

# PERSPECTIVES on Science and Christian Faith

JOURNAL OF THE AMERICAN SCIENTIFIC AFFILIATION

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Lake Suigetsu Varves, Tree Rings, and Carbon-14

Doubt and Faith in Science and Religion

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Intelligent Design Theory: The God-of-the-Gaps  
Rooted in Concordism

*"The fear of the Lord  
is the beginning of Wisdom."*  
Psalm 111:10

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James C. Peterson

# Learning of God from Creation

If one just starts with nature to discern what one can about the character of its creator, it gives a confusing message of splendid sunrises and painful parasites. But if one knows God the Creator because God has been revealed through Jesus Christ and his people, and then studies God's creation, one may learn and appreciate more of God.

If we know God is the creator, we can gain some experience of God's immense power when measuring the height of Mount Everest or hiking the geology of the Grand Canyon. New discoveries further that awareness. Think of the Hubble Space Telescope peering into the deep space field. We now calculate that beyond our galaxy of about 200 billion stars, there are two trillion more galaxies. Seeing the vastness of space all the way to the furthest galaxy that we have seen thus far, reveals not only a greater sense of how powerful the Creator is, but also some of the magnitude of what it means to say that God has revealed that God is fully present in every place. That God is fully present, both here and at the furthest known galaxy—MACS0647-JD, stretches our perception of God's omnipresence.

We know from the Christian scriptures that God, time and again, prefers to start small and build over time. The people of Israel traced their roots to one couple, Abraham and Sarah. The Exodus began with a baby in the rushes of the Nile River. The church grew from twelve disciples to 70, then to two and a half billion. It is not surprising to see that God who chooses to build over time, has created our material world over even longer periods of time. The great age of the earth measured in so many jointly confirming ways such as by the varves of Lake Suigetsu described in this issue, reminds us that God's experience of time is vastly different from ours. As we look at the life cycle of stars and the rate of expansion of the universe, our universe appears to be about 13.8 billion years old. Learning more of our natural world, brings to attention more of what it means to describe God as fully present in all times, and across time.

We read in 1 Corinthians 13:12 that "Now we see only a reflection as in a mirror dimly; but someday we shall see face to face, and know as deeply as we have been known." Since the Middle Ages, St. Augustine has been described as seeing a little girl quite industriously marching into the surf to fill her pail with water and then back up the beach to pour the water into a dip in the sand. The story goes that he stopped at a nonthreatening distance, and asked, "Excuse me, but what are you doing?" The little girl raised the pail up with confidence and said, "Today, I am going to empty the ocean with my pail."

I can picture that the girl felt the waves tugging at her feet. She knew the taste of salt water on her tongue. She could hear the roar of the surf. She could see the blue water stretching to the horizon. She knew the ocean with every sense she had, and as completely as she could. But she did not even begin to conceive that the water stretched all the way to the other coasts. She had no inkling that in the water before her there were mountain ranges and canyons, whales and walruses, icebergs and tropical islands. There is a parallel here with how we know God. All who God is—beyond any one way of knowing, and even with all our ways of knowing together—ultimately, is beyond our current best human comprehension, but we can truly know God with all the ability that we have, including from our ability to experience nature. If one knows God by God's self-revelation, one can then recognize God's presence in the serene moonrise rippling across a lake, and in the fierce, and as it turns out, life-giving, forest fire.

Living in this material world is a generous and complicated gift that can enrich our understanding and experience of God. What we discover and experience of our material world through the sciences, can sometimes help us to recognize more of its Creator.

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**James C. Peterson**, *Editor-in-Chief*

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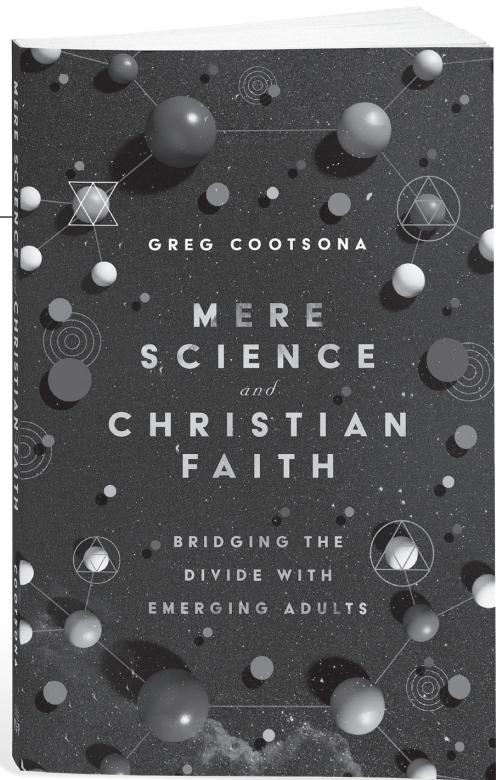
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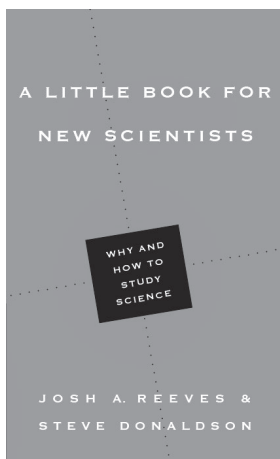
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# Testing and Verifying Old Age Evidence: Lake Suigetsu Varves, Tree Rings, and Carbon-14

Gregg Davidson and Ken Wolgemuth

*Carbon-14 measurements from layered sediments collected in 2006 from Lake Suigetsu, Japan, together with tree-ring data, offer an unprecedented opportunity to demonstrate how competing old- and young-earth hypotheses can be quantifiably tested. Conventional observation of radioactive decay rates, atmospheric carbon-14 production, tree-ring growth, cross-dating, and varve formation yields a narrow range of expected values for the carbon-14 content of samples over the last 50,000 years. Young-earth challenges to each observation should result in specific and predictable departures from conventional expectations. This article documents a sequence of tests to demonstrate beyond reasonable doubt that carbon-14 decay rates have remained unchanged, estimates of past atmospheric production rates are accurate, cross-dating of tree rings is reliable, the sampled trees have grown one ring per year going back more than 14,000 years, and finely layered sediments from Lake Suigetsu were deposited annually going back more than 50,000 years.*



Gregg Davidson



Ken Wolgemuth

In 2010, we wrote a paper that combined published carbon-14 measurements from tree rings and annually laminated sediments from Lake Suigetsu, Japan, to show how we can test and validate assumptions about Earth's past.<sup>1</sup> That paper made use of carbon-14 from sediment cores collected up through 1993. In 2006, the Suigetsu team collected a new set of cores with greater controls on sediment recovery between extractions. Detailed analyses of the new cores, with publications leading up to 2013, included more sophisticated counting methods, Ar-Ar dating of an ancient ash layer, and a greatly increased sampling density for carbon-14. The new data, plus published reactions to our 2010 paper by young-earth writers, has provided material for a more rigorous comparison to test competing conventional and young-earth models.

The objectives of this article are two-fold. The first is to illustrate how calcula-

tions about past geologic processes can be rigorously tested and verified. By combining independent measurements such as counts of tree rings, counts of lake-sediment couplets that appear to be annual deposits, and carbon-14 content, we can demonstrate beyond reasonable doubt that the trees put on one ring per year, the sediments in question formed annual layers, radioactive decay rates have not changed over time, estimates of past atmospheric production of carbon-14 are accurate, and the history of

**Gregg Davidson** is Professor and Chair of Geology and Geological Engineering at the University of Mississippi. His books on science and Christian faith include *The Grand Canyon, Monument to an Ancient Earth* (associate editor and contributing author), *When Faith and Science Collide*, and entries in *Zondervan's Dictionary of Christianity and Science*.

**Ken Wolgemuth** is an ASA Fellow, adjunct professor of Geosciences at the University of Tulsa, and founder of Solid Rock Lectures. He has a 40-year career in the petroleum industry, and is a contributing author to *The Grand Canyon, Monument to an Ancient Earth* and to *Zondervan's Dictionary of Christianity and Science*.

# Article

## Testing and Verifying Old Age Evidence: Lake Suigetsu Varves, Tree Rings, and Carbon-14

Earth goes back far beyond a few thousand years. At the same time, speculative arguments made by young-earth advocates can likewise be objectively tested and shown to be untenable. This will be done in a stepwise fashion, beginning with tree rings, then incorporating carbon-14, and finally adding the annual sediment couplets (varves) from Lake Suigetsu.

Our second objective is to shed light on the typical methods employed by young-earth writers to turn confidence into doubt. This is an important part of the story, for the best scientific explanations go unheeded by many in the church if the alternative explanations provided by young-earth advocates sound equally convincing. After each of our steps that describe how we can test and verify specific hypotheses, we follow with example arguments that young-earth advocates employ to create doubt in the validity of those tests. These sections each start with the heading *Casting Doubt*. The coverage of young-earth tactics is not exhaustive, but the examples are broadly representative of the methods employed to distract readers from the obvious implications of the scientific evidence.

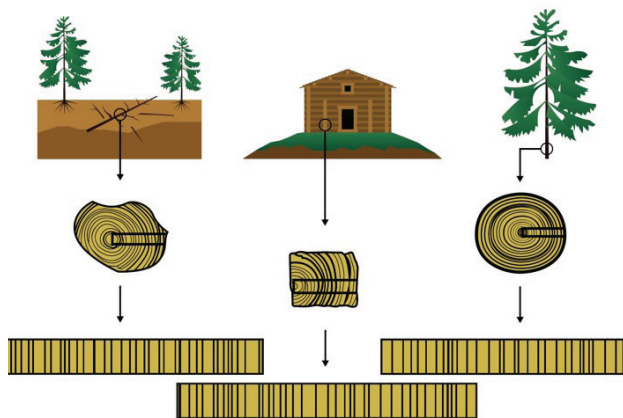
To set up the sequential tests, we first need some background information.

### Tree rings

In many trees (conifers and dicot angiosperms), a pattern of light and dark bands forms annually as a result of different growth rates. In the spring or wet season, rapid growth produces larger, lighter-colored cells. In the autumn or dry season, smaller, darker-colored cells form. The two together form one growth ring. Environmental conditions or tree health can occasionally result in more than one ring in a year or no ring at all, though for an individual tree, these are readily identified by comparing with tree-ring cores from other trees in the same area.

The oldest known living trees are bristlecone pines in the White Mountains of California, with one possessing more than 5,000 rings.<sup>2</sup> Counting beyond the age of living trees is accomplished by cross-dating. Variable environmental or climatic conditions from one year to the next result in trees putting on thicker or thinner growth rings, producing a pattern of rings comparable to a commercial bar code. Trees that grew in the same region (experiencing the same envi-

ronmental conditions) that died sometime after our living trees began to grow, will have some growth rings that overlap our living tree record. Aligning the ring patterns allows us to extend the counting back in time (fig. 1). Finding even older wood that overlapped in time with the dead trees extends the count back farther still.



**Figure 1.** Cross-dating of tree rings. Patterns in ring growth from trees growing in the same region are aligned to extend the count back in time.

In principle, this record could be extended as far back in time as there were trees on Earth. However, there is a practical limitation, as it becomes increasingly difficult at a given location to find very old wood that reliably overlaps to yield an *unbroken* sequence far back in time. A gap in the record may be due, for example, to climatic changes in the past when trees did not readily grow in that area, or a time interval when most of the fallen trees fully decomposed. At present, the oldest reliable cross-dated count goes back about 14,000 years, based on living and fossil trees from Central Europe.<sup>3</sup>

### Carbon-14

Most radioactive atoms, especially of the heavier elements, are not produced on Earth. The concentrations of these radionuclides have been diminishing since Earth was formed. Some, however, like carbon-14, are produced in the upper atmosphere. Carbon-14 is formed by collisions of cosmic rays with nitrogen atoms that result in the loss of a proton and gain of a neutron. The new configuration is unstable and eventually decays back to nitrogen. Freshly formed carbon-14 in the atmosphere readily joins with oxygen to form  $^{14}\text{CO}_2$ . Growing plants absorb the  $^{14}\text{CO}_2$ , turning it into complex organic molecules as part

of their tissue. Carbon-14 continually decays and is replenished as long as the plant lives, maintaining a concentration essentially equal to what is in the atmosphere. When the plant dies, the resupply of carbon-14 is cut off and the concentration begins to diminish. Animals that eat plants are similar, ingesting carbon-14 from the plants and incorporating it into their organic tissues until the time that they die. The carbon-14 content then begins to diminish at a predictable rate, raising the possibility of estimating the age based on the amount of carbon-14 left.

The primary requirements for determining age are (1) a constant radioactive decay rate, (2) knowledge of the original carbon-14 content, and (3) quantification of any old carbon that may have been incorporated into the specimen. The last requirement applies mostly to marine samples, in which ocean-dwelling organisms, even today, extract carbon from seawater that has been “pre-aged” by long isolation from the atmosphere.<sup>4</sup> Terrestrial samples, such as tree rings and lake sediments, are less susceptible to this complicating factor, limiting the primary requirements to the first two.

If the concentration of carbon-14 in the atmosphere were constant over time, and if carbon-14 decay rates have remained constant, it would be a relatively simple matter of measuring the amount still present in an old sample and calculating the age by applying the radioactive decay equation:

$$t = -\ln(A/A_0)/\lambda \quad [1]$$

where  $t$  equals the time since cell death,  $A_0$  is the initial atmospheric carbon-14 concentration,  $A$  is the concentration of carbon-14 remaining today, and  $\lambda$  is the decay constant for carbon-14 (0.000121 for a half-life of 5730 years).<sup>5</sup>

But recall how carbon-14 is formed. Variations in cosmic-ray flux, caused by a variety of factors such as solar flares and changes in Earth’s magnetic field, result in variable carbon-14 production. To turn a measured carbon-14 value into an age, independent methods are employed to first provide realistic assessments of past atmospheric production rates. This is an important note, for young-earth writers routinely make the false assertion that conventional geologists naively assume a constant historical production rate.<sup>6</sup>

## Varves

In some lakes, environmental or climatic conditions result in seasonal changes in the character of sediment deposition, producing alternating laminations. Where lakes freeze over in winter, laminations may alternate between fine-grained silt and clay in winter, and coarser-grained sands in spring. In other places, such as Lake Suigetsu, Japan, seasonal blooms of algae litter the lake floor with microscopic shells. If biological activity of bottom-dwelling organisms is low, such as when bottom waters are anoxic, the layers may be preserved. Pairs or sets of alternating layers that represent annual deposits are called *varves*. In the Green River Formation in southwest Wyoming, ancient lithified lake deposits contain hundreds of thousands of laminated layers that are believed to be varves—each varve couplet representing the passage of one year. In Lake Suigetsu, cores contain sections with tens of thousands of varves, with a total record estimated to represent more than 150,000 years.

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## Casting Doubt: An Alternative Flood Model

Young-earth writers cast doubt on virtually every aspect of dating using tree rings, carbon-14, or varves. To explain observed data, leading young-earth models call upon a violent global flood with flow dynamics that produced thick monolithic deposits in some places, and innumerable fine-scaled laminations in other places (misinterpreted by conventional geologists as varves).<sup>7</sup> Carbon-14 in the biosphere is said to have been very low at the start of the flood, resulting in massive fossil-bearing deposits containing low, but measurable, levels of carbon-14.<sup>8</sup> After the flood, wild climatic swings with cycles of months, days, or even a few hours resulted in continued deposition of multiple sediment layers per year. New trees sprouted, producing multiple rings per year for centuries.<sup>9</sup> Carbon-14 produced in the sub-surface by the neutron flux from accelerated decay of uranium-series isotopes began to escape to the atmosphere, raising the carbon-14 content over several hundred years until reaching near-modern levels by the time of Israel’s first king (allowing semi-accurate radiocarbon dating of biblical artifacts).<sup>10</sup>

There are many issues of illogic and misrepresentation made in the young-earth model and objections to conventional dating, enough to require a book-length manuscript to adequately describe.<sup>11</sup> Rather than listing and debunking individual arguments, we will take a completely different approach here that sets aside possible fallacies: an approach that tests competing claims and expectations directly against what we actually find when combining tree rings, carbon-14, and sediment laminae. We will conduct the tests in a step-wise fashion, following each step with the relevant young-earth responses.

