support of our common ancestry with primates. The discussion shifts from the study of retroviruses to transposons (genes that actually "copy and paste" or "cut and paste" themselves throughout the genome) to pseudogenes (genes that do not code for functional protein), to the phenomenon of gene formation. The author keenly describes these various pieces of evidence as "very compelling." Christian or not, the supposed evolution of humans from a common primate ancestor has received attention for years, but only relatively recently have we had the necessary tools to investigate questions regarding the human and nonhuman primate genomes.

The similarity of the human genome to the chimp genome is reported to be anywhere from 96–99%. The author capitalizes on this similarity and not only provides the reader with details in support of this point, but also attempts to convince us that this likeness is the result of a common evolutionary lineage. He believes that the most convincing piece of information in support of this argument lies within the shared mutated regions of the chimp and human genomes. Mutations can exist in many forms: a change in a single building block of DNA, the insertion of a stretch of DNA into a gene, or even the deletion of part of a gene, to name a few. The basis for the author's argument that humans share a common ancestor with primates goes something like this: humans share genes with other mammalian species. Some of these shared genes are functional in certain species, but nonfunctional in others. For a species with a nonfunctional copy, a mutation must have occurred within the gene at some point, rendering it nonfunctional. When two species share the same mutation within the same gene, it is then believed that the species diverged from a common ancestor.

While I understand that the aim of this book was not to relate genetic evidence to the biblical account of creation, the book almost seemed incomplete without some mention of how all of this genetic evidence might coexist with faith. The closest that the author gets to this is in the epilogue, where he acknowledges that although humans and primates are similar genetically, many differences in cognition, intelligence, and spirituality separate us as species.

An additional critique is that the author's argument seemed to ignore the potential for new technologies to lead us to conclusions that challenge present understanding. For instance, the analysis of high-throughput genomic data is a relatively new area of science. As much faith as I place in the potential power of genomic data, I am equally aware of the assumptions, caveats, and potential errors that accompany such analyses. Unfortunately, the author fails to draw attention to this. He mentions that sophisticated algorithms and statistical analyses are performed to conduct the types of phylogenetic analyses that he spotlights, but he does not inform the reader of the potential biases or assumptions that accompany them. Numerous methods and software packages exist to sequence DNA, call genetic variants, and align DNA to a reference genome—each method with its associated error rates and inconsistencies. In fact, there is still much debate within the genetics, bioinformatics, and statistics communities regarding which software and methods are best for analyzing these data. This is a clear indication that there is still much to learn in this field of study. I was both surprised and a little disappointed that the author did not acknowledge these potential problems and shortcomings.

Lastly, I also think it important for the author to mention the *differences* between the human and chimp genomes. For example, what about the striking dissimilarity of the human Y chromosome to that of the chimp Y chromosome?

Human Evolution is a good read for anyone interested in phylogenetics, molecular genetics, or evolutionary biology, but will disappoint those looking for a theological perspective or discussion.

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Philosophy & Theology

CREATOR GOD, EVOLVING WORLD by Cynthia Crysdale and Neil Ormerod. Minneapolis, MN: Fortress Press, 2013. 168 pages. Paperback; $18.00. ISBN: 9780800698775.

Crysdale and Ormerod have written an excellent and accessible book for "those in the middle" of the culture wars on the issue of evolution and Christian faith. They argue that science and faith are complementary pursuits and do so assisted by the groundbreaking methodology of the late Jesuit philosopher and theologian Bernard Lonergan.

First, the authors furnish a brief overview of the emergence of modern science and the legacy of the problem of God's relation to nature bequeathed to us by the interaction of Newton and Laplace. Newton's system was deterministic, but it required "intermittent divine interventions" (p. 5) to keep things running smoothly. The central theological question here is, "Is God not only a primary cause but also a secondary cause, intervening occasionally to ensure God's order in the universe?" (p. 5). Newton's invocation of God as a secondary cause maintaining the solar system's stability, with Laplace's famous retort, has set the mold for the unfortunate "God of the gaps" pattern that science and faith have pursued for hundreds of years. Newton's

deterministic worldview was rather recently shattered with the introduction of Darwin's statistical model of science and the advent of quantum mechanics. This was a revolution in thinking, since, for the first time, probability was viewed as a valid way of doing science. Thus, with Newton, we have a model of science that focuses on regularities, while with Darwin (and quantum physicists), we have a model of science that admits of the random. A question for theology and ethics is whether the universe is, at bottom, purposeful or chance-driven.

