but this information also can be used for discrimination in the popular sense. It is likely only a matter of time before this approach identifies genetic variation that influences complex human traits such as intelligence, predisposition to violence, religious devotion, or sexual orientation.⁵⁴ Indeed, widespread genomic sequencing of the human race could allow for discrimination at an unprecedented level of detail. Insurance companies might deny health claims

50. For example, Sun et al., “Haplotypes in Matrix Metalloproteinase Gene Cluster.”

51. Klein et al., “Complement Factor H Polymorphism.” In this instance the result was a surprise in that an immune system protein variant was identified as a risk factor, suggesting macular degeneration to be an autoimmune disease.

52. See Goetz, “23AndMe.”

53. Indeed, it is likely that genome-wide polymorphism analysis of individual patients will be the standard of care in western medicine in the not-too-distant future.

54. Following his 2007 keynote address at the National Association of Biology Teachers Annual Conference, Francis Collins was specifically asked about variation contributing to religious experience. His response was to the effect that while it was likely such variation would be found, subtle predisposition was not to be viewed as deterministic.

for individuals with disease-predisposing genotypes. Companies might only hire individuals with favorable genomics. Universities might require applicants to submit a DNA sample along with an SAT score. Parents of the future may choose genetic testing to screen prospective embryos for a veritable “laundry list” of predispositions—and abort (or elect not to implant) those who fail their criteria.⁵⁵ The view driving these potential abuses of genomic technology is genetic determinism: the notion that traits are, in the main, controlled by genes.⁵⁶ This view is erroneous, in that it overlooks or downplays the vital role of environmental influence on complex characteristics. A growth of genetic determinism in popular opinion has followed scientific advances in genetics before,⁵⁷ so this is not necessarily surprising.

In light of these complex issues, what might faithful improvisation look like? The key issue, that of discrimination, is a major theme in the New Testament. Division along Jew–Gentile lines was a problem for many of the Pauline churches, and Paul was vigilant against it, for he knew it negated the gospel of Christ. Consider his swift response when Peter and Barnabas withdrew from table fellowship with Gentiles at Antioch: “When Cephas came to Antioch, I opposed him to his face, because he stood condemned” (Galatians 2:11).⁵⁸ The reason for this no-holds-barred approach is clearly based on Paul’s conviction about the unifying work of Christ on the cross.⁵⁹ While the Jew–Gentile schism is the primary division at issue in the New Testament, Paul’s theology of unity cuts across every potential basis for division of the day:

So in Christ Jesus you are all children of God through faith, for all of you who were baptized into Christ have clothed yourselves with Christ. There is neither Jew nor Gentile, neither slave nor free,

55. Pre-implantation genetic diagnosis is already a widespread practice for couples known to be carriers for certain recessive diseases.

56. *Gattaca* depicts a society that has bought into genetic determinism wholesale.

57. The most notorious example is of course that of Nazi Germany, where racial discrimination and genocide was rationalized, in the words of Rudolf Hess, as “nothing more than applied biology.” That Hess could appeal to biology in this way is indicative of popular perception at the time. The rediscovery of Mendel’s work and its repeated confirmation in other species, including our own, defined the scientific climate of biology in the early 1900s.

58. Note also Paul’s statement in v. 14 that Peter was out of line with respect to the “truth of the gospel.”

59. For example, see Paul’s argument in Ephesians 2:11–22.

neither male nor female, for you are all one in Christ Jesus. If you belong to Christ, then you are Abraham’s seed, and heirs according to the promise. (Galatians 3:26–29)

The point, of course, is not that these categories cease to exist:⁶⁰ women will remain women, Gentiles will remain Gentiles, *et cetera*. Variation does not vanish into uniformity. The point is that these categories, in the light of Christ, cease to have social significance or divisive power. To reinvest these categories with such significance is to return to viewing one another *kata sarka*—that is, according to the flesh.⁶¹ Note too how the categories include what the ancients would have considered differences in heredity.⁶² What shall we say then? Paul rejected and vigorously opposed all contemporary means of discrimination and division in his day as antithetical to the gospel. Though genomics might permit an ever more detailed means by which some may advocate discrimination, we should do no less than he.⁶³

“RAPTURE ME AND LET IT BURN”:

WHAT PLACE CHRISTIAN ENVIRONMENTALISM?