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# Article

## Testing and Verifying Old Age Evidence: Lake Suigetsu Varves, Tree Rings, and Carbon-14

### Step 1. Quantify Conventional Expectations: Carbon-14

The conventional geologic model gives us specific expected outcomes for how much carbon-14 should be present in tree rings or varves of particular ages. This is a natural outgrowth of assuming constant radioactive decay rates, and annual production of tree rings and varves. The young-earth model (also known as *flood geology*), in contrast, does not have any *inherent* expectations, for purported fluctuations in natural processes during and after the flood could produce virtually any outcome. To explain observed data, however, there are specific claims that young-earth advocates make that, in turn, should produce predictable departures from the expectations of the conventional model.

In this first step, we will build a plot of expected carbon-14 content today versus age (equivalent to tree-ring or varve count). Note that we are not plotting calibrated radiocarbon ages here, just the raw carbon-14 concentrations we expect to find when real measurements are made. This will greatly simplify the discussion, because it will bypass debates over the nuances or validity of radiocarbon dating and the use of calibration curves. For the conventional model, the plot will assume (1) carbon-14 decay rates have been constant, (2) sampled trees grew one ring per year, (3) cross-dating of tree rings was done correctly, (4) sampled sediment layers are varves (one per year), (5) terrestrial tree rings and varves are free of “pre-aged” carbon, and (6) variation in atmospheric production of carbon-14 over the period of interest was limited within a discernable range.

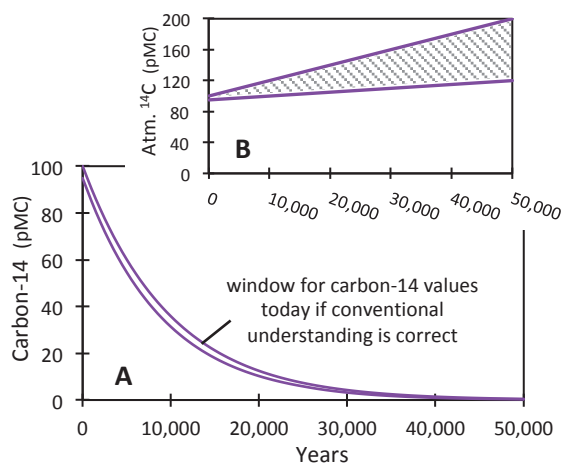
The expected concentration of carbon-14 remaining today in a sample of a particular age can be found by rearranging equation 1 to solve for A (see eq. 1 above for definition of terms):

$$A = A_0 e^{(-\lambda t)} \quad [2]$$

If the atmospheric concentration of carbon-14 ( $A_0$ ) were constant in the past, the equation would yield a single line of expected carbon-14 concentrations versus tree-ring or varve count. We already noted, however, that atmospheric production rates were *not* constant. We will thus need to establish upper and lower boundaries for our expected carbon-14 values today based on estimates of maximum and minimum production rates over the years of interest.

One way to establish these limits is using beryllium-10 concentrations in sediments that contain carbon-14 above background levels. Beryllium-10 is also produced in the atmosphere by cosmic rays, but unlike carbon, it readily falls to the ground, potentially preserving a record of variations in cosmic flux. From this record of flux, we can calculate proportional carbon-14 production.<sup>12</sup> Based on this and other methods, atmospheric carbon-14 was modestly lower at some times in the past, falling to roughly 95 percent Modern Carbon (pMC),<sup>13</sup> and significantly higher at other times, reaching levels of 185 pMC or higher. The beryllium-10 concentrations exhibit a high degree of variation, suggesting significant variability in cosmic flux. In general, however, the lower concentrations (lower flux) tend to be found in layers containing higher *current* carbon-14 (deposited in the recent past), and the highest concentrations (higher flux) tend to be in layers containing lower *current* carbon-14 (deposited in the more distant past). Given conventional expectations, even if atmospheric carbon-14 was double today’s level, the low carbon-14 samples should be on the order of 50,000 years.<sup>14</sup>

Based on these observations, we can set ballpark boundaries on expected production rates in the past (fig. 2B). For the upper boundary, we will set the modern value at 100 pMC and allow it to rise linearly to 200 pMC at 50,000 years. For the lower boundary, we will start at 95 pMC to accommodate lower rates in the recent past, and allow it to increase linearly to 120 pMC.<sup>15</sup> Actual year-to-year fluctuations in the past should fall mostly between these two boundaries.



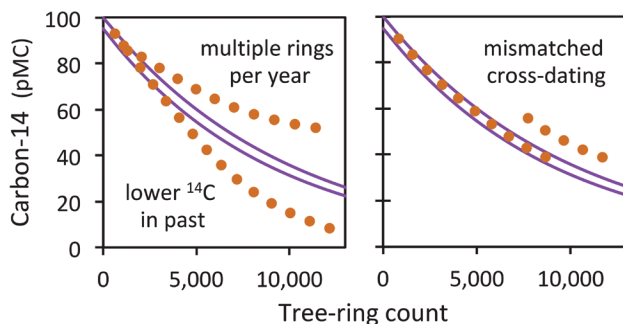
**Figure 2.** (A) Expected range of carbon-14 values for samples currently of the age on the X-axis if conventional geologic understanding is correct, and using the range of initial atmospheric carbon-14 concentrations shown in (B).



We are then ready to apply the radioactive decay equation (2) to each point along the upper and lower boundary to determine how much carbon-14 should still be present today for a sample of a particular age, up to 50,000 years. The result is shown in figure 2A, where we can see that conventional expectations form a surprisingly narrow band of carbon-14 versus tree ring or varve count (equivalent to age). If *any* of the conventional assumptions is not correct, it should become readily apparent as measured values trend outside this window. Moreover, specific young-earth claims should result in predictable departures from conventional expectations that would lend support to their model.

### Step 2. Combine Tree Rings and Carbon-14: Testing Rings per Year and Cross-Dating

This step is designed to test the competing claims about tree rings. The conventional model assumes one tree ring per year and accurate cross-dating to obtain a continuous record of 14,000 rings, equal to 14,000 years. For this test, we need only the left portion of figure 2A, the 14,000 years covering the time range applicable to the sample tree-ring count (fig. 3). If all the conventional assumptions are valid, then carbon-14 measured in our sampled tree rings should fall within the window. Multiple tree rings per year, postulated by Flood geologists, should yield values that fall above the window (rings are younger and higher in carbon-14 than conventionally expected). On the other hand, if atmospheric carbon-14 was much lower in the past, the data should plot well below the window. And any errors in cross-dating the tree rings, due to false-positive matches in ring patterns, should be readily apparent by data that abruptly shifts upward (wood younger

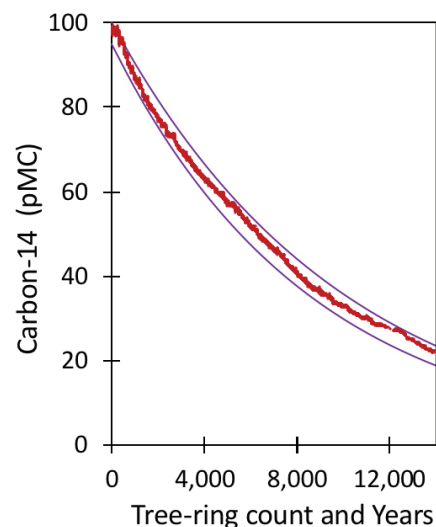


**Figure 3.** Expected tree-ring count vs. carbon-14 content for different young-earth scenarios (circles), relative to conventional expectations (lines). Only the tree-ring time range of 14,000 years of figure 2A is plotted.

than the match suggested) or downward (wood older than the match suggested).

What we actually see are data that fit conventional expectations beautifully (fig. 4). No contrived explanations are necessary to account for this fit. No calibration or manipulation of data. No initial assumption of ages. Just the raw tree-ring count and the measured carbon-14 content. Small-scale perturbations in the data are consistent with our understanding of fluctuations in the atmospheric production rate (within the expected range).

The result means one of two things. Either God saw fit that 14,000 tree rings equals 14,000 years, or God manipulated unrelated and independent processes (tree rings per year, atmospheric carbon-14 production, and radioactive decay rates) in a *precise* manner over a much more abbreviated time frame such that they are indistinguishable from the expectations of conventional geology. By any rational measure, Test 1 confirms conventional understanding of tree rings, cross-dating, and carbon-14 back to at least 14,000 years.



**Figure 4.** Tree-ring count vs. measured carbon-14 content in tree rings (line represents 4,310 samples). Solid boundary lines represent the window for conventional expectations.<sup>16</sup>

### Casting Doubt: Circular Reasoning

For our first test, young-earth advocates charge that our measured carbon-14 values are misrepresented, arguing that they are *calculated* values derived from calibrated radiocarbon ages that are in turn based on a host of untestable assumptions. If values were manipulated to fit expectations of age, then of course a plot of the values versus age will meet expectations—circular reasoning!<sup>17</sup>

# Article

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Some of the measured carbon-14 data used in this and the 2010 paper were indeed calculated from published work, though the charges of circular reasoning are unfounded. At issue is the meaning of “radiocarbon age.” It can be a little confusing for those who are unfamiliar with carbon-14 research, but a radiocarbon age is not an age at all, nor is it massaged to fit any uniformitarian expectations. It is a *reporting convention* that dates back to the early days of carbon-14 research when an old half-life of 5,568 years was being used (now known as the “Libby half-life,” after Willard Libby), and not much was yet known about variability of carbon-14 production in the atmosphere.<sup>18</sup> In those days, measured carbon-14 was converted to an estimated age in “years before 1950” (prior to atmospheric perturbations from nuclear weapons testing), assuming constant atmospheric production, and using the Libby half-life. Years later, more accurate measurements of the carbon-14 half-life yielded a value of 5,730 years, and knowledge of atmospheric variability greatly increased.

This led to a dilemma of how to report new measured values in a way that was directly comparable to older data sets. A collective decision was made to continue the convention of reporting using the Libby half-life and a fixed 100 pMC initial atmospheric content, adjusted relative to 1950.<sup>19</sup> Not all are happy with this decision, but everyone working in the field understands what it is. A reported “radiocarbon age” is not a date or an actual age; it is a reporting convention easily and simply converted back to the measured value using equation 2 with  $A_0$  equal to 100, and a decay constant ( $\lambda$ ) of 0.000124. Some researchers report both the “radiocarbon age” and the measured carbon-14 content. At least one of our sources did this, so anyone can check our numbers.<sup>20</sup>

A closely related charge is that the tree-ring and varve studies were performed for the purpose of improving a radiocarbon calibration curve; therefore, our claim of not making use of calibration curves is somehow employing circular reasoning and our conclusions invalidated.<sup>21</sup> This charge boils down to the nonsensical assertion that one cannot use data for more than one purpose. The cited researchers used their measured carbon-14 to refine a calibration curve. We made use of their measured data for a completely different purpose. Circular reasoning was left in the unemployment line.

Other young-earth claims of circular reasoning have similar explanations.

### Step 3. Combine Varves and Carbon-14: Lake Suigetsu, Japan

Lake Suigetsu is a part of a multi-lake system on the western coast of Japan, sitting nearly at sea-level (fig. 5). Several factors make this site of particular interest for those studying lake sediments for evidence of Earth’s recent history. River inflow enters adjacent Lake Mikata where most of the coarse-grained mate-

rial settles out before water and fine-grained sediments pass into Lake Suigetsu. Each spring, algal blooms grow in the lakes, producing tiny shells that rain out on the lake floor. The bottom waters of Suigetsu are anoxic (no oxygen), preventing burrowing organisms from disrupting the sediments, allowing preservation of annual couplets (varves) of alternating darker sediments and lighter shells.<sup>22</sup>

The region is also seismically and volcanically active. Earthquakes shake loose sediments along the flanks that then flow across the lake floor (forming deposits called *turbidites*), and volcanic eruptions from both Japan and South Korea have periodically blanketed the lake with ash. The chemical compositions of ash from the different volcanoes are distinct, permitting an investigator to trace the origin of a layer of deposited ash to its source. Intermittent flood deposits are likewise recognizable in the sequence of layers. All these together make for a potentially ideal site to



**Figure 5.** Lake Suigetsu, ~50 km north of Kyoto, Japan. Locations of SG93 and SG06 core sampling sites shown on map. Larger grains washed into Mikata tend to settle out before flowing into Suigetsu, as illustrated by the photo after a heavy rain. (Photo provided by Fukui Shimbun.)

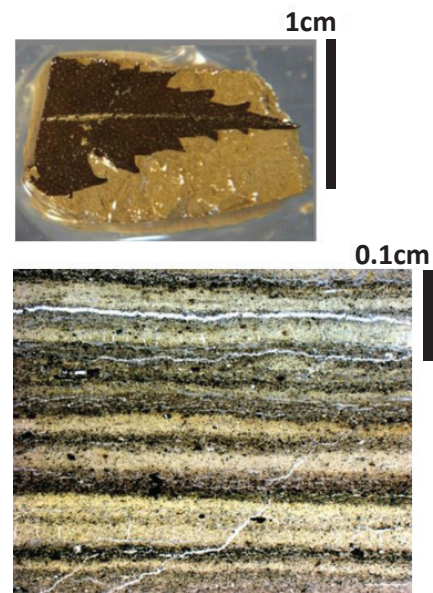
preserve a long-term, datable record of past climate, volcanism, seismicity, and ecology.<sup>23</sup>

With this interest, several small cores and a longer 75 m core were collected from the lake by 1993. Below the first meter, a roughly 12 m interval was not varved, suggesting a span of time when bottom waters were oxygenated and organisms mixed the seasonal deposition of diatoms. Current anoxic conditions were likely caused by the introduction of brackish water when a channel was cut in 1664 from Suigetsu to Lake Kugushi which connects to the Sea of Japan.<sup>24</sup> Below 12 m in the core, tens of thousands of preserved varves were observed. In a series of reports leading up to the year 2000, more than 21,000 varves had been logged, with thousands more waiting to be counted. Though core recovery was nearly complete, it was recognized that small losses between each recovered core segment meant the varve count underestimated the total. Carbon-14 measurements were made from over 275 samples, which were the primary subject of our 2010 paper.<sup>25</sup>

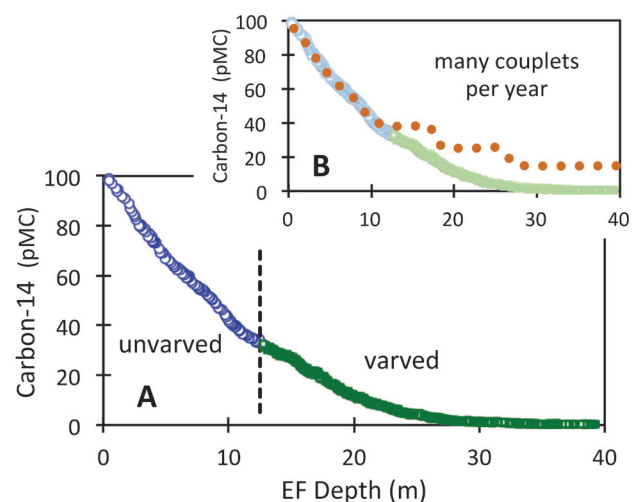
The Suigetsu team returned in 2006 to collect four new cores, within 40 m horizontal distance from each other. Recovery intervals were offset this time such that a break between any two recovered segments in one core was represented by an uninterrupted length from an adjacent core.<sup>26</sup> Multiple flood, turbidite, and ash “event layers” distributed through the profile allowed confident correlation between the four cores to ensure time-equivalency with depth, with no significant correlation errors within the top 46 m.<sup>27</sup> The composite record from the four cores is referred to by the Suigetsu research team as SG06, reaching a depth of 73 m. The event layers also allowed correlation with the original SG93 cores to account for missing sediments between the earlier core segments.