The authors introduce readers to Lonergan's way of characterizing the progress of the physical sciences as a function of the nature of the inquiries we make. Newton's approach to the physical world led to an emphasis on its regularities, and classical science was its result. Darwin's approach emphasized the contingent or conditional nature of such regularities, and its result was statistical science. Classical science heads toward regularities that hold "all things being equal," that is, if certain contingent conditions are met. Statistical science heads toward ideal frequencies with respect to which actual frequencies are expected to diverge in a nonsystematic way, that is, in a random fashion. Each kind of science grasps a different sort of intelligibility, "Classical science seeks the *intelligibility of system* while statistical science seeks the *intelligibility of probability*" (p. 24). These two "models" are not, Lonergan insists, separate endeavors, but interweave when giving an account of the natural world.

The authors have a very helpful clarification of the meaning of random. They argue that there is no such thing as "a random event," since randomness can only be determined relative to a patterned aggregate (ideal frequency) from which that event diverges nonsystematically. Such a nonsystematic divergence cannot be determined by a single instance. Conversely, the claim that the universe is absolutely random would require virtually omniscient knowledge since it "would require a grasp of some intelligible pattern … from which all events diverge nonsystematically" (p. 31).

Lonergan argues that the interweaving of classical regularities and statistical probabilities yields the world process of "emergent probability." This is Lonergan's umbrella concept referring to nature as a self-assembling, hierarchically structured reality. Such a structured reality emerges as a result of certain "schemes of recurrence." The latter are any cyclical series "in which the occurrence of any one of these events sets off a recurrent scheme" (p. 32). The authors use examples such as Earth's water cycle and the Krebs cycle for the production of energy in the cells of our bodies. The basic idea is that as such schemes assemble and repeat themselves they become intertwined in such a way that new orders and structures emerge and flourish. The emergence of these new structures makes further, more complex interdependencies more likely, that is, it "shifts the probabilities of certain further events occurring" (p. 35). This point is employed to challenge "intelligent design's" account of certain biological structures as "irreducibly complex." The authors summarize, stating that (1) natural selection is not a random process, (2) it pertains to populations and not individuals, and (3) it occurs as a result of the interaction of random and nonrandom processes in accord with Lonergan's notion of "emergent probability" (p. 39).

Crysdale and Ormerod go on to defend the classical conception of God as eternal (beyond time and space), unchanging, omniscient, omnipotent, and so forth, from certain charges of process theologians. Since they believe that the classical conception makes God too remote, process theologians have wished to bring God closer to the evolving world. They wish to introduce change, limitation, and contingency into the divine essence. Thus, God's nature, in the process view, would be "dipolar": one pole having the classical attributes; another possessing more limited, conditioned traits. In short, God would be both a necessary and a contingent being (p. 44). The authors reject this proposal on the grounds that it is unnecessary and bad theology.

The central issue is how the eternal God is related to the contingent process of the world. If all things are willed by divine providence, how can there be free will or contingency? Everything would already be determined. If, on the other hand, free will and contingency are real, then how can God be sovereign over creation? According to the classical tradition, God's providence can only be effective if God has created all things *ex nihilo* "with no preconditions or constraints" (p. 45). God can only be God, if the Creator is not subject to creation and its contingencies. God has ordained, says Aquinas, certain things to happen necessarily and other things to happen contingently. This schema is transposed into primary and secondary modes of causality (pp. 45–46). God is the primary cause of existence; the rest of creation belongs to the realm of secondary causality and is the purview of scientific investigation. Scientists are free to pursue an investigation into the intelligibilities of the causal mechanisms of the natural world (whether or not they acknowledge God) and God, the one who "breathes fire" into the equations of physicists, is the sole necessary cause of the contingent universe.

The authors take a page from the physicists in their critique of process theology. It is the consensus of contemporary physics that time and space are not separate "things" but comprise one reality, "space-time." Against process theology, they argue that if a temporal element is introduced into God's nature, then a spatial one will also have to be introduced. In short, God will

have to have a body. This is unacceptable to the authors since this makes the Creator too much in the likeness of a creature.