We now turn to an issue that, while it concerns faithful living in the present age, is influenced by *eschatology*: what one believes about the age to come.⁶⁴ Christian environmentalism, once viewed with great suspicion as too pantheistic by evangelicals,⁶⁵ has made great advances in recent

60. There is an exception: Paul advocates that slaves obtain their freedom, if possible. Cf. 1 Corinthians 7:17–24, where freedom from slavery is the one departure from Paul’s general admonition for the Corinthians to remain in the station they were in when they came to faith.

61. For example, 2 Corinthians 5:16: “from now on we regard no one from a worldly point of view” (*kata sarka*).

62. Even with the slavery issue, there would have been overtones of heredity present, as slaves were often born into their station or were captured members of other races.

63. One might contend that Paul was focused only on these issues *within* the church. This is to miss the point entirely: Paul’s view was that the church was the “colony” of the future worldwide Kingdom of God. It was for good reason that Paul was accused of heralding “another king, one called Jesus,” in direct opposition to Caesar (Acts 17:7).

64. Truesdale, “Last Things First.”

65. Tony Campolo’s 1992 book promoting Christian environmentalism entitled *How to Rescue the Earth without Worshiping Nature* gives a good picture of the mindset of the intended audience at that time. Ample evidence of this mindset can also be seen in the interlocutor to whom DeWitt responds in “Preparing the Way for Action” (see below).

years.⁶⁶ Another viewpoint has also made great strides in the last decade, however: that of premillennial “rapture” theology. Having begun with origins, and holding to our premise of present faithful living, we now turn our attention to “the end.”

As part of an introductory biology course for non-majors, I lecture on the biblical basis for environmental stewardship. As an introduction to the lecture, I query students about their own environmental views. One student’s response, though not unique, was particularly telling: she expressed an interest in environmentalism but wondered how such interest could have a biblical basis given that the earth was going to be destroyed in the end times, and Christians raptured up to heaven to escape its destruction. The particular version of eschatology this student assumed ran roughshod over biblically-motivated environmentalism by removing the non-human creation from God’s redemptive plan.⁶⁷ This set of beliefs regarding the end times, though popularized in the last few years through hugely successful novels,⁶⁸ is not easily reconciled with Paul’s use of *parousia* imagery.⁶⁹ Despite the popularity of the *Left Behind* series, several theologians argue instead that Christian environmental stewardship finds its true motivation in the view that the final dwelling place of God, and those who are redeemed by him, is a renewed earth.⁷⁰

Even within the Christian environmental movement there is a regrettable lack of consensus on the final fate of the created order. Calvin DeWitt, noted Christian environmentalist, educator, and author, makes a case for conservation in spite of the earth’s impending destruction. Primary in his list of “stumbling blocks” to Christian environmentalism lies the key question: “Since we’re headed for heaven anyway, why take

66. The success of Christian environmental organizations such as A Rocha and the Au Sable Institute are good examples of how the issue has penetrated the evangelical consciousness.

67. Truesdale, “Last Things First.”

68. As of this writing, the novels in the *Left Behind* series have sold more than 65,000,000 copies.

69. Wright, “Farewell to the Rapture.” Paul’s description of meeting Jesus in the air upon his return has the concept of *parousia* as its cultural referent: the welcoming of an emperor into one of his cities by going out to meet him. The original recipients of Paul’s letter would not have expected the emperor to whisk the welcoming party away.

70. For example, the announcement in Revelation 21:3 that the dwelling place of God will be “among the people” that precedes the description of the new Jerusalem descending to earth.

care of creation?”⁷¹ DeWitt argues that even objects destined to be destroyed are maintained and cared for until their designated end. Notably, he includes the human body in his examples: “But temporal as our bodies are, we still take care of our appearance and health. . . . Thus, even structures whose destruction is planned are still protected and maintained with . . . custodial care [emphasis mine].”⁷²