Varve counting was carried out using two different methods, (1) high-resolution photography under a high-powered optical microscope, and (2) X-ray fluorescence and X-radiography for geochemical variation. In places where it was difficult to confidently differentiate layers, counts were estimated based on average layer thicknesses above and below the uncertain sections.<sup>28</sup> By 2013 reports, approximately 31,000 varves had been logged between 12 and 32 m, with a continuous sequence of uncounted varves continuing to 41 m.<sup>29</sup> Still more varves were found continuing to 46 m, though interrupted by unvarved sections.<sup>30</sup>

Carbon-14 analyses in the Suigetsu cores were done on macrofossil samples that were handpicked from individual varves (fig. 6). The majority of samples were tree leaves, although small twigs and a few segments of insects provided carbon for some analyses. Combining the new analyses with those from the SG93 cores resulted in over 800 carbon-14 measurements from near the surface to a depth of approximately 41 m at an estimated age in excess of 50,000 years.<sup>32</sup> Figure 7 shows the results as a function of “event free depth” (thickness of ash, flood, and turbidite deposits subtracted), with different data markers for the varved and unvarved sections.



**Figure 6.** Photos of Suigetsu varves and samples used for carbon-14 analyses.<sup>31</sup>



**Figure 7.** “Event free” (EF) depth vs. carbon-14 content for Lake Suigetsu core. The inset shows, qualitatively, what should be expected for the young-earth model, with myriad couplets deposited per year in stair-step fashion during and after the flood.



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The first thing that should be obvious from this data is the relatively smooth decline in carbon-14 content with depth, all the way to background levels near zero. Based on conventional geologic understanding, the shape of the curve is consistent with a fairly uniform annual sediment deposition rate between episodic volcanic, earthquake, or flood inputs. Conventional understanding allows for periods of Earth history with higher or lower frequencies of things like earthquakes or eruptions, but for this area, the flood, turbidite, and ash layers are distributed relatively equally throughout the core. The 31,000 varves and estimates of tens of thousands more are consistent with carbon-14 content declining over a time span of roughly 50,000 years. At depths greater than 40 meters, the carbon-14 content falls below the level of resolution.

In contrast, the young-earth model expects (1) massive sediment deposits during the flood year, and (2) a prolonged period of environmental and geologic instability resulting in many sediment couplets deposited in any given year, *and* a higher frequency of earthquakes and eruptions. Near-zero carbon-14 content in older samples is accommodated by the hypothesis that atmospheric carbon-14 content at the time of the flood was only about 0.5 pMC and rose rapidly in the years following the flood. Given these criteria, the end of the flood must be represented by sediments near 40 m, where the carbon-14 content first begins to climb in the overlying layers.

Conditions during a global catastrophic flood should be quite different from the conditions that follow, so at the very least, we should see a marked transition in the nature of the deposits above and below 40 m. We find no such change. Not only do the varves appear the same above and below, but the frequency and thickness of interspersed ash, flood, and earthquake-induced turbidite deposits also vary little above and below.<sup>33</sup> One Suigetsu study even noted that turbidite deposits (caused by shaking loose sediments on the perimeter slopes) document a regular pattern of earthquakes throughout the core, varying by 1,200 to 5,300 varves (years) between events.<sup>34</sup>

If multiple sediment couplets formed in pulses in the early post-flood years, deposits that formed in rapid succession should have nearly the same carbon-14 content. This should produce a stair-step appearance to a plot of carbon-14 versus depth or varve number, with flat stretches indicative of couplet-layers depos-

ited at nearly the same time (fig. 7 inset). There is no evidence of such stair-steps in the observed data.

It gets still worse. To account for the observed data in a few thousand years, we do not just need “multiple” sediment couplets per year. In the early years after the flood, it would require over 1,000 couplets per year—on the order of 3 per day—to match the observed data. Aside from the impossibility of cyclical diatom blooms happening over periods of hours, the flood model also needs these successive blooms to stay separated as they settle down to the lake bottom to form distinct, unmixed couplets formed hours apart. In other words, miraculous intervention is required to exactly mimic conventional expectations.

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### *Casting Doubt: Questioning the Varve Count*

Collecting more than one core allowed Suigetsu researchers to compare the number of varves counted between event markers in cores collected from different locations. For example, an obvious ash layer and an underlying flood layer found in one core could be easily identified at approximately the same depths in another core, and the number of varves counted between the event markers. If they come out the same, confidence is greater that the varve layers represent annual deposition over the whole lake. Young-earth writers latch on to any differences as evidence that the layering is discontinuous and untrustworthy for estimating age, without informing readers of the evidence provided that either explains differences, or that demonstrates that differences are exceedingly small. Outdated studies may also be cited in which discrepancies between cores were reported, without letting readers know that more recent studies with better sampling controls and analytical methods show minimal discrepancies. For example, Hebert et al. (2016) discussed mismatches on varve counts from the SG93 cores from Lake Suigetsu published in 1995, but not the work from the new cores and analyses with much better controls and results published in 2012 and 2013.<sup>35</sup> But even if there is some error in the count, or if some of the couplets do not cover the entire lake bottom, the fact remains that there are tens of thousands of these layers, with carbon-14 contents that decline *as expected* if those tens of thousands of layers represent tens of thousands of years.

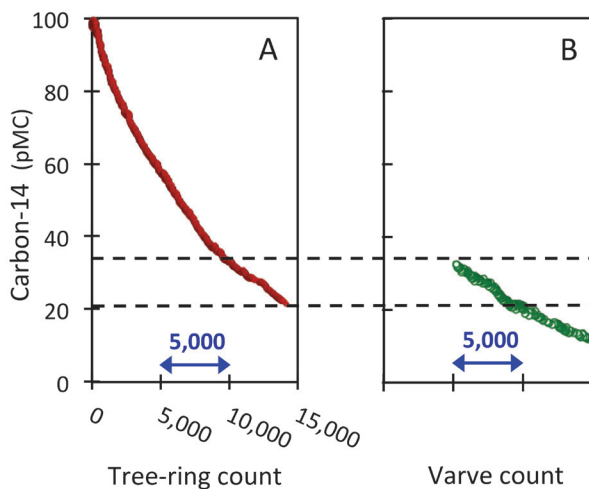
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### **Step 4. Combine Tree Rings, Varves, and Carbon-14: Testing Annual Deposition Claim**

The Suigetsu core has a limitation that also provides a unique *opportunity* to demonstrate the power of forensic science (the science of determining what happened in the unobserved past). The varves do not continue all the way to the surface, so the starting age of the first



varve below 12 m is not obtainable by simple counting. However, the carbon-14 content of our counted tree rings overlaps with the carbon-14 content of these varves (fig. 8). Tree rings and leaves/twigs from the Suigetsu cores all get their carbon-14 from the atmosphere, so if they were growing at the same time, they should have close to the same carbon-14 content. We



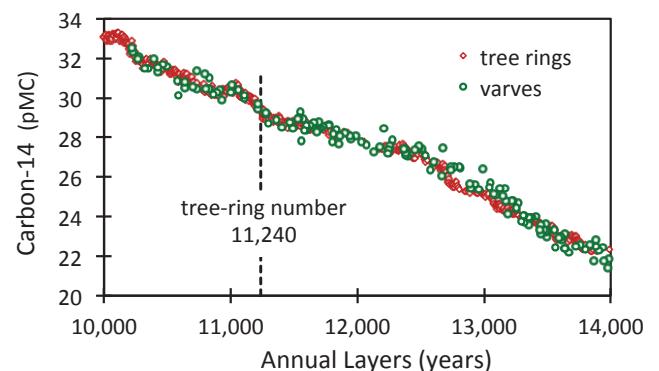
**Figure 8.** (A) Tree-ring count vs. carbon-14 content, and (B) varve count vs. carbon-14 content (for upper varve data). No numbers are placed on the varve count, but are plotted with the *same spacing* as the tree rings (5,000 tree rings with same spacing as 5,000 varves). Dashed lines show overlap in carbon-14 content.

can use this information in two ways. First, we can use the carbon-14 overlap to match contemporaneous tree-ring growth with sediment deposition (same carbon-14 content equals same time of formation). Second, we can test the hypothesis that the sediment layers in this range are truly varves—meaning they are genuinely annual deposits and not myriad couplets deposited within the same year.

The test for annual deposition of sediment couplets is simple in principle. We start with a plot of tree-ring count versus carbon-14 content. On the same graph, we will add the varve count with the initial assumption of one varve equaling the same time as one tree ring. This is equivalent to taking the two graphs in figure 8 and sliding the varve data over the tree-ring data to see how well the points do or do not align. For our example, we will initially assign the uppermost varve the same number as the tree ring number with an equal carbon-14 content. This will serve as a hinge point from which we can see how the remaining varves line up. If, in fact, more than one sediment couplet formed each year, it should be obvious, for the sediment data will diverge from the tree-ring data

beyond the first matched point. Specifically, if more sediment layers deposited in a year than the number of rings grown in the trees, the sediment data should plot increasingly above the tree-ring data. If each sediment couplet is annual, the varves and tree rings should follow the same curve.

Suigetsu researchers employed this conceptual approach, though using a more robust method that effectively nudges the sediment data left and right to find the best match of all the overlapping data rather than just the first point. With the more robust method, multiple sediment couplets per year would still plot with an *obviously* different slope than the tree-ring data. What we find in the actual data is an unequivocal alignment between the tree rings and varves (fig. 9). The tree-ring data pass right down the middle of the varve data. Not only do they match in general, there is a particularly strong alignment in a downward jog in the data around tree-ring number 11,240. Though the entire overlapping sequence effectively anchors the age of the varves, those conducting this research identified the steep portion of the data as the principle anchor linking the varve ages to the tree-ring ages.<sup>36</sup> No unverified starting assumptions of age were required. No calibrated carbon-14 curves. Just measured carbon-14, and counts of tree rings and varves.



**Figure 9.** Tree-ring and varve count plotted against carbon-14 content for the range of overlap. Uncertainty ( $1\sigma$ ) in varves data is approximately  $\pm 1$  pMC. Most varve values represent 1 varve. Tree-ring samples average 10 annual increments (number of tree-ring samples in this range = 656).<sup>37</sup>

These results mean one of two things. Either God was superintending one sediment couplet per year at the same time that trees were adding one growth ring per year 11,000 years ago, *or* God manipulated unrelated and independent processes (tree rings per

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year, atmospheric carbon-14, decay rates, and sediment couplets per year) in a precise manner over a much more abbreviated time frame such that they are indistinguishable from the expectations of conventional geology.

### Casting Doubt: Not a "One to One" Match

Young-earth advocates try to cast doubt on the match between tree rings and varves with claims that many sediment points do not exactly match with the tree ring data.<sup>38</sup> While this is technically a truthful statement, the implication that this means the varve and tree-ring data do not align is utterly false. The greater scatter in the sediment data is *expected* for two simple reasons. (1) The tree-ring data represents the carbon-14 content of multiple annual increments (one data point represents the average carbon-14 content of four or more annual rings).<sup>39</sup> The majority of the leaf/twig samples were from a *single* varve.<sup>40</sup> Multi-year composite samples will always have less scatter than year-by-year measurements. (2) The leaf/twig samples from these varves were small, resulting in greater uncertainties (plus or minus a little over 1 pMC). The tree-ring data lies easily within the analytical uncertainty.

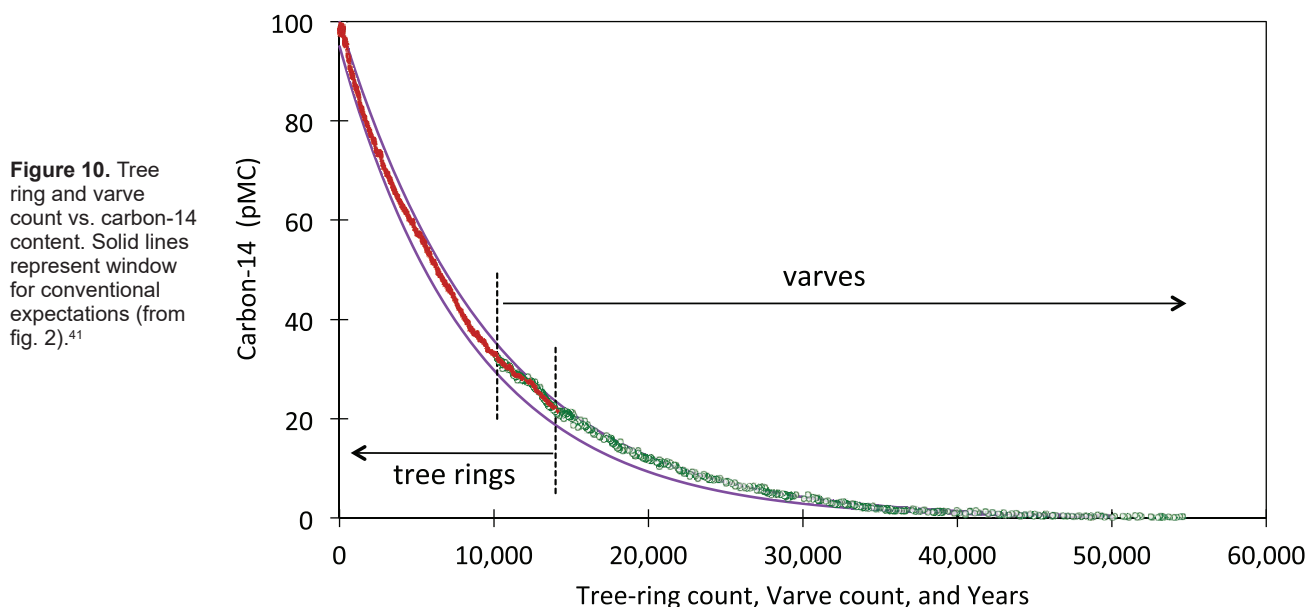
What is also left out of young-earth claims is that none of this even matters. If multiple sediment couplets were deposited in various years, the sediment data would not just fall a bit above and below the tree ring data, they would not align *at all*. An incorrect assumption of one varve per year would result in sediment data sitting well above the tree ring data in figure 9. The alignment of the two data sets—one tree ring and one varve per year—is unequivocal.

### Step 5. Combine Varves and Carbon-14: Testing Continued Annual Deposition to 50,000 Years

When addressing tree rings and carbon-14, we established a narrow range of expected carbon-14 with age that should be observed only if our conventional understanding is correct (one tree ring per year, constant decay rate, and atmospheric production ranging up to twice current levels). The actual data falls nicely within that narrow range. We can apply the same principle to the Lake Suigetsu varve data.

If we have anchored the dates of the Suigetsu varves correctly to the tree rings, and if the couplets continue to be annual deposits moving back in time, the sediment data should continue to fall within that very narrow expected range. Conversely, if numerous sediment couplets formed each year, the data should plot above the conventional expectation. More specifically, as we move back in time closer to the flood, we should see a stair-step pattern emerge, with long flat sections where myriad sediment couplets were deposited in rapid succession with nearly the same carbon-14 content (fig. 7).

What we find, again, is that the data plot within the narrow range of conventionally expected values down to the point where there is too little carbon-14 left to reliably measure (figs. 2 and 10). Tens of thousands of additional varves lie below these layers, strongly



suggesting a history of this lake that goes back more than 100,000 years. Higher in the core, the transition between varved and unvarved sediments fits with the timing of the end of the last ice age roughly 11,000 years ago. Large climatic shifts could be responsible for the change in this particular lake from anoxic conditions to oxygenated bottom-water, where organisms began to disturb and mix the annual couplets.

Once again, we have two options. Option 1 is that God gave us amazing tools to test and verify that carbon-14 decay rates have not changed and sediments in Lake Suigetsu have been accumulating for more than 50,000 years. Option 2 is that God precisely manipulated multiple independent phenomena—tree ring growth, atmospheric carbon-14 production, and sediment couplet formation—to *mimic* conventional expectations.