The issue of purpose and meaning in relation to evolution is examined. Building upon emergent probability, they refer to Lonergan's notion of "finality" to characterize the dynamic, "upwardly directed" but "indeterminate" nature of the evolutionary epic. Recall that Lonergan views natural process as having an inbuilt capacity for self-assembly in which schemes of recurrence pyramid and yield ever greater systems of complexity and intricacy. While nature possesses this dynamic tendency, it is "open ended," that is, it does not have a predetermined goal and does not imply "automatic progress" (pp. 71–73). Thus, finality implies direction and flexibility.

In the final chapters, the authors consider theodicy and related questions of suffering, evil, and ethics. God wills the entire universe of emergent probability and it is governed by God's providence, but such providence does not sequester us from suffering. Furthermore, our sufferings may lead us to develop virtues that the absence of suffering may never have called forth. God has created us free, and the good of freedom is so great that God "risked" making the sort of beings who could abuse their freedom by sinning.

Emergent probabilities for human beings do not pertain solely to the physical constituents of survival, but also to the survival of meaning and purpose. They contrast an "ethic of control" with an "ethic of risk" (p. 110). An ethic of control implies a belief in the sovereignty of the agent and his ability to achieve "clear results" (p. 110). An ethic of risk accepts a more limited, situated agency and is "committed to the struggle over the long haul" (p. 111). The authors endorse the ethic of risk as more effective in "shifting probabilities for change" (p. 110) and as more respectful of others and God's creation.

Crysdale and Ormerod conclude their book by reiterating their claim that the eternal, transcendent God of classical theism is a personal God and that this conception of God, alone, can do full justice to the Christian conception of creation, salvation, and redemption. Throughout the work, excellent examples are provided to clarify and illustrate. The book is highly recommended for undergraduate courses in science and religion.

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As space permits, *PSCF* plans to list recently published books and peer-reviewed articles related to science and Christian faith that are written by our members and brought to our attention. To let us know of such works, please write to patrick.franklin@prov.ca.

Science & Biblical Studies

THE LOST WORLD OF ADAM AND EVE: Genesis 2–3 and the Human Origins Debate by John H. Walton. Downers Grove, IL: InterVarsity Press, 2015. 255 pages. Paperback; $17.00. ISBN: 9780830824618.

Walton approaches the creation accounts in Genesis theologically. It is his belief that these chapters are not giving a description of the actual origins of the universe. His interpretive method is characterized by perspectives found in the literature of the ancient Near East, for the simple reason that human language can only function within the perspectives and presuppositions of its culture. The account of origins therefore has to do with order, function, and roles rather than the material universe. The order that God created inaugurated sacred space in the cosmos. God intended a place for people created in his image where he would be in relationship with them and present among them.

Genesis 2 is the establishment of a terrestrial center of sacred space in what is identified as a garden. Adam and Eve are commissioned as priests in this sacred space, mediating revelation of God and access to God. This is in keeping with biblical theological themes. Walton developed the concept of the Genesis account describing a cosmic temple in his *NIV Application Commentary: Genesis* (Zondervan, 2001). Temples in ancient Canaan were images of creation, so it is natural that the creation story of Genesis be told in temple terms with temple functions. In "Equilibrium and the Sacred Compass" (*Bulletin for Biblical Research* 11, no. 2 [2001]: 293–304), Walton develops this concept from the book of Leviticus. The temple is a reminder that creation is God's sacred space. The objects of the Hebrew verb "atone" (*kāpar*) are those of the sanctuary, not the people. Leviticus ritual is focused on sacred space; individuals are the beneficiaries in that their status is restored because of the cleansing that has taken place on their behalf. Walton's hermeneutics of Genesis has a solid basis, not only in its cultural setting, but especially in biblical theology. The confessional rituals of Israel make the functional interpretation of the creation accounts the only one that is biblically justifiable.

The narrative of Genesis 2 presents the formation of Adam and Eve as archetypes, in keeping with other ancient Near Eastern accounts. They are representatives of a group. All members of the group participate in the actions of the representative archetype. This concept is defended in an interpretation of Romans by N. T. Wright (pp. 170–80). Paul's treatment of Adam has to do with the kingdom of God and the whole creation project rather than salvation from sins. For Paul, the parallels between vocations (functions) of Adam and Israel are