DeWitt’s argument concurs with the view that “Heaven is my home, I’m just a-passing through”—and that creation itself is to be destroyed. Thus, in want of a practical theological motivation for environmental stewardship, he frames his argument merely in terms of obedience: “Biblical teachings reinforce our responsibility for the care and keeping of creation. They include teachings for a stewardly life, [and] they give grave warning that those who destroy the earth will themselves be destroyed. . . .”⁷³

Others contend that the New Testament vision for the coming new creation is strikingly different and vastly more appealing. Theologians such as Gordon Zerbe and N. T. Wright have made a strong case for a renewed earth as the final dwelling place of God and his kingdom.⁷⁴ Zerbe frames the crucial question in much the same way as DeWitt: “Why preserve the present earth when it is headed for collapse and a new heaven and new earth will replace it? Why be concerned with the earth at all? Are not spiritual concerns more important?”⁷⁵ In the course of his arguments, however, Zerbe arrives at a radically different conclusion:

71. DeWitt, “Preparing the Way for Action,” 81.

72. *Ibid.*, 81.

73. Cf. Revelation 11:18. DeWitt does modify his position somewhat in a later publication, asserting that “Creation is not a lost cause” in a discussion of the work of Abraham Kuyper (DeWitt, *Caring for Creation*, 37–40). He does not elaborate on what “not a lost cause” might mean or retract his previous arguments, however.

74. This vision is not unique to the New Testament, but runs right through Scripture from Genesis 1 (the creation declared *good* by God) to Isaiah’s prophetic visions of the earth rejoicing at the return from exile (e.g., Isaiah 55:12–13) and on to the grand vision of the new Jerusalem coming down from heaven to a renewed earth in Revelation 21. See Wright, “Creation and New Creation in the New Testament”; also, Zerbe, “The Kingdom of God and Stewardship of Creation.”

75. Zerbe, “The Kingdom of God and Stewardship of Creation”, 83, with the irony duly noted that this fine essay appears in a book edited by DeWitt and published several years before DeWitt’s “Preparing the Way for Action.”

[T]he New Testament vision of the kingdom is first that of the new order in the age to come. That reality results when the rule of Christ and of God is realized in all creation. . . . [T]his future vision shows that God is concerned not only with the world of humanity, but with the entirety of creation. All creation is good and is the object of God's ultimate redeeming act.⁷⁶

Zerbe thus answers his original question of whether earth-keeping is a Christian believer's responsibility with a resounding "Yes"—not merely in terms of obedience, but with the insight that the earth will not be replaced, but redeemed. This is a crucial issue: there is continuity and discontinuity between the earth of this age and the age to come.⁷⁷

Despite this overarching theology in the New Testament, there is little direct teaching therein on creation care. The reason for this is simple: in New Testament times there was not widespread environmental degradation of the earth, nor were humans considered to have much control over, or impact on, nature. We do, however, have an appropriate parallel in one of Paul's letters to the Corinthians: an example of creation abuse that Paul actively corrected. Paul's letters, though masterpieces of sustained logical argument, are *occasioned* documents, addressed to the specific needs (often we might say errors) of the recipient congregation.⁷⁸ The Corinthian church fell into erroneous, dualistic thinking about the treatment of the human body: by asserting the body to be temporary, some in the congregation held that sexual union with prostitutes was acceptable (1 Corinthians 6:12–20). Paul's blunt and forceful correction is based on his theology of bodily continuity: "In particular, the argument . . . depends on Paul's belief that what is done with the present body *matters* precisely because it is to be raised. The *continuity* between the present body and the future resurrection body is what gives weight to the present ethical imperative."⁷⁹ Thus the future resurrection life informs ethics in the present age predicated on its continuity with the present embodied life. This

76. *Ibid.*, 83.

77. Wright, "Creation and New Creation in the New Testament." This lecture series includes an excellent discussion of continuity/discontinuity imagery in the Pauline corpus.

78. Indeed, if not for the errors of the New Testament church we would lack clear teaching on several topics considered central to Christian faith.