Understanding the significance of this warrants a little more detail. The conventional model is based on simple natural processes of annual weather patterns producing one tree ring and one sediment couplet each year, with atmospheric carbon-14 production varying within a fairly generous range due to well-understood fluctuations in cosmic ray influx. All straight-forward phenomena. For the flood model to mimic these results, atmospheric carbon-14 after the flood must have begun to rise at a pace precisely matched to myriad sediment couplets such that it would appear today *as if neither actually happened*, followed by a period of accelerated tree-ring production that would also be precisely paced to match the number of sediment couplets forming in a lake half way around the world from forests in Europe, and controlled by completely unrelated processes. Rising atmospheric carbon-14 production continued to precisely match multiple tree rings per year to coincidentally make the results indistinguishable from conventional expectations.

The God whose character we are told is manifest in his natural creation (Rom. 1:20) is not the God of option 2. His glory is evident in the beauty and simplicity of option 1.

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### ***Casting Doubt: "Non-independence" of Variables***

Young-earth writers call attention to the fact that the tree-ring data is used to determine the starting varve count for the sediment data, and therefore claim that the varves are *not* an independent data set. The implication, of course, is that the whole argument is thus nullified and void. This

is yet another example of a truthful factoid being used to promote a false conclusion. The hinge point of the varve count at tree ring 11,240 (fig. 9) is indeed dependent on the tree-ring count, so the age of the uppermost varves is not determined independently. What is left out is that the hinge point is not the only use of the varve data. First, when assessing the general question of whether the Suigetsu couplets are *annual* deposits, we did not need to assume any ages for either tree rings or varves. The alignment of the overlapping tree-ring and sediment data provided *independent* evidence that the tree rings and varves are, in fact, annual formations. The young-earth explanation (simultaneous nonannual tree rings and nonannual sediment couplets with a coincidental alignment if assuming one year for each) requires either divine meddling with intent to confuse, or fantastically improbable changes in unrelated natural processes to yield false confidence in conventional understanding.

Second, once the hinge point for the varves was established, we employed an *independent* method of testing the hypothesis of one varve per year back as far as carbon-14 can be employed. If our hinge point is incorrect, or if multiple varves formed each year, or if the varve count is wrong, or if carbon-14 was much lower, or if decay rates were faster, the data should plot outside the narrow window expected by conventional geology. It does not. God gave us awesome tools to test and verify the unobserved past!

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### **Step 6. Varves, Tree Rings, and Ar-Ar Dating: Testing with Another Method**

The presence of volcanic ash deposits in the Lake Suigetsu sediments presents an opportunity to compare our results from tree rings, varves, and carbon-14 with other radiometric dating methods. A radiometric dating technique called argon-argon (Ar-Ar) dating is commonly used on igneous rocks (crystallized from melted rock). The method works best with well-formed crystals, and not as well with the fine-grained, crystal-poor ash found far from the point of eruption. Different volcanoes often have unique chemical compositions that allow distant ash deposits to be matched to the volcano of origin. Eruptions from the same volcano separated in time also frequently have their own geochemical fingerprint, allowing a distant ash bed to be traced back to a specific eruption from a volcano.

The Suigetsu team picked an ash layer near the top of the varved sequence in a range where the carbon-14 content overlaps tree rings. The carbon-14 content directly above and below the ash layer aligns with tree rings in the range of 10,200 to 10,230 (fig. 11). The chemical composition of this ash layer

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is indistinguishable from the composition of the “U4” deposit from an eruption of the Ulleungdo volcano in South Korea. That eruption has been Ar-Ar dated at 10,000 years, with an uncertainty of plus or minus 300 years. In other words, the Ar-Ar dates are consistent with the varve ages based on carbon-14 and tree rings.<sup>42</sup>

### Step 7. Tree Rings, Carbon-14, and Biblical Artifacts: Testing against Archaeology

We established above that the carbon-14 content of tree rings behaves as expected if 14,000 rings equals 14,000 years, which extends back well before Abraham and the inception of the nation of Israel. So what happens if we compare the carbon-14 content of biblical artifacts to the content found in tree rings? We could pick a number of examples, but one of our favorites is the Dead Sea Scrolls, particularly as it relates to the book of Isaiah. Isaiah 53 describes the “suffering servant,” a depiction that seems to describe the life and death of Jesus so directly, critics long argued it was written after the time of Christ. For most of church history, no pre-Christian era copies of Isaiah were known. The discovery of the Dead Sea Scrolls in the late 1940s, however, raised the possibility of putting the competing claims to the test with carbon-14 dating.

The result? The carbon-14 content in the Isaiah scroll is approximately the same as found in tree rings

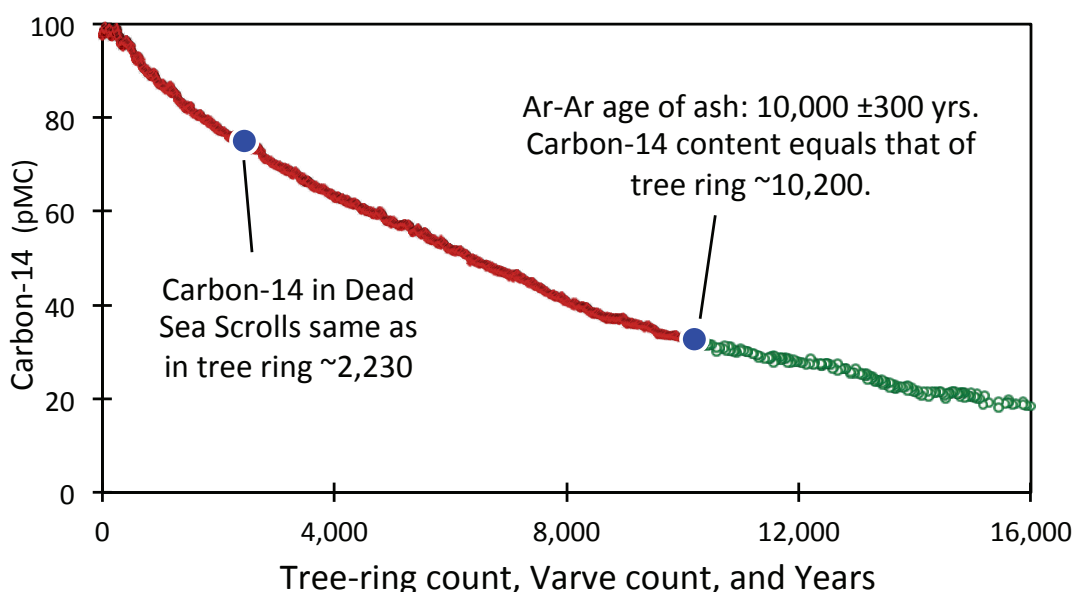
ranging from about number 2,120 to 2,350 (if counting from today) (fig. 11). If one tree ring equals one year, the calendar date for the Isaiah scroll is somewhere between 107 and 335 BC.<sup>43</sup> In other words, carbon-14 confirms that Isaiah 53 pre-dates the sufferings of Christ.

The young-earth response is that atmospheric carbon-14 rose rapidly after the flood, reaching nearly modern levels just in time for carbon-14 dating of biblical artifacts to yield accurate results based on, once again, conventional geologic expectations.<sup>44</sup> Apparently, carbon-14 works when young-earth advocates *want* it to work.

### Casting Doubt: Measurable Carbon-14 in Samples Supposedly Millions of Years Old

The discussion of carbon-14 would be incomplete without addressing the observation that samples deeper in the Suigetsu core, and even samples geologists say are millions of years old, yield carbon-14 measurements as much as one hundred times higher than the instrumental detection limit. In the Suigetsu core, approximately 50 samples were taken from depths estimated to be 90,000 to 100,000 years old. These were measured as “dead carbon” samples, meaning that enough time has passed to drop the original carbon-14 content below the detection limit of the instrument. The amount measured in the dead-carbon samples is considered to be “background” and is subtracted from all the other measurements. For the deep Suigetsu samples, the background value averaged about 0.3 pMC.<sup>45</sup>

**Figure 11.** Carbon-14 dating of the Dead Sea Scrolls and Ar-Ar dating of an ash bed from the Suigetsu core are consistent with ages determined by tree-ring counts.





Young-earth advocates have objected to the subtraction, arguing that these carbon-14 levels are well above the instrument detection limit (~0.003 pMC) and represent residual carbon-14 from the time of deposition. Ages of hundreds of thousands or millions of years are thus declared to be impossible. Instead, it is argued that the carbon-14 content of the atmosphere and organisms at the time of the flood was only about 0.5 pMC. In the roughly 4000 years since the flood, this has decayed to ~0.3 pMC. Miles of fossil-bearing deposits laid down during the flood all now have roughly the same amount of this residual carbon-14.<sup>46</sup>

To understand why this raises no concern among carbon-14 researchers, we need to know a little about how samples are processed. Biological samples are never just brushed off and analyzed. There are many potential sources of contamination that must be eliminated first, such as bacterial growths that may be much younger than the sample. Cleaning is done using an aggressive sequence of caustic chemicals. Though great care is taken to isolate samples and chemicals from the atmosphere or other sources of carbon-14, it is inevitable that tiny amounts of contamination end up in the sample. By way of analogy, consider cleaning a dirty window. With each pass of a cloth, a few fibers *from the cloth* are left behind on the glass. With a sequence of fresh cloths, we will clean off far more contamination than we will add, but eventually, every wipe will add as much contamination as it removes.

We know this is happening with our sample processing for a simple reason. There are some materials that can be run with and without treatment. Ancient graphite samples analyzed directly on a modern accelerator mass spectrometer yield values around 0.003 pMC—the detection limit below which random detector noise cannot be differentiated from real carbon-14 atoms. The same graphite samples run after taking them through the whole chemical treatment processes yield values around 0.3 pMC.<sup>47</sup> This is called the “laboratory background,” which gets subtracted from subsequent measurements. This accounts for the vast majority of “measurable carbon-14” levels in ancient samples.

Young-earth advocates will still insist that there are some ancient samples that seem to contain more carbon-14 than they should, even after accounting for additions during processing.<sup>48</sup> There are indeed occasions where results are obtained that are not readily explainable without additional investigation. That is the nature of real science. Typically, answers are found with further study, but there is a more important question. Why would God choose an atmospheric level of carbon-14 *and date* of the flood, such that samples today would fall in the range that is indistinguishable from laboratory background noise? The flood-era carbon-14 level could have been *any* value. Why didn't God set it at 2 pMC or higher, where all

those ancient samples measured today would level out well above the laboratory background? Why would God make all the evidence of a global catastrophe fit exactly within the expectations of conventional geology? It makes far more sense, and fits the nature of God as described in scripture far better, if the data fits expectations for an ancient Earth because it *is* ancient.

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## Conclusions

Contrary to young-earth claims that historical science is not real science because it cannot be tested, God has given us amazing tools for testing hypotheses and assumptions about the unobserved past. Tree-ring growth, atmospheric carbon-14 production, radiometric decay rates, sediment couplets, and ash chemistry are all independent phenomena. Combining these independent measurements allows a rigorous comparison of conventional and young-earth models. The data, in total, fit amazingly well with conventional geologic understanding, requiring no disruptions of natural laws or unfathomably improbable alignment of unrelated processes. Even accurate biblical dates of artifacts are possible with conventional understanding. In contrast, the young-earth model can explain the data only by calling upon a host of unrelated processes aligning in perfect synchronization to coincidentally match conventional expectations. It requires supernatural manipulation of nature with no apparent purpose other than to mislead.

Many in the world marvel at the handiwork of God while denying the Creator. In response, young-earth advocates demand that to acknowledge the Creator, we must deny his workmanship. Can there be a more ineffective witness? Why not rejoice in the fact that God gave us the ability to explore not only the present world in which we live, but also the wonders of creation that predate our presence on this Earth? Romans 1:20 tells us that God's character is manifest in his creation. Why should we work to undermine scripture with arguments that ultimately require nature to be deceptive? If, after seeing the evidence in God's creation in figures 10 and 11, the church insists that the obvious meaning is not true, we create a completely unnecessary stumbling block to faith. Christ himself is a sufficient stumbling block—we need not create any other! \*