79. Wright, *The Resurrection of the Son of God*, 289 (emphasis mine). That DeWitt selects the human body as an example of a temporary object is especially regrettable in light of the New Testament theology of resurrection continuity.

theme is a major chord in Paul: that Christians, through the indwelling power of the Holy Spirit, live the life of the coming age in the present one.⁸⁰ That is, after all, what *zōē aiōnios*, commonly translated as "eternal life," means: "the life of the coming age."⁸¹ What, then, would be Paul's response to the environmental crisis? In the coming age all creation will be renewed and liberated by God (Romans 8:18–19).⁸² There is continuity between the present creation and the renewed creation to come, just as there is continuity between our present bodies and our future resurrection bodies.⁸³ How then shall we live with respect to the environment in the present? Shall we await the rapture to whisk us away from the earth's destruction? God forbid. To do so runs counter to the theology of the New Testament, recapitulating the dualistic Corinthian error with respect to the planet as a whole.

CONCLUSION

The call to a scientifically informed, thoughtful Christian interaction with contemporary culture is not a new one. As you prayerfully consider your calling as a potential student of biology, consider well the words of Saint Augustine:

Usually even a non-Christian knows something about the earth, the heavens, and the other elements of this world, about the motion and orbit of the stars and even their size and relative positions, about the predictable eclipses of the sun and moon, the cycles of the years and the seasons, about the kinds of animals, shrubs, stones and so forth, and this knowledge he holds to as being certain from reason and experience. Now, it is a disgraceful and dangerous thing for an infidel to hear a Christian, presumably giving the meaning of Holy Scripture, talking nonsense on these topics; and we should take all means to prevent such an embarrassing situation, in which people show up vast ignorance in a Christian and laugh it to scorn. The shame is not so much that an ignorant individual is derided, but that people outside the household of faith think our sacred writers held such opinions, and, to the great loss of those for whose

80. Fee, *Paul, the Spirit, and the People of God*, 51–52.

81. Wright, *The Resurrection of the Son of God*, 246.

82. It is tragic that Paul's central and majestic vision of the new creation in Romans 8 has often been viewed as something of an aside by Reformation theologians, among others.

83. Wright, "Creation and New Creation in the New Testament."

salvation we toil, the writers of our Scripture are criticized and rejected as unlearned men. If they find a Christian mistaken in a field which they themselves know well and hear him maintaining his foolish opinions about our books, how are they going to believe those books in matters concerning the resurrection of the dead, the hope of eternal life, and the kingdom of heaven, when they think their pages are full of falsehoods on facts they themselves have learnt from experience and the light of reason? Reckless and incompetent expounders of Holy Scripture bring untold trouble and sorrow on their wiser brethren when they are caught in one of their mischievous false opinions and are taken to task by those who are not bound by the authority of our sacred books. For then, to defend their utterly foolish and obviously untrue statements, they will try to call upon Holy Scripture for proof and even recite from memory many passages which they think support their position, although they understand neither what they say nor the things about which they make assertion.⁸⁴

WORKS CITED

- Augustine. *The Literal Meaning of Genesis*. In *Ancient Christian Writers: The Works of the Fathers in Translation*, No. 41, translated by John Hammond Taylor. New York: Newman Press, 1982.
- Behe, Michael J. *Darwin's Black Box: The Biochemical Challenge to Evolution*. New York: Free Press, 1996.
- . *The Edge of Evolution: The Search for the Limits of Darwinism*. New York: Free Press, 2007.
- Blow, Nathan. "The Personal Side of Genomics." *Nature* 449 (October 2007) 627–30.
- Brawand, David, Walter Wali, and Henrik Kaessmann. "Loss of Egg Yolk Genes in Mammals and the Origin of Lactation and Placentation." *PLoS Biology* 6 (March 2008) 0507–0517.
- Campolo, Anthony. *How to Rescue the Earth without Worshiping Nature*. Nashville: Nelson, 1992.
- Chapman, Matthew. *40 Days and 40 Nights: Darwin, Intelligent Design, God, OxyContin® and Other Oddities on Trial in Pennsylvania*. New York: Harper Collins, 2007.
- The Chimpanzee Sequencing and Analysis Consortium. "Initial Sequence of the Chimpanzee Genome and Comparison with the Human Genome." *Nature* 437 (September 2005) 69–87.
- Collins, Francis S. *The Language of God: A Scientist Presents Evidence for Belief*. New York: Free Press, 2006.
- Darwin, Charles. *The Origin of Species*. New York: Modern Library, 1998 (1859).