### Notes

- <sup>1</sup>Gregg Davidson and Ken Wolgemuth, "Christian Geologists on Noah's Flood: Biblical and Scientific Shortcomings of Flood Geology," *BioLogos Scholarly Essay* (2010), [https://biologos.org/uploads/projects/davidson\\_wolgemuth\\_scholarly\\_essay.pdf](https://biologos.org/uploads/projects/davidson_wolgemuth_scholarly_essay.pdf).
- <sup>2</sup>Rocky Mountain Tree-Ring Research, [www.rmtrr.org/oldlist.htm](http://www.rmtrr.org/oldlist.htm).
- <sup>3</sup>M. Friedrich et al., "The 12,460-year Hohenheim Oak and Pine Tree-Ring Chronology from Central Europe—A Unique Annual Record for Radiocarbon Calibration and Paleoenvironment Reconstructions," *Radiocarbon* 46, no. 3 (2004): 1111–22; P. J. Reimer et al., "IntCal13 and Marine13 Radiocarbon Age Calibration Curves 0–50,000 Years Cal BP," *Radiocarbon* 55, no. 4 (2013): 1869–87.
- <sup>4</sup>Deep circulating ocean waters contain dissolved carbon that has been isolated from the atmosphere for hundreds of years. Organisms drawing on this carbon reservoir start with "pre-aged" carbon, requiring a correction for estimating actual age. The well-studied phenomenon is called the "reservoir effect."
- <sup>5</sup>The concentration is technically referred to as the *activity*, referring to the number of decays per second. Higher concentrations of carbon-14 will have a proportionally higher level of radioactivity.
- <sup>6</sup>Jake Hebert, Andrew Snelling, and Timothy Clarey, "Do Varves, Tree-Rings, and Radiocarbon Measurements Prove an Old Earth? Refuting a Popular Argument by Old-Earth Geologists Gregg Davidson and Ken Wolgemuth," *Answers Research Journal* 9 (2016): 339–61; Walt Brown, *In the Beginning: Compelling Evidence for Creation and the Flood*, 8th ed. (Phoenix, AZ: Center for Scientific Creation, 2008), 342–43; and Mike Riddle, "Doesn't Carbon-14 Dating Disprove the Bible?," in *The New Answers Book 1*, ed. Ken Ham (Green Forest, AR: Master Books, 2006), 77–87.
- <sup>7</sup>Michael J. Oard, "Do Varves Contradict Biblical History?," in *Rock Solid Answers: The Biblical Truth Behind 14 Geological Questions*, ed. M. J. Oard and J. K. Reed (Green Forest, AR: Master Books, 2009), 125–48.
- <sup>8</sup>John R. Baumgardner, "Carbon-14 Evidence for a Recent Global Flood and a Young Earth," in *Radioisotopes and the Age of the Earth: Results of a Young-Earth Creationist Research Initiative*, ed. Larry Vardiman, Andrew A. Snelling, and Eugene F. Chaffin (El Cajon, CA: Institute for Creation Research, 2005), 587–630.
- <sup>9</sup>Oard, "Do Varves Contradict Biblical History?," 131; John Morris, "Tree Ring Dating," *Acts & Facts* 41, no. 10 (2012): 15; and John Woodmorappe, "Biblical Chronology and the 8,000-Year-Long Bristlecone Pine Tree-Ring Chronology," *Answers in Depth* 4 (2009): 4–5.
- <sup>10</sup>Hebert, Snelling, and Clarey, "Do Varves, Tree-Rings, and Radiocarbon Measurements Prove an Old Earth?," 353.
- <sup>11</sup>One of our favorite young-earth objections to our own work is the routine complaint that "uniformitarian" geologists do not keep up with young-earth literature; otherwise, we would know that the Suigetsu varves had already been debunked. Upon looking up the primary citation for one such claim, we found this statement about Lake Suigetsu: "Unfortunately, there is very little literature on these varves in English, and so it is difficult to analyze them" (Hebert, Snelling, and Clarey, "Do Varves, Tree-Rings, and Radiocarbon Measurements Prove an Old Earth?," 341, citing Oard, "Do Varves Contradict Biblical History?," 131).
- <sup>12</sup>Beryllium-10 is also radioactive, though with a very long half-life (~1.4 million years), resulting in very little change over 50,000 years.
- <sup>13</sup>Modern Carbon refers to the concentration, or activity, of carbon-14 in the atmosphere in 1950, prior to atmospheric testing of nuclear weapons.
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- <sup>15</sup>Raising the lower boundary to 120 pMC makes the expected window for conventional expectations smaller (i.e., easier for young-earth arguments to be found valid if true).
- <sup>16</sup>IntCal13 database, <http://intcal.qub.ac.uk/intcal13/query/>. Under advanced query, the first 8 datasets (*setno*) are tree rings, *calage* is the dendrochronological age before 1950, *calspan* is the number of tree rings in each sample, *c14age* represents the measured carbon-14 content reported as a "radiocarbon age" using Equation 2. (Laboratory and isotopic fractionation corrections applied to the raw data do not visibly change any plots shown in this paper.)
- <sup>17</sup>Hebert, Snelling, and Clarey, "Do Varves, Tree-Rings, and Radiocarbon Measurements Prove an Old Earth?," 346; Young-earth writers throw in additional distractions for good measure, like the "isotopic fractionation correction" as supposed evidence of manipulating results to meet expectations. In this case, if the very small and very non-controversial correction factor were left out, you would not visibly see a change in figure 4.
- <sup>18</sup>W. F. Libby, E. C. Anderson, and J. R. Arnold, "Age Determination by Radiocarbon Content: World-Wide Assay of Natural Radiocarbon," *Science* 109, no. 2827 (1949): 227–28.
- <sup>19</sup>E. C. Anderson and W. F. Libby, "World-Wide Distribution of Natural Radiocarbon," *Physical Review* 81 (1951): 64–69; M. Stuiver and H. A. Polach, "Discussion: Reporting of Carbon-14 Data," *Radiocarbon* 19, no. 3 (1977): 355–63; and A. R. Millard, "Conventions for Reporting Radiocarbon Determinations," *Radiocarbon* 56, no. 2 (2014): 555–59.
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- <sup>21</sup>Hebert, Snelling, and Clarey, "Do Varves, Tree-Rings, and Radiocarbon Measurements Prove an Old Earth?," 351.
- <sup>22</sup>Y. Suzuki et al., "Mass Accumulation Rate of Detrital Materials in Lake Suigetsu as a Potential Proxy for Heavy Precipitation: A Comparison of the Observational Precipitation and Sedimentary Record," *Progress in Earth and Planetary Science* 3 (2016): 1–14.
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- <sup>26</sup>Staff et al., "New Carbon-14 Determinations from Lake Suigetsu, Japan," 513.
- <sup>27</sup>T. Nakagawa et al., "SG06, A Fully Continuous and Varved Sediment Core from Lake Suigetsu, Japan: Stratigraphy and Potential for Improving the Radiocarbon Calibration Model and Understanding of Late Quaternary Climate Changes," *Quaternary Science Reviews* 36 (2012): 168.
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- <sup>29</sup>R. A. Staff et al., "The Multiple Chronological Techniques Applied to the Lake Suigetsu SG06 Sediment Core, Central Japan," *Boreas* 42, no. 2 (2013): 259–66.
- <sup>30</sup>Richard Staff, personal communication, 2017.
- <sup>31</sup>Photos from the Suigetsu Varves 2006 website, <http://www.suigetsu.org>.
- <sup>32</sup>R. A. Staff et al., "Integration of the Old and New Lake Suigetsu (Japan) Terrestrial Radiocarbon Calibration Data Sets," *Radiocarbon* 55, no. 4 (2013): 2049–58; Ramsey et al., "A Complete Terrestrial Radiocarbon Record for 11.2 to 52.8 kyr B.P.," supplemental data.
- <sup>33</sup>Staff et al., "The Multiple Chronological Techniques Applied to the Lake Suigetsu SG06 Sediment Core, Central Japan," 263.
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- <sup>38</sup>Hebert, Snelling, and Clarey, "Do Varves, Tree-Rings, and Radiocarbon Measurements Prove an Old Earth?," 350.
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- <sup>41</sup>The Lake Suigetsu data is also available in the IntCal13 database, <http://intcal.qub.ac.uk/intcal13/query/>, under advanced query, *setno* = 9.
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- <sup>46</sup>Baumgardner, "Carbon-14 Evidence for a Recent Global Flood and a Young Earth," 624.
- <sup>47</sup>Warren Beck, University of Arizona AMS radiocarbon laboratory, personal communication.
- <sup>48</sup>Marcus R. Ross, "Fossil Record (Young-Earth Creation View)," in *Dictionary of Christianity and Science*, ed. P. C. Copan, T. Longman III, C. L. Reese, and M. G. Strauss (Grand Rapids, MI: Zondervan, 2017), 290–94; Baumgardner, "Carbon-14 Evidence for a Recent Global Flood and a Young Earth," 622.

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Keith B. Miller

## Article

# Doubt and Faith in Science and Religion

Keith B. Miller

*In popular discussions and debates on science and religious faith, it is commonly assumed that faith is founded on personal certainty whereas science is based on skeptical inquiry. "To have faith" is almost synonymous in popular conversation with "to believe despite the evidence." The scientific community, on the other hand, presents its conclusions as tentative and subject to revision based on evidence. I argue that this perceived contrast between science and religious faith is misleading and drives yet another unnecessary wedge between these two important paths to pursuing truth. In reality, both scientific inquiry and religion are founded on the acceptance of fundamentally unprovable assumptions, and are subject to correction and change in response to new observations and new experience.*

**T**he modern elevation of scientific explanations over religious claims has its roots in the nineteenth century. In his study of the origins of unbelief during the Victorian period, James Turner argues that one of the primary causes of the abandonment of religion as a path to truth was the rise of "... intellectual uncertainties about belief that produced the conviction that knowledge about God lay beyond human powers, if such a Being existed."<sup>1</sup> Furthermore, at the same time, science was providing increasingly persuasive explanations of the natural world, including humans, without reference to God. Scientific explanations were seen as displacing religious ones.

Darwin's work provided a scientific framework for understanding human origins which extended to the human mind and emotions. Anthropologists

conveyed the impression that religious beliefs, having evolved to meet purely natural individual and social needs, were entirely explicable in those terms ... If the idea of God

could be accounted for naturalistically, supernatural explanations became supererogatory and therefore dubious.<sup>2</sup>

This view was extended to other areas of science such as brain physiology and psychology in explaining the mind and soul, raising questions about the limits of human knowledge. Reflecting this growing skepticism, Darwin wrote on the matter of knowing God,

But then arises doubt—can the mind of a man, which has, as I fully believe, been developed from a mind as low as that possessed by the lowest animal, be trusted when it draws such grand conclusions.<sup>3</sup>

The cultural ascendancy of science over religion was also aided by the early nineteenth-century dominance of Paley's argument from design for the existence of God. As stated by Turner,

No demonstration showed more forcefully how science led to nature's God than the argument from design. No proof of God compelled more nearly universal assent than the argument from design. No theology exuded more confidence than the argument from design.<sup>4</sup>

Both the rejection of God and metaphysics by the appeal to naturalistic scientific

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explanation, and the use of the design argument for the existence of God, were predicated on the rational superiority of scientific knowledge over spiritual knowledge. Turner suggests, "Admiring natural theology as the irrefutable demonstration of God, church leaders had put so much energy into it that they had neglected to cultivate carefully other paths ..."<sup>5</sup>

The consequence of this history is that today science is often described as being based on observational "facts" and that its conclusions are founded on tested, or at least testable, claims. Science is thus seen by many as the only path to more rational knowledge—to the "truth." Science also is presented as based on skepticism and doubt; its conclusions, tentative and continually subject to revision based on evidence. Religion, by contrast, is perceived as being impervious to change and based on faith in unsubstantiated beliefs. Religious beliefs are thus presumed to be destroyed by doubt, and are seen as being in conflict with the pursuit of rational knowledge.

These views are caricatures and significantly misrepresent the reality of both the scientific enterprise and religious faith. Lack of appreciation for the role of doubt and faith in both science and religion has resulted in barriers to a productive dialogue between scientists and people of religious faith.

## Doubt and Faith in Science

### *Doubt and Uncertainty in Science*

As stated by Henry Bauer, "Over the last few centuries, the authority of science came to supersede that of religion precisely because science seemed to offer more certain knowledge, at least about the tangible world."<sup>6</sup> However, in conflict with that perception, Bauer concludes that "... no general claim to certainty made globally in the name of science can be sustained."<sup>7</sup> Is our scientific understanding really that uncertain?

There are a number of sources of uncertainty in the pursuit of scientific explanation. These various types of uncertainty are very different in their scope and in their implications about the nature of scientific knowledge. Some of the important types of uncertainty do not have a fundamental bearing on the question of the relative roles of doubt and faith in science. These include (1) uncertainty due to the

limits of measurement (ubiquitous because all scientific measurements have some range of error); (2) uncertainty in the validity of scientific conclusions resulting from human error, as well as personal and cultural bias; and (3) the inherent indeterminism of nature.

The lack of absolute precision in measurement does not invalidate those measurements, and the development of new technologies and methods enable measurement errors to be systematically reduced. Errors introduced by human bias have the potential of being corrected by the critical review of a culturally diverse global scientific community. While humans will always be fallible, specific human errors can ultimately be found and corrected. Lastly, the uncertainty introduced by the fundamental limits of nature, such as Heisenberg's Uncertainty Principle and Quantum Theory as well as limits to predictability by inherently random or chaotic processes, is a result of our advancing understanding of nature rather than being based on our ignorance.

However, there are sources of uncertainty in science that do generate significant doubt about our ability to ever fully know all of created reality, or to know that we know it. These are limitations to scientific knowledge that are not subject to resolution in any potential future. They are the primary focus of this discussion, and include (1) the methodological limits of knowing in science; (2) the uncertainty due to the inherent limitation of human knowledge; and (3) the uncertainty due to untestable assumptions.

Probably the clearest statement of the methodological limits of science is by Paul de Vries. He used the term methodological naturalism to describe the legitimate purview of science as one limited to explaining and interpreting the natural world in terms only of natural processes and causes. He describes scientific inquiry as follows:

The goal of inquiry in the natural sciences is to establish explanations of contingent natural phenomena strictly in terms of other contingent natural things—laws, fields, probabilities. Any explanations that make reference to supernatural beings or powers are certainly excluded from natural science ... The natural sciences are limited by method to naturalistic foci. By method they must seek answers to their questions within nature, within the non-personal and contingent created order, and not anywhere else. Thus, the natural

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sciences are guided by what I call methodological naturalism.<sup>8</sup>

In other words, science cannot investigate the existence or action of supernatural agents. Supernatural agents are not constrained by physical limitations, and agents that are unconstrained in their effects on the natural world are not useful scientific explanatory causes. They are effectively black boxes.<sup>9</sup> The question of the existence, or not, of supernatural causal agents active in the natural world cannot be answered by appeal to scientific investigation. Thus, the existence and role of an entire possible realm of reality lie outside of the ability of science to test and explore. This is not to say that there is no observational warrant for belief in the supernatural, but that science cannot test (confirm or disprove) that belief. Science can, and does, proceed within both theistic and nontheistic worldviews.

Our current scientific knowledge of the natural world is part of an ongoing historical process, and as such is incomplete and always will be. One of the central characteristics of the scientific enterprise is that its conclusions are tentative and potentially subject to correction and revision. The tentative nature of science enables it to respond to new observations and to new ways of conceptualizing previous observations. It is this ability to reformulate its understanding of the natural world, however fitfully, that is rightly understood as the key to the success of science in advancing our understanding of the natural world. However, the inherent tentative nature of scientific conclusions also implies that our knowledge will never be complete.

Science is always embedded in a historical context; it is limited by the body of knowledge, theoretical conceptions, and technological capabilities existing at the time. Science at any time is a product of that time. As Nicholas Rescher states,

Our theorizing about the nature of the real is a fallible estimation, the best that can be done at this time, in this particular state of the art. Our science is a historical phenomenon; it is one transitory state of things in an ongoing process.<sup>10</sup>

In emphasizing the historical context of scientific knowledge, Rescher makes the observation that “if there is one thing we can learn from the history of science, it is that the scientific theorizing of one day is looked upon by that of the next as deficient.”<sup>11</sup> He states further,

There is nothing epistemically privileged about the present—any present, our own prominently included. Such a perspective indicates not only the incompleteness of our knowledge but its presumptive incorrectness as well.<sup>12</sup>

Our current knowledge and understanding of reality is thus not only incomplete, but also in ways unknown and unknowable to us—wrong. As expressed by Rescher,

We must come to terms with the fact that—at any rate, at the scientific level of generality and precision—*each* of our accepted beliefs *may* turn out to be false, and many of our accepted beliefs *will* turn out to be false.<sup>13</sup>

This is not some form of fatalism, but simply a recognition that our state of knowledge is imperfect and always will be. Without such an awareness there would be no motivation to continue to investigate the universe, correct false conceptions, and open new windows to our understanding.

It is important to understand that science always has a context in time and place. Our scientific knowledge is always part of a broader historical trajectory and embedded in a particular cultural and social context at particular places in particular times. David Livingstone has emphasized the importance of place in understanding the scientific enterprise. He states, “... science is not above culture; it is part of culture. Science does not transcend our particularities; it discloses them. Science is not a disembodied entity; it is incarnated in human beings.”<sup>14</sup> The scientific understanding of the physical world at a particular time and place is an expression of the social, political, and philosophical views of the culture in which that science is practiced. These cultural influences affect what aspects of the natural world we give attention to and how we perceive, interpret, and communicate our observations.

How we see and understand the physical world is built upon the historical heritage of ideas and theory passed on to us. Even our understanding of “facts” is subject to the current view of the nature of reality. According to Bauer,

One of the modern recognitions by philosophers of science ... is that facts are theory-laden: that is, there is no such thing as a definite piece of indisputable knowledge about the world whose meaning is not in some way colored by preexisting belief about the world.<sup>15</sup>

There are very few unambiguous timeless facts about nature. Although this may seem to leave science without a solid foundation, it is merely a recognition of our human limitations and the absence of absolute certainty.<sup>16</sup>

Perhaps the most inescapable sources of doubt, and the ones of which we are most unaware, are the unprovable assumptions that underpin all scientific knowledge. All the things that we know, and all of the ways of knowing them, depend on underlying assumptions that cannot themselves be proven. Michael Polanyi has strongly argued that it is not possible only to believe what is objective and certain knowledge, and to reject all else. He states,

Objectivism has totally falsified our conception of truth, by exalting what we can know and prove, while covering up with ambiguous utterances all that we know and *cannot* prove, even though the latter knowledge underlies, and must ultimately set its seal to, all that we *can* prove.<sup>17</sup>

And he further says, "Our formally declared beliefs can be held to be true in the last resort only because of our logically anterior acceptance of a particular set of terms, from which all our references to reality are constructed."<sup>18</sup>

To accept as true any of our scientific understandings of the natural world relies on a whole set of assumptions about the nature of reality, and of the nature of our own existence and ability to perceive that reality. Without these fundamental assumptions, there would be no accepted path to knowledge. We proceed in our study of physical reality by taking for granted a common set of unproven shared beliefs about that reality. As stated by Os Guinness,

When we set out to know something we do not proceed by *proving* everything we know before we know it. If we are to know anything, we must proceed on the basis of certain things which *cannot be proved but which must be presupposed*.<sup>19</sup>

Guinness provides a fitting conclusion to this discussion of doubt in science.

Rationality is part of our greatness, but it also serves to keep us humble because rationality itself must be assumed by faith ... In a profound sense we doubt not only because we are ignorant of something but because we are absolutely certain of nothing.<sup>20</sup>

## *Faith in Science*

So what unprovable assumptions underlie the scientific enterprise? In what ways does science rest on faith?

Some assumptions are so fundamental, not just to science but to any interaction with the physical world, that they rarely if ever are brought to our conscious awareness. We assume that an objective physical reality exists, and that our senses provide access to at least some true aspects of that external reality. That is, we assume that our perceptions are not merely creations of our mind, and that there is a reality that corresponds to our sensory experience. The challenge to the existence of a knowable external reality was famously raised by René Descartes. He proposed an "evil demon" that presents a complete illusion of an external world including our assumed perceptions of it.<sup>21</sup> This same idea is reflected in more contemporary arguments that we are merely "brains in a jar," and expressed in science fiction stories such as "The Matrix." There is actually no way to disprove such arguments, but we proceed by faith, on the assumption of the reality of our sensory experience. At the same time, we are also aware that our senses can sometimes deceive us.