84. Augustine, *The Literal Meaning of Genesis*, Book One, Chapter 19. This passage, though over 1600 years old, is so timely I quote it here at length. See also the discussion of portions of this passage in Miller, *Finding Darwin's God*, 255–59.

- Dawkins, Richard. *The Blind Watchmaker: Why the Evidence of Evolution Reveals a World without Design*. New York: Norton, 1996.
- Dembski, William A. *The Design Inference: Eliminating Chance through Small Probabilities*. Cambridge: Cambridge University Press, 1998.
- Dennett, Daniel C. *Darwin's Dangerous Idea: Evolution and the Meanings of Life*. New York: Simon & Schuster, 1995.
- DeWitt, Calvin B. *Caring for Creation: Responsible Stewardship of God's Handiwork*. Grand Rapids, MI: Baker Books, 1998.
- . "Preparing the Way for Action." *Perspectives on Science and Christian Faith* 46.2 (June 1994) 80–89.
- Dobzhansky, Theodosius. "Nothing in Biology Makes Sense Except in the Light of Evolution." *American Biology Teacher* 35 (March 1973) 125–29.
- Fee, Gordon D. *Paul, the Spirit, and the People of God*. Peabody, MA: Hendrickson, 1996.
- Felsenstein, Joe. "Has Natural Selection Been Refuted?" *Reports of the National Center for Science Education* 27 (May–August 2007) 20–26.
- Fischer, Dick. "Young-earth Creationism: A Literal Mistake." *Perspectives on Science and Christian Faith* 55.4 (December 2003) 222–31.
- Gibbs, J. Raphael, and Andrew Singleton. "Application of Genome-wide Single Nucleotide Polymorphism Typing: Simple Association and Beyond." *PLoS Genetics* 2 (October 2006) 1511–17.
- Gishlick, Alan D. "Evolutionary Paths to Irreducible Systems." In *Why Intelligent Design Fails: A Scientific Critique of the New Creationism*, edited by Matt Young and Taner Edis, 58–71. Piscataway, NJ: Rutgers University Press, 2004.
- Goetz, Thomas. "23AndMe Will Decode Your DNA for \$1000. Welcome to the Age of Genomics." *Wired Magazine* 15 (November 2007). Available online at www.wired.com/medtech/genetics/magazine/15-12/ff_genomics.
- Haarsma, Deborah B., and Loren D. Haarsma. *Origins: A Reformed Look at Creation, Design and Evolution*. Grand Rapids, MI: Faith Alive Christian Resources, 2007.
- Johnson, Phillip E. *Darwin on Trial*. Downers Grove, IL: InterVarsity Press, 1991.
- Klein, R. J., et al. "Complement Factor H Polymorphism in Age-related Macular Degeneration." *Science* 308 (April 2005) 385–89.
- Lamoureux, Denis O. *Evolutionary Creation: A Christian Approach to Evolution*. Eugene, OR: Wipf & Stock, 2008.
- . "Lessons from the Heavens: On Scripture, Science and Inerrancy." *Perspectives on Science and Christian Faith* 60.1 (March 2008) 4–15.
- Levin, David E. "The Edge of Evolution." *Reports of the National Center for Science Education* 27 (March–April 2007) 38–40.
- Miller, Kenneth R. *Finding Darwin's God: A Scientist's Search for Common Ground between God and Evolution*. New York: HarperCollins, 1999.
- Musgrave, Ian. "Evolution of the Bacterial Flagellum." In *Why Intelligent Design Fails: A Scientific Critique of the New Creationism*, edited by Matt Young and Taner Edis, 72–84. Piscataway, NJ: Rutgers University Press, 2004.
- Newman, Robert C. "Some Problems for Theistic Evolution." *Perspectives on Science and Christian Faith* 55.2 (June 2003) 117–28.
- Nichols, Ryan. "Scientific Content, Testability, and Vacuity of Intelligent Design Theory." *American Catholic Philosophical Quarterly* 77 (2003) 589–609.