The debate over which fundamental presuppositions are necessary for the conduct of science is illustrated by the views of the eighteenth-century contemporaries David Hume and Thomas Reid.<sup>22</sup> The skeptic Hume argued that science was limited to describing our perceptions, avoiding any speculation about the existence of an external physical reality. Reid, however, was an advocate of common sense as the only secure foundation for philosophy and science. He argued that not only our senses, but also the reality of the physical external objects that cause them, must be starting points for philosophical reflections. He endorsed the basic reliability of both our sensory and mental faculties. The presupposition of common sense is fundamental and it is not possible to provide independent grounds for its acceptance.

Reid also argued that, according to reason, belief and action should match. As Gauch illustrates this point, "... a skeptic's mouth may say that we cannot be sure that a car is a real or hard object, but at a car's rapid approach, the skeptic's feet had better move!"<sup>23</sup> Reid further argued that the deeper questions of common sense are, Why does the physical world exist



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at all, and why are we constituted so that the world is comprehensible to us?<sup>24</sup> These deeper questions could only be answered by appeal to a worldview, and for Reid that worldview was a Christian one.

Granting the existence of an objective external physical reality, in our pursuit of scientific knowledge we further assume that the universe has certain qualities. We assume that the universe is intelligible—that it behaves in regular and predictable ways. Scientific explanation often refers to “natural laws” that “govern” physical processes. This is a metaphorical way of communicating the regularities of the physical universe that we seek to describe in the language of mathematics. Science is the study of such regularities. In fact, any event in the universe that is inconsistent with known natural regularities remains outside current scientific explanation.

In developing our explanatory models of the universe, we also apply certain expectations about the nature of physical reality. For example, simplicity is preferred over complexity. Given a set of alternative explanations for a phenomenon, we favor the one that is less complex and that requires the fewest number of assumptions. This is referred to as “Occam’s razor” or the principle of parsimony. This tool for selecting between alternative theories avoids the problem of multiplying auxiliary, or ad hoc, hypotheses to protect increasingly complex explanations from falsification. There is no logical reason to reject highly complex explanations, but as a practical matter simpler theories are preferred to complex ones because they are more testable.

There is also a very powerful aesthetic underlying the preference for simplicity—particularly, mathematical simplicity. This encompasses the pursuit of beauty in the description of physical reality. The desire to describe physical phenomena and forces with mathematical equations of simplicity, symmetry, and beauty has driven scientific discovery for centuries. Mathematicians often describe equations as beautiful or elegant. The drive to develop a single “theory of everything” to unite all the known forces into a single equation is also a pursuit of beauty and simplicity. An aesthetic element seems fundamental to science, yet there is no a priori reason why the universe must abide by our sense of order and beauty. Many connections have also been made between mathematics, music, and art.<sup>25</sup> At an emotional and experiential level, a recent neurological study has

shown that the same area of the brain is involved in appreciating mathematical beauty and the beauty of art.<sup>26</sup> Our trust in our human aesthetic sense is clearly a driver in formulating our scientific understanding of the universe.

A further very important assumption underlying the doing of science, is that the scientific enterprise is more than a socially constructed phenomenon. It is accepted as a path to truth. Science is understood as a progressive enterprise that builds on previous knowledge. We do not continually retest accepted explanations, but seek to understand remaining gaps in our current theoretical framework.<sup>27</sup> To do this we must trust in the general reliability of the current scientific paradigm. This is the “normal science” of Thomas Kuhn.<sup>28</sup> Even when there is a major paradigm shift (a Kuhnian “revolution”), previous observations are not thrown out but are understood in a different light and incorporated into a new more-comprehensive paradigm.

### *How Then Does Science Progress?*

On what basis can we say that science is progressive? Nicholas Rescher proposes two ways in which science can be understood to progress. One aspect of progress is that scientific investigation brings more and more phenomena under its explanatory framework. This includes the development of both new tools and new theoretical models. Rescher states,

For all of recent science has a clear thrust of development—using ever more potent instruments to press ever further outward in the exploration of physical parameter-space, forging more and more powerful physical and conceptual instrumentalities for the identification and analysis of new phenomena.<sup>29</sup>

The other aspect of progress is that “science is marked by an ever-expanding predictive and physical control over nature.”<sup>30</sup> These historical aspects of science suggest a directional trend not only toward more comprehensive explanations of the physical universe, but also toward increasingly true ones.

Fundamentally, science can progress toward increasingly true understandings of the physical universe because those understandings are being tested against a physical reality that exists independently of us. The history and character of the universe is what it is regardless of our current conceptions of it. Some

of those conceptions more accurately reflect the objective reality of the universe than others.

However, given our limited knowledge and human error, how is it that science does actually manage to progress? What prevents us from continually pursuing errant conceptions, and never coming any closer to an understanding of the true nature of physical reality? The answer lies in the fact that science is a communal activity conducted by a diverse group of practitioners. Within this community, scientific ideas compete with each other for acceptance. As stated by George Kneller, "Science is kept critical through competition between theories. Rival theories expose one another's weaknesses by their own successes, the less fertile theories eventually being abandoned."<sup>31</sup> Theories that successfully predict new observations gain acceptance by the community, and those that do not are rejected.

This competition among alternative interpretations serves not only to reveal those theories with the greatest explanatory power, but also to root out those that have been affected by human error or confirmation bias, and occasionally even deliberate fabrication.<sup>32</sup> This is one of the critical roles of professional peer review. It functions as a filter, though imperfect, through which scientific research must pass. Bauer states,

... individual frailties or imperfections must run the gauntlet of communal scrutiny, with the result that much of the error, bias, and dishonesty that exists within the ferment of frontier science does not enter the scientific literature.<sup>33</sup>

That literature, in turn, makes new ideas and interpretations available to the worldwide scientific community for testing and further confirmation or rejection.

The central role of community for the conduct and progress of scientific research is the reason that scientific consensus carries such importance. The scientific consensus on a particular question represents the best current understanding because it has passed through the critical filters of review and testing.<sup>34</sup> As pointed out by Bauer, what we understand as objectivity in science, is not a characteristic of individuals, but of communities.

The apparent objectivity of science results not from the accumulation of the individual objectivities of scientists but from the fact that the scientific

community ... works through consensus because there is no other way to play effectively.<sup>35</sup>

In a research environment isolated from outside critical review, the opportunity for significant error and misguided and futile research programs is great. Probably the most famous example of such a failure is that of the breeding efforts directed by Trofim Lysenko in Stalinist Russia.<sup>36</sup> Supported by Stalin, Lysenko's work was based on a commitment to Lamarckian concepts of the heritability of acquired characteristics and on a rejection of natural selection. In isolation from the global scientific community and with the banning of all other genetic research, "Lysenkoism" resulted in a decline in agricultural production and set Soviet biological science back decades.

Because science only works in community, the work of individual scientists must always be placed before that community for critical review and testing. As emphasized by Bauer,

One of the things wrong with the popular, classical definition of the scientific method is the implication that solitary people can successfully do good science, for example, frame hypotheses and test them.<sup>37</sup>

Furthermore, he states, "If one understands that science is inescapably a cooperative enterprise, one can appropriately view as pseudoscience any claims made from outside the competent, relevant scientific community."<sup>38</sup> Isolation is an invitation to error and self-delusion.

The scientific community is a very conservative one, and it is resistant to novel ideas that stand in conflict with the accepted scientific consensus. This resistance to novelty is not any flaw in science that arises from the fallibility of the human beings who are doing science. Far from it.

This resistance is actually the foundation of the trustworthy strength of science. The conservatism of the scientific community ensures that science itself is conservative and conserved, that new notions must prove themselves quite compellingly, with overwhelming evidence, before they win the day.<sup>39</sup>

The new radical ideas of today can become the consensus of tomorrow. However, they must first be demonstrated to have greater explanatory and predictive power than the reigning paradigm.

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## *Doubt and Faith in Science and Religion*

My field of geology has seen several such radical ideas move from the margins to mainstream through the persistent accumulation of evidence and effective response to critiques. Although Alfred Wegener's original proposals of continental drift were met with great skepticism, the construction of the powerful explanatory model of plate tectonics in the middle decades of the twentieth century transformed nearly all aspects of the earth sciences.<sup>40</sup> Several scientific debates during my own professional career also illustrate the hard work involved in having a radical new idea accepted. One of these was the proposal that the channeled scablands of Washington State were formed catastrophically by floods from glacial Lake Missoula, and another was the asteroid impact theory for the end-Cretaceous extinction.<sup>41</sup>

## Doubt and Faith in Religion

### *Doubt and Uncertainty in Religion*

There are as wide a variety of types of doubt and uncertainty in religion as there are in science. One type of doubt is that which is highly personal and particular. These are doubts that arise from personal spiritual experience, experiences with particular religious communities or individuals, or from perceptions of the history of particular religious groups. Such doubts may involve questioning aspects of the character of God (such as God's goodness or omnipotence) as understood by different religious communities, or questioning the very existence of God or other spiritual realities.

Less particularly, there are doubts that arise from apparent contradictions between received doctrine and human experience, and between doctrine and evidence from observations of the physical universe. Although much of the popular view of conflict between science and faith arises from common misconceptions of both science and religious faith,<sup>42</sup> there are still genuine points of tension. The very real tensions and unanswered questions that result can call into question long-held beliefs about God and God's relationship with humans and the physical creation. Resolution of such questions is illusive, and the resulting doubts are an unavoidable aspect of the life of religious faith.

Since the monotheistic faiths rely on written revelation as well as other forms of spiritual enlightenment,

there are all of the attendant uncertainties associated with the preservation and proper interpretation of that recorded revelation. The processes of accurately copying texts, translating from ancient languages, understanding historical and cultural contexts, and so forth, introduce elements of uncertainty in the accuracy and meaning of the existing documents. That preserved revelation must then be interpreted and applied within a modern cultural and historical context entirely foreign to its origin. It must be continually adapted to new situations and new challenges.

Lastly, all spiritual revelation is limited. Just as scientific knowledge is incomplete, so is our spiritual knowledge. We do see through a glass darkly. This is not a cause for despair or abandonment of spiritual wisdom and insight, but a simple recognition of human fallibility and a call to humility. As stated by Guinness, "The root of doubt is not in our faith but in our humanness."<sup>43</sup>

### *Faith in Religion*

It might seem that talking about faith in religion is comparable to talking about the wetness of water. However, perhaps to the surprise of many, the role of faith in religion is actually not that much different from its role in any other pursuit of knowledge, including the conduct of scientific investigation of the natural world.

The most fundamental unproven assumption is that a divine spiritual reality exists. Many faiths see the divine as grounding and infusing all of physical reality—of being a creative force. For the Abrahamic faiths, there is the additional assumption that there is a personal God who has, in different ways and times, communicated to humanity. This is not substantially different from the assumptions of science discussed above—that there is an objective physical reality, and that our senses provide access to true aspects of that reality. Our life experience may confirm these assumptions, but they must be taken on faith.

That the existence of the spiritual cannot be tested—or proven—by physical observation does not make it unreasonable to believe. Michael Polanyi states:

God cannot be observed, any more than truth or beauty can be observed. He exists in the sense that He is to be worshipped and obeyed, but not



otherwise; not as a fact—any more than truth, beauty or justice exist as facts.<sup>44</sup>

To demand observational proof of God's existence is in actuality to reduce God to a natural agent. As Polanyi further argues,

It is illogical to attempt the proof of the supernatural by natural tests, for these can only establish the natural aspects of an event and can never represent it as supernatural. Observation may supply us with rich clues for our belief in God; but any scientifically convincing observation of God would turn religious worship into an idolatrous adoration of a mere object, or natural person.<sup>45</sup>

*Having faith* is not the antithesis of *knowing*, but its foundation. As stated by Guinness, "Without faith there is no knowledge. All true faith depends on knowledge. Knowledge and faith are inseparable."<sup>46</sup> Furthermore, "... the fact that assumptions are necessary for knowledge shows that knowledge and faith are not archenemies, as often supposed, but blood brothers."<sup>47</sup>

All knowledge is based on assumptions that cannot be proven but must be presupposed. Furthermore, as we have already seen, scientific knowledge is limited by its method to understanding the physical universe only in terms of material observable agents. Religion is the pursuit of understanding those things that transcend the physical. Each pursuit rests on a set of initial assumptions. Physicist Richard Feynman has commented on the validity of the pursuit of extra-scientific truth. He states:

But if a thing is not scientific, if it cannot be subjected to the test of observation, this does not mean that it is dead, or wrong, or stupid ... Scientists take all those things that can be analyzed by observation, and thus the things called science are found out. But there are some things left out, for which the method does not work.<sup>48</sup>

As with science, religion is seen by its practitioners as more than a culturally constructed phenomenon. It is pursued as a pathway to spiritual truth. Given a set of basic assumptions, we seek to advance our understanding of the nature of God and the implications of that knowledge for human actions and moral values. Religious views are not static but change over time. Both progressive revelation and the human pursuit of God result in a more complete understanding of the divine.

### *How Does Theology Progress?*

Our understanding of the supernatural is subject to change by encounter with the spiritual that is affirmed by the believing community. Religion (theology) also changes in response to interactions with other realms of knowledge, and by resolving its own internal conflicts. Alfred Whitehead has observed that "Theology itself exhibits exactly the same character of gradual development [as science], arising from an aspect of conflict between its own proper ideas."<sup>49</sup> He further states:

Science is even more changeable than theology. No man of science could subscribe without qualifications to Galileo's beliefs, or to Newton's beliefs, or to all his own scientific beliefs of ten years ago. In both regions of thought, additions, distinctions, and modifications have been introduced.<sup>50</sup>

No area of knowledge is static if its objective is the pursuit of truth—of understanding reality as it truly is. To claim otherwise is to commit the hubris of assuming that perfect and complete knowledge has already been obtained. Recognition of the current incompleteness and tentativeness of current knowledge is not to reject objective truth, but to affirm it. The pursuit of knowledge in both the natural and supernatural realms is the never-ending work of more accurately and completely describing the truth that we already know exists. Whitehead's comments are again relevant.

It is a general feature of our knowledge, that we are insistently aware of important truth, and yet that the only formulations of these truths which we are able to make presuppose a general standpoint of conceptions which may have to be modified.<sup>51</sup>

The confidence that there is a set of unchanging truths is what drives our efforts to more fully apprehend them and to seek correction. "(Religion's) principles may be eternal, but the expression of those principles requires continual development."<sup>52</sup>

The Reformed theologian Barrett Gritters has discussed what it means for the church to be "always reforming." He argues that "the reformers never wanted anything more than to (1) reject what was in error, (2) sharpen what was unclear, and (3) retain everything else."<sup>53</sup> The conservative nature of theology that is both resistant to change yet open to challenge and correction, is not unlike the conservative nature of consensus science. However, to be open to needed change and correction requires

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## *Doubt and Faith in Science and Religion*

dialogue in a diverse religious community. Only when challenged by dissenting views, can potential error be recognized and valuable new insights be gained. Again, as in science, isolation greatly increases the opportunity for significant error and self-deception. Religious practice and the search for theological truth cannot be an individual enterprise but must take place within a community.

### **Doubt and Uncertainty Are Important for the Search for Truth in Science and Religion**

An important conclusion from the above discussion is that doubt is of critical value in the pursuit of knowledge—any knowledge. Progress in science requires the recognition of the incompleteness and potential error of our current understanding of the natural world. As Feynman has stated,

All scientific knowledge is uncertain. This experience with doubt and uncertainty is important. I believe that it is of very great value, and one that extends beyond the sciences ... If we were not able or did not desire to look in any new direction, if we did not have a doubt or recognize ignorance, we would not get any new ideas.<sup>54</sup>

Unwillingness to entertain potential error is an invitation to remain in error with stubborn confidence. Feynman further argues, "... it is the admission of ignorance and the admission of uncertainty that there is a hope for the continuous motion of human beings in some direction that doesn't get confined, permanently blocked ..."<sup>55</sup> Our hope for progress rests in acknowledgment of our current ignorance.

The demand for definitive and certain answers is not only unrealizable, but prevents us from advancing our understanding to more closely approach that objective truth that exists outside us. Rescher encourages us to embrace the uncertainty and incompleteness of our knowledge.

We yearn for absolutes but have to settle for plausibilities; we desire what is definitively correct but have to settle for conjectures and estimates ... But in science, as in the moral life, we can operate perfectly well in the realization that perfection is unattainable ...

For the fact that perfection is unattainable does nothing to countervail against the no less real fact

that improvement is realizable—that progress is possible.<sup>56</sup>

We do not pursue what we have already obtained. Unanswered questions and doubts are not barriers or reasons for discouragement, but the basis for our longings and strivings. "The value of an ideal, even of one that is not realizable, lies not in the benefit of its attainment ... but in the benefits that accrue from its pursuit."<sup>57</sup> This applies no less to theology and religious practice than to the pursuit of scientific understanding. Certainly, as religious people we should recognize that we "see through a glass, darkly"<sup>58</sup> and are seeking an elusive and unattainable goal. It is in striving to live our religious and moral lives in accordance with spiritual truth, while humbly recognizing our own limitations and failures, that we grow in spiritual understanding and wisdom.

Apparent conflicts between our religious beliefs and current scientific understandings of the natural world, and theological conflicts within our religious communities, serve to focus our attention on those areas where error may lie, and where new ideas may need to be entertained. These tensions should not paralyze us, but encourage us to pursue truth with both humility and confidence. Whitehead encourages us,

We should wait: but we should not wait passively, or in despair. The clash is a sign that there are wider truths and finer perspectives within which a reconciliation of a deeper religion and a more subtle science will be found.<sup>59</sup>

Furthermore, he says, "A clash of doctrines is not a disaster—it is an opportunity."<sup>60</sup> Such opportunities for growth in scientific knowledge and spiritual wisdom will not come if we isolate ourselves from other voices and hide within our own echo chambers.

Doubts about our theological beliefs and religious practice provide the opportunity to correct error or inform ignorance. Alternatively, resolution of doubt may also serve to reaffirm and strengthen established beliefs. Guinness has described the nature of doubt as being in two minds.

To believe is to be "in one mind" about accepting something as true; to disbelieve is to be "in one mind" about rejecting it. To doubt is to waver between the two, to believe and disbelieve at once and so to be "in two minds."<sup>61</sup>

Doubt is not something to fear as though it were a failure of religious faith. Rather, it should be a motivator to seek truth more diligently and humbly. Doubt should also not cause us to be "... tossed back and forth by the waves, and blown here and there by every wind of teaching and by the cunning and craftiness of people ..." <sup>62</sup> Religious doctrine is conservative and resistant to change, and rightly so. But it is also reformational and must be open to challenge and, if needed, correction. There is no value, or moral high ground, in holding onto a false belief in the face of persuasive theological argument and spiritual witness requiring its rejection.

Again, as argued by Guinness, "If doubt is eventually justified, we were believing what clearly was not worth believing. But if doubt is answered, our faith has grown stronger still." <sup>63</sup> Doubt is a tool that if used bluntly can destroy well-founded belief, but if used rightly is critical to discovering error and advancing our knowledge.

The value of doubt is that it can be used to detect error ... If doubt can be turned destructively against truth so that it is dismissed as error, doubt can also be used constructively to prosecute error disguised as truth. <sup>64</sup>

This applies equally to both the scientific enterprise and to religious doctrine and theology.

## Conclusions

Scientists proceed with limited knowledge and evidence, and they must recognize uncertainty. The theoretical frameworks that guide scientific research and exploration of the natural world are not static but evolve with new observations and new philosophical perspectives. Science is rooted in history and takes place within a broad, diverse community that provides a necessary corrective.

Similarly, religious faith is accompanied by doubt and uncertainty. We must question our theological assumptions and commitments in order to avoid serious error. One important role of the global Christian community is to provide correction—to challenge individuals and local faith communities to reevaluate perspectives and positions. Our faith is also molded by our experience in the world. Revelation is progressive and inextricably intertwined with the history of God's people. Through the witness of

the Holy Spirit and the work of God in the body of Christ, the church has over the centuries been challenged to reconsider old assumptions and scriptural interpretations. Furthermore, our understanding of God's character has evolved in response to historical events and new discoveries, including those in the sciences. <sup>65</sup> Thus Christian theology is not static, but dynamic. Like science, faith is open-ended and unfinished. \*

## Acknowledgments

I would like to thank two anonymous reviewers for their critiques and recommendations that improved my clarity of thought and presentation. I would also like to thank Mark Hansard, IVCF faculty staff at Kansas State University, for his encouragement and support.

## Notes

<sup>1</sup>James Turner, *Without God, Without Creed: The Origins of Unbelief in America* (Baltimore, MD: Johns Hopkins University Press, 1986), 172.

<sup>2</sup>*Ibid.*, 173–74.

<sup>3</sup>Nora Barlow, ed., *The Autobiography of Charles Darwin 1809–1882* (London: Collins, 1958), 93.

<sup>4</sup>Turner, *Without God, Without Creed*, 182.

<sup>5</sup>*Ibid.*, 189.

<sup>6</sup>Henry H. Bauer, *Scientific Literacy and the Myth of the Scientific Method* (Urbana, IL: University of Illinois Press, 1992), 61.

<sup>7</sup>*Ibid.*, 63.

<sup>8</sup>Paul deVries, "Naturalism in the Natural Sciences: A Christian Perspective," *Christian Scholar's Review* 15 (1986): 388–89.

<sup>9</sup>Keith B. Miller, "The Misguided Attack on Methodological Naturalism," in *For the Rock Record: Geologists on Intelligent Design*, ed. J. S. Schneidman and W. D. Allman (Berkeley, CA: University of California Press, 2009), 117–40. In this essay, I more thoroughly discuss why science cannot prove the existence of supernatural action or supernatural agents.

<sup>10</sup>Nicholas Rescher, *The Limits of Science*, rev. ed. (Pittsburgh, PA: University of Pittsburgh Press, 1999), 38.

<sup>11</sup>Rescher, *The Limits of Science*, 36.

<sup>12</sup>*Ibid.*, 37.

<sup>13</sup>*Ibid.*, 34.

<sup>14</sup>David N. Livingstone, *Putting Science in Its Place: Geographies of Scientific Knowledge* (Chicago, IL: University of Chicago Press, 2003), 180.

<sup>15</sup>Bauer, *Scientific Literacy and the Myth of the Scientific Method*, 65.

<sup>16</sup>For more discussion of my thoughts on fact and theory, see Keith B. Miller, "Countering Public Misconceptions about the Nature of Evolutionary Science," *Southeastern Biology* 52 (2005): 415–27.

<sup>17</sup>Michael Polanyi, *Personal Knowledge: Towards a Post-critical Philosophy* (Chicago, IL: University of Chicago Press, 1962), 286.



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<sup>18</sup>Ibid., 287.

<sup>19</sup>Os Guinness, *In Two Minds: The Dilemma of Doubt and How to Resolve It* (Downers Grove, IL: InterVarsity Press, 1972), 40.

<sup>20</sup>Ibid., 41, 42.

<sup>21</sup>René Descartes, *Meditations on First Philosophy 1641*, trans. J. Cottingham (Cambridge, UK: Cambridge University Press, 1996).

<sup>22</sup>See chapter four in Hugh G. Gauch, Jr., *Scientific Method in Practice* (Cambridge, UK: Cambridge University Press, 2003).

<sup>23</sup>Ibid., 121–22.

<sup>24</sup>Ibid.

<sup>25</sup>See the compilation of essays in Subrahmanyam Chandrasekhar, *Truth and Beauty: Aesthetics and Motivations in Science* (Chicago, IL: University of Chicago Press, 1987).

<sup>26</sup>Semir Zeki et al., “The Experience of Mathematical Beauty and Its Neural Correlates,” *Frontiers in Human Neuroscience* 8 (2014): 1–12, <https://doi.org/10.3389/fnhum.2014.00068>.

<sup>27</sup>Henry Bauer makes the important point that a reigning scientific paradigm “... not only embraces what we think we know, it equally determines what we believe to remain unknown ... The unknown unknown comprises what we do not even suspect” (Bauer, *Scientific Literacy and the Myth of the Scientific Method*, 74).

<sup>28</sup>For a thorough introduction to Kuhn’s view of scientific paradigms and normal science, see Thomas S. Kuhn, *The Structure of Scientific Revolutions*, 2nd ed. (Chicago, IL: University of Chicago Press, 1970).

<sup>29</sup>Rescher, *The Limits of Science*, 38.

<sup>30</sup>Ibid., 39.

<sup>31</sup>George F. Kneller, *Science as a Human Endeavor* (New York: Columbia University Press, 1978), 68.

<sup>32</sup>One well-known recent example of the important role of critical peer review is the case of “cold fusion.” Two respected researchers made claims for the demonstration of nuclear fusion at room temperature: Martin Fleischmann and Stanley Pons, “Electrochemically Induced Nuclear Fusion of Deuterium,” *Journal of Electroanalytical Chemistry* 261, no. 2A (1989): 301–8. The subsequent failure of others to replicate their experiment, and the discovery of errors and the absence of nuclear reaction products resulted in the rejection of the original claims. See Gary Taubes, *Bad Science: The Short Life and Weird Times of Cold Fusion* (New York: Random House, 1993).

<sup>33</sup>Bauer, *Scientific Literacy and the Myth of the Scientific Method*, 46.

<sup>34</sup>See my discussion of consensus in Keith B. Miller, “The Nature of Science and the Public Debate over Anthropogenic Global Warming,” *Perspectives on Science and Christian Faith* 64, no. 4 (2012): 220–29.

<sup>35</sup>Bauer, *Scientific Literacy and the Myth of the Scientific Method*, 48.

<sup>36</sup>Vadim J. Birstein, *The Perversion of Knowledge: The True Story of Soviet Science* (New York: Basic Books, 2004).

<sup>37</sup>Bauer, *Scientific Literacy and the Myth of the Scientific Method*, 52.

<sup>38</sup>Ibid., 60.

<sup>39</sup>Ibid., 76.

<sup>40</sup>A. Hallam, *A Revolution in the Earth Sciences: From Continental Drift to Plate Tectonics* (New York: Oxford University Press, 1975).

<sup>41</sup>See Victor R. Baker, “The Channeled Scabland: A Retrospective,” *Annual Review of Earth and Planetary Sciences* 37,

no. 1 (2009): 393–411. Also, see L. W. Alvarez et al., “Extra-terrestrial Cause for the Cretaceous-Tertiary Extinction,” *Science* 208, no. 4448 (1980): 1095–108.

<sup>42</sup>See Miller, “Countering Public Misconceptions about the Nature of Evolutionary Science” and Miller, “The Misguided Attack on Methodological Naturalism.”

<sup>43</sup>Guinness, *In Two Minds*, 39.

<sup>44</sup>Polanyi, *Personal Knowledge*, 279.

<sup>45</sup>Ibid., 284.

<sup>46</sup>Guinness, *In Two Minds*, 39.

<sup>47</sup>Ibid., 40.

<sup>48</sup>Richard P. Feynman, *The Meaning of It All: Thoughts of a Citizen Scientist* (Boston, MA: Addison-Wesley, 1998), 16.

<sup>49</sup>Alfred N. Whitehead, *Science and the Modern World: Lowell Lectures, 1925* (New York: The Macmillan Company, 1926), 261.

<sup>50</sup>Ibid., 261–62.

<sup>51</sup>Ibid., 262–63.

<sup>52</sup>Ibid., 270.

<sup>53</sup>Barrett Gritters, “What It Means to Be Reformed: Reformed, Yet ‘Always Reforming,’” *The Standard Bearer* 92, no.11 (2016): 244–47.

<sup>54</sup>Feynman, 26, 27.

<sup>55</sup>Ibid., 34.

<sup>56</sup>Rescher, *The Limits of Science*, rev. ed., 157, 158.

<sup>57</sup>Ibid., 160.

<sup>58</sup>1 Corinthians 13:12 (King James Version).

<sup>59</sup>Whitehead, *Science and the Modern World*, 264.

<sup>60</sup>Ibid., 266.

<sup>61</sup>Guinness, *In Two Minds*, 25.

<sup>62</sup>Quotation taken from Ephesians 4:14 (New International Version of the Holy Bible, 2011).

<sup>63</sup>Guinness, *In Two Minds*, 16.

<sup>64</sup>Ibid., 47.

<sup>65</sup>Davis A. Young, *The Biblical Flood: A Case Study of the Church’s Response to Extrabiblical Evidence* (Grand Rapids, MI: Wm. B. Eerdmans, 1995). This book provides an account of how the church’s understanding of one part of scripture was impacted by the growing understanding of the character and history of the natural world.

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Kai-yan Chan

# On Sean Carroll's Case for Naturalism and against Theism

Kai-yan Chan

*Among atheist scientists, Sean Carroll is one of the most careful critics of theism and defenders of naturalism. He has provided two arguments for naturalism and against theism – one earlier argument and another later argument, which is built upon the earlier one. This article is intended to articulate and critically assess Carroll's arguments. I shall argue that Carroll's two arguments fail. The earlier argument fails because there is a crucial step of inference in the argument that is logically incorrect. The second argument fails because some of its key premises are dubious.*

Among the atheist scientists, Sean Carroll is one of the most careful critics of theism and defenders of naturalism/materialism.<sup>1</sup> My article will articulate Carroll's major arguments for naturalism and against theism, and critically examine them. I shall argue that none of Carroll's arguments are cogent.

Carroll's main thesis is the following:

C: By scientific standards, the materialist hypothesis should be accepted and the God hypothesis should be rejected.<sup>2</sup>

Carroll provides two arguments to support his thesis: one argument put forward in his earlier writing, "Why (Almost All) Cosmologists Are Atheists"; and a second argument that is built upon his earlier argument and is put forward in his later works.<sup>3</sup>

## Carroll's Earlier Argument

Carroll's first argument for his thesis C, which is presented in his paper "Why (Almost All) Cosmologists Are Atheists," is as follows:

1. Science has been extremely successful at constructing theories which accurately model reality.
2. In the various ways in which the God hypothesis might have been judged to be a helpful hypothesis, there are alternative explanations

which are no less plausible than the God hypothesis, but which do not require anything outside a completely formal, materialist description.

- ∴ 3. Appealing to physical factors alone is already sufficient to explain the universe – why it exists, why it has the laws it has, and why its laws are fine tuned to the existence of intelligent life; adding God would just make things more complicated (i.e., the postulation of God to explain the universe is redundant). [Since 1 and 2]
6. There are no other considerations (or data) which could lower the probability of the conclusion. (This is the requirement of total evidence.)
- ∴ C: By scientific standards, the materialist hypothesis should be accepted and the God hypothesis should be rejected. [Since 3 and 6]

Premise 6 above is not explicitly stated in Carroll's early paper "Why (Almost All) Cosmologists Are Atheists," but it is

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a hidden premise required for the derivation of the conclusion from the other premises.

In order to support premise 2, Carroll points out that there are in particular two possible ways in which theism could be judged more compelling than materialism:

- a. There are phenomena which cannot be explained in materialism, but which can be explained by theism; and
- b. There are patterns which theism can explain better than materialism.

For possibility a, the beginning of the universe may count as a candidate, and for possibility b, cosmic fine tuning may count as a candidate.