- Sun, T., et al. "Haplotypes in Matrix Metalloproteinase Gene Cluster on Chromosome 11q22 Contribute to the Risk of Lung Cancer Development and Progression." *Clinical Cancer Research* 12 (December 2006) 7009–17.
- Truesdale, Al. "Last Things First: The Impact of Eschatology on Ecology." *Perspectives on Science and Christian Faith* 45.2 (June 1994) 116–22.
- Vardiman, Larry, et al. "Radioisotopes and the Age of the Earth." In *Proceedings of the Fifth International Conference on Creationism*, edited by R. Ivey. Pittsburgh, PA: Creation Science Fellowship, 2003. Accessed online at www.icr.org/pdf/research/RATE_ICC_Vardiman.pdf.
- Watts, Rikki E. "On the Edge of the Millennium: Making Sense of Genesis 1." In *Living in the LambLight: Christianity and Contemporary Challenges to the Gospel*, edited by Hans I. Boersma, 129–51. Vancouver, BC: Regent College Publishing, 2001.
- Wood, Todd C. "The Chimpanzee Genome and the Problem of Biological Similarity." *Occasional Papers of the Baraminology Study Group* 7 (February 2006). Available online at <http://www.creationbiology.org/>.
- Wright, N. T. "Creation and New Creation in the New Testament" (audio recording). Regent Audio, 2003. Available online at www.regentaudio.com.
- . "Farewell to the Rapture." *Bible Review* 17.4 (August 2001) 8.
- . *The Resurrection of the Son of God*. Christian Origins and the Question of God, III. Minneapolis: Fortress Press, 2003.
- Young, Davis A. "How Old Is It? How Do We Know? A Review of Dating Methods—Part One: Relative Dating, Absolute Dating, and Non-Radiometric Dating Methods." *Perspectives on Science and Christian Faith* 58.4 (December 2006) 259–65.
- . "How Old Is It? How Do We Know? A Review of Dating Methods—Part Two: Radiometric Dating: Mineral, Isochron and Concordia Methods." *Perspectives on Science and Christian Faith* 59.1 (March 2007) 28–36.
- Zerbe, Gordon. "The Kingdom of God and Stewardship of Creation." In *The Environment and the Christian: What Can We Learn from the New Testament?* edited by Calvin B. DeWitt, 73–92. Grand Rapids, MI: Baker, 1991.

FOR FURTHER READING

- Anderson, Paul M. "A Common Thread." In *Professors Who Believe: The Spiritual Journeys of Christian Faculty*, edited by Paul M. Anderson, 14–27. Downers Grove, IL: InterVarsity Press, 1998.
- Coalition of Scientific Societies. "Evolution and its Discontents: A Role for Scientists in Science Education." *FASEB Journal* 22 (January 2008) 1–4.
- Cobb, John B., Jr., ed. *Back to Darwin: A Richer Account of Evolution*. Grand Rapids, MI: Eerdmans, 2008.
- Colling, Richard G. *Random Designer: Created from Chaos to Connect with the Creator*. Bourbonnais, IL: Browning Press, 2004.
- Dembski, William A., ed. *Uncommon Dissent: Intellectuals Who Find Darwinism Unconvincing*. Wilmington, DE: ISI Books, 2004.
- Falk, Darryl R. *Coming to Peace with Science: Bridging the Worlds between Faith and Biology*. Downers Grove, IL: InterVarsity Press, 2004.
- National Academy of Sciences and Institute of Medicine. *Science, Evolution, and Creationism*. Washington, DC: The National Academies Press, 2008.

- Peters, Ted, and Martinez Hewlett. *Can You Believe in God and Evolution? A Guide for the Perplexed*. Nashville: Abingdon Press, 2006.
- Pigliucci, Massimo. *Denying Evolution: Creationism, Scientism, and the Nature of Science*. Sunderland, MA: Sinauer Associates, 2000.
- Ratzsch, Del. *The Battle of Beginnings: Why Neither Side Is Winning the Creation–Evolution Debate*. Downers Grove, IL: InterVarsity Press, 1996.
- Ross, Hugh. *The Creator and the Cosmos: How the Greatest Scientific Discoveries of the Century Reveal God*. 3d ed. Colorado Springs, CO: NavPress, 2003.