Carroll then turns to rebut both possibilities. With regard to the first candidate (or the kalam cosmological argument, which appeals to such a candidate), Carroll's rebuttal is this: We do not have good reason for thinking that the universe has a boundary. There are possibilities to avoid a boundary: (i) The Big Bang is nonsingular (the Hartle-Hawking no-boundary proposal), and (ii) The universe is eternal. These possibilities have not been eliminated yet, and they deserve our serious consideration. Carroll said,

There is no way to decide between [the no-boundary proposal] and eternal cosmologies on the basis of pure thought; both possibilities are being actively pursued by working cosmologists, and a definitive judgment will have to wait until one or the other approach develops into a mature scientific theory that makes contact with observations.<sup>4</sup>

With regard to the second candidate, cosmic fine tuning (or the fine-tuning design argument, which appeals to such a candidate), Carroll's rebuttal is as follows:

- i. There are two serious holes in the argument: we do not know what the universe would look like if the parameters of the standard model were different, nor do we know what the necessary conditions are for the formation of intelligent life.
- ii. There are features of the laws of nature which are irrelevant to the existence of life. First, [in] a cosmological context, the most obvious example is the sheer vastness of the universe; it would hardly seem necessary to

make so many galaxies just so that life could arise on a single planet around a single star.<sup>5</sup>

Second, there are particles which are completely superfluous.

All the processes we observe in the everyday workings of the universe would go on in essentially the same way if those particles didn't exist. Why do the constituents of nature exhibit this pointless duplication, if the laws of nature were constructed with life in mind?<sup>6</sup>

In other words, the existence of these features, according to Carroll, disconfirms the design hypothesis.

- iii. It might turn out that the constants of nature could not have had any other values. They may be calculable from a single underlying parameter.
- iv. It is possible that a multiverse exists. If a multiverse exists, then it will not be surprising that there is a universe whose laws are fine tuned to the existence of intelligent life. The existence of a multiverse is predicted by a combination of the theory of eternal inflation and string theory.

So, according to Carroll, no arguments for the role of God in explaining the universe are successful. There are naturalistic alternatives, which are no less plausible than the God-hypothesis and which are also simpler than the God-hypothesis.

## A Critical Evaluation of Carroll's First Argument

Because of the limitation of space in this article, I have to postpone my critical evaluation of Carroll's critique of the kalam cosmological argument and the fine-tuning design argument to another paper. (However, a brief comment on each does accompany this article in an appendix.) Here I want to put forward only one criticism of Carroll's first argument: Statement 3 does not follow from premises 1 and 2.

Let us first note that in Carroll's argument, two *ultimate explanations* of the universe are being compared: the God hypothesis and the materialist hypothesis. By the term "ultimate explanation," I mean an explanation in which the factors appealed to in explaining phenomena are claimed to have no further explanation. In the materialist hypothesis,



the existence of laws of nature and the existence of matter/energy are taken to be ultimate brute facts; and in the God hypothesis, God is taken to be the first cause of the existence of everything else.

How is statement 3 supposed to be derivable from premises 1 and 2? The derivation seems to proceed in this way. According to the principle of simplicity, other things being equal, the simpler hypothesis among a set of competing alternatives would be the most rationally preferable one.<sup>7</sup> If there are naturalistic ultimate explanations of the existence of the universe and its laws that do not require anything outside a completely formal, materialist description, then they will be *simpler* than the theistic explanation, which does require a supernatural entity outside the material order. If some of these naturalistic explanations are also no less plausible than the theistic explanation, then, according to the principle of simplicity, they will be rationally preferable to the theistic explanation. Also, since naturalistic explanations (in the areas of physics, chemistry, biology, etc.) have been tremendously successful in the past, we can be reasonably confident that they will one day provide the true ultimate explanation for the existence of the universe and its laws. Therefore, given premises 1 and 2, we can logically conclude that appealing to physical factors alone is already sufficient to ultimately explain the universe, and that the postulation of God to explain the universe is simply redundant.

The above line of reasoning, however, is questionable. First, from the fact that naturalistic explanations have been tremendously successful in the past in various areas of science, it does not follow that naturalistic explanations will also be successful to *ultimately* explain the existence of the universe and its laws. Surely, naturalistic explanations have been tremendously successful in the past, but those are all non-ultimate explanations. When we provide ultimate explanations, we are addressing questions such as why the universe (physical reality) exists, why natural laws exist, why the universe has the laws it has, and whether these facts have further explanation or are they already the ultimate brute facts. There are big differences between non-ultimate explanations in various areas of science and ultimate explanations of the universe. Non-ultimate explanations in various areas of science deal with facts (e.g., the motion of planets) that can possibly be explained by appealing to natural laws. But ultimate explanations of the

universe deal with facts (e.g., the existence of natural laws) that cannot possibly be explained by natural laws. Those facts are such that either they have no further explanation or they can be further explained only by nonphysical factors, such as God. It remains to be seen whether naturalistic *ultimate* explanations will enjoy the same success in addressing the above questions.

Second, according to the above line of reasoning, if there are naturalistic ultimate explanations of the universe that do not require anything outside a completely formal, materialist description, then they will be simpler than the theistic explanation, which does require a supernatural entity outside the material order. However, there are good reasons for rejecting this assumption. Here are two reasons why the God hypothesis is simpler than the naturalistic ultimate explanations (or materialism).

**Reason One:** The *explanatory ultimate* posited by the God hypothesis—namely, God—is simpler than the *explanatory ultimate* posited by materialism—namely, the universe (matter-energy, space-time, and laws of nature). God is a very simple entity, a disembodied nonphysical Mind, who is not composed of parts at all, and who has zero limits in his essential attributes: knowledge, power, and goodness. In contrast, the universe is composed of parts related to each other in certain ways.

Theism is a very simple hypothesis. In explicating the concept of simplicity that is employed in scientific inquiry, Carroll said, “[The] simplicity of a model is judged by how much information is required to fully specify the system.”<sup>8</sup> We can describe God in a very simple way as “the maximally perfect being.”<sup>9</sup> From the concept of being maximally perfect, other essential properties of God follow: all-knowing, all-good, all-powerful. And it also follows that God necessarily depends on nothing else for his existence.

Here is Richard Swinburne’s explication of the concept of simplicity:

The simplicity of a theory, in my view, is a matter of postulating few (logically independent) entities, few properties of entities, few kinds of entities, few kinds of properties, properties more readily observable, few separate laws with few terms relating few variables, the simplest formulation of each law being mathematically simple.<sup>10</sup>

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Theism postulates only one entity, God, in providing an ultimate explanation of the existence of the universe and its laws; the entity is very simple—a disembodied nonphysical mind. And his essential properties can be unified in a very simple way—they are properties following from God's maximal perfection.<sup>11</sup>

**Reason Two:** In explaining the existence and fine-tuning of the universe, the God hypothesis posits fewer *brute facts* than materialism. By the term "brute fact," I mean a fact which can possibly have an explanation, but which just happens to have no explanation. Under this sense of the term "brute fact," if God exists, then God's existence would not be a brute fact, since God's existence *necessarily* has no explanation. As a maximally perfect being, God is essentially uncaused and essentially eternal. In other words, *necessarily*, if God exists, then God must be uncaused and eternal. Therefore, it simply does not make sense to ask for an explanation/cause of God's existence.

On the other hand, it does make sense to ask for an explanation of the existence of the universe, because it is logically possible that theism provides the ultimate explanation for the universe—why it exists, why it has the laws it has, and why its laws are fine tuned to the existence of intelligent life. Under the God hypothesis, everything which *can possibly* have an explanation *does* have an explanation. But under materialism, many things (e.g., the existence of matter/energy, the existence of laws of nature, and the fact that physical reality possesses the laws it possesses) which *can possibly* have an explanation, just happen to have *no* explanation.

However, Carroll thinks that materialism is simpler:

[If] we are looking for simplicity of description, a view which only invokes formal structures and patterns would appear to be simpler than one in which God appeared in addition.<sup>12</sup>

My reply is this. In postulating God in our explanatory theory, what we are doing is not postulating God *in addition to* the postulation of structures and patterns *in the explanans* to explain the universe. Rather, God *alone* is postulated in the explanans to ultimately explain the universe, including its structures and patterns. In other words, the structures and patterns of the universe are parts of the explanandum, *not* parts of the explanans. God *alone* is the explanatory ultimate. And God is a very simple entity.

Let us look at some examples in science. According to Swinburne, as we postulate microscopic entities to explain the characteristics of macroscopic entities, we would not require microscopic entities to be like macroscopic entities, since our knowledge about the latter entities is not, in this case, part of the background knowledge, but data to be explained by the postulation of microscopic entities. The postulation of a microscopic realm (which is radically different from the macroscopic realm) to explain phenomena in the macroscopic realm does not render our subatomic theory to be a complicated theory. What matters to the simplicity of the theory is the simplicity of the models and mathematical formulae in the theory. Similarly, in explaining empirical data such as those about the human world, we need not require the postulated entity to be like human beings. What we require are, rather, simplicity and explanatory power of the postulation.<sup>13</sup>

Therefore, in the words of Don Page, "[It] might be that God is even simpler than the universe, so that one would get a simpler explanation starting with God than starting with just the universe."<sup>14</sup>

Thus, the reasoning from premises 1 and 2 to statement 3 in Carroll's first argument leaves the following *possibility* intact. On the one hand, the God hypothesis is no less plausible than the naturalistic ultimate explanations (although the latter may also be no less plausible than the former). And, on the other hand, the God hypothesis is simpler than those naturalistic explanations (although the former requires a supernatural entity outside the material order and the latter do not). In other words, even if premises 1 and 2 are true, it does not follow that appealing to physical factors alone is already sufficient to ultimately explain the universe, or that the postulation of God to explain the universe is simply redundant.

Since, in Carroll's first argument, statement 3 does not follow from premises 1 and 2, Carroll's first argument for his thesis C fails to be convincing.

## Carroll's Second Argument and My Critical Evaluation of It

Carroll's second and later argument for his thesis C is built upon his earlier argument and is more sophisticated. It is as follows:

1. Science has been extremely successful at constructing theories which accurately model reality.
  2. In the various ways in which the God hypothesis might have been judged to be a helpful hypothesis, there are alternative explanations which are no less plausible than the God-hypothesis, and which do not require anything outside a completely formal, materialist description.
  4. The God hypothesis is not a viable explanation.
  5. Materialism is well confirmed by empirical evidence.
  6. There are no other considerations/data, which could lower the probability of the conclusion. (This is the requirement of total evidence.)
- ∴ C: By scientific standards, the materialist hypothesis should be accepted and the God hypothesis should be rejected.

Premises 4 and 5 are newly added premises. Premise 4 says that the God hypothesis is a deeply flawed hypothesis. Premise 5 says that materialism is a well-confirmed hypothesis. The conclusion of Carroll's second argument does follow from the premises. However, I shall argue, its premises 4 and 5 are dubious.

#### *Premise 4 of Carroll's Argument*

In support of premise 4, Carroll provides the following reasons:<sup>15</sup>

- 4.1 The God hypothesis postulates an external cause for the whole physical reality. However, the very concept of an external cause of the whole physical reality is nonsensical. Therefore the very meaningfulness of the God hypothesis is doubtful.
- 4.2 Either the God hypothesis is already significantly disconfirmed by empirical evidence, or it is empirically untestable and not well defined.
- 4.3 Asking for an external cause of the physical reality is unnecessary, because *the* right way to know reality is through laws of nature, and because there is no need for extra metaphysical baggage, such as the postulation of a transcendent cause. What we need to do,

rather, is to build complete and consistent physical models that fit with empirical data. This is the right way to know reality. We have no right to demand more than that.

In support of 4.1, Carroll argues in the following way. Asking for causes or explanations for phenomena *in* the universe is meaningful, since there are unbreakable laws of physics, and since there is an arrow of time stretching from the past to the future, and since the entropy was lower in the past and increases toward the future. Yet both of these features of the universe that allow us to speak meaningfully of the language of cause and effect are completely absent when we talk about the physical reality *as a whole*.<sup>16</sup>

However, Carroll's argument for his claim in 4.1, that the very concept of an external cause of the whole physical reality is nonsensical, is questionable. Yes, it is true that there are unbreakable laws of physics, that there is an arrow of time stretching from the past to the future, that the entropy was lower in the past and increases toward the future, and that these are sufficient conditions for the meaningfulness of the language of cause and effect. But why should we think that these are also *necessary* conditions of the meaningfulness of the language of cause and effect? It is clearly conceivable that physical space-time, matter-energy, and natural laws had a beginning and that they were created by God.

As Swinburne points out, we can provide an intentional explanation in terms of God's purposes and reasons for the existence of physical reality. (Intentional explanations, which are often used in social sciences, are one kind of proper explanations.) Even Carroll admits this point: "It is certainly conceivable that the ultimate explanation is to be found in God ..." <sup>17</sup> If it is *conceivable* that the ultimate explanation of the physical reality is to be found in God, then the very concept of an *external* cause is meaningful. Hence Carroll's argument for his claim in 4.1 is not convincing.

Let's consider Carroll's second support of premise 4. Why should we accept it? Here is his reason for 4.2. If theism is empirically testable, then it is already significantly disconfirmed. Carroll thinks that the following empirical observations have significantly disconfirmed theism (if it is empirically testable at all):



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4.2.1 "In numerous ways, the world around us is more like what we would expect from a dys-teleological set of uncaring laws of nature than from a higher power with an interest in our welfare."<sup>18</sup>

4.2.2 "In a cosmological context, the most obvious example is the sheer vastness of the universe; it would hardly seem necessary to make so many galaxies just so that life could arise on a single planet around a single star."<sup>19</sup> "The entropy didn't need to be nearly that low in order for life to come into existence. One way of thinking about this is to note that we certainly don't need a hundred billion other galaxies in the universe in order for life to arise here on earth; our single galaxy would have been fine, or for that matter a single solar system."<sup>20</sup> and

4.2.3 There are particles which are completely superfluous. "All the processes we observe in the everyday workings of the universe would go on in essentially the same way if those particles didn't exist. Why do the constituents of nature exhibit this pointless duplication, if the laws of nature were constructed with life in mind?"<sup>21</sup>

However, these apparent disconfirmations of theism can be rebutted. For the facts about evils, there are various theodicies and defenses which show that theism can be perfectly coherent with such facts. For the existence of those features in nature, which are apparently unnecessary to the existence of intelligent life, we can simply point out the possibilities missed by Carroll. Here are some of those possibilities. God might well have other purposes, besides the creation of intelligent life, in creating the universe. For example, the extremely sophisticated order of the cosmos can manifest to the intelligent creatures the handiworks and thus the reality of God, so that they can be led to seek God. Also in creating a vast universe, God might well intend for there to be abundant life and, accordingly, other life-affirming planets in different parts of the universe.<sup>22</sup> So it is not surprising that God would choose to build a vast life-affirming universe, rather than just a small one. Hence, the empirical observations highlighted by Carroll (4.2.1, 4.2.2, 4.2.3) are not sufficient to lower the probability of theism.

In his recent book *The Big Picture*, Carroll elaborated on his problem of evil against theism:

[Imagine] a world that is very much like ours, except that evil does not exist. People in this world are much like us, and seem able to make their own choices, but they always end up choosing to do good rather than evil. In that world, the relevant data is the absence of evil. How would that be construed, as far as theism is concerned? It's hard to doubt that the absence of evil would be taken as very strong evidence in favor of the existence of God. If humanity simply evolved according to natural selection, without any divine guidance or interference, we would expect to inherit a wide variety of natural impulses—some for good, and some for not so good. The absence of evil in the world would be hard to explain under atheism, but relatively easy under theism, so it would count as evidence for the existence of God. But if that's true, the fact that we do experience evil is unambiguous evidence against the existence of God. If the likelihood of no evil is larger under theism, then the likelihood of evil is larger under atheism, so evil's existence increases our credence that atheism is correct.<sup>23</sup>

Let  $p$  represent "probability";  $E$ , the statement "Evils exist"; and  $T$ , the statement "God exists." Carroll's argument from evil, put in a formal way, is as follows:

6.  $p(\sim E \mid T) > p(\sim E \mid \sim T)$
7. If  $p(\sim E \mid T) > p(\sim E \mid \sim T)$ , then  $p(E \mid \sim T) > p(E \mid T)$  [This is a theorem in probability theory.]
- $\therefore$  8.  $p(E \mid \sim T) > p(E \mid T)$  [Since 6 and 7]
- $\therefore$  9.  $p(T \mid E) < p(T)$  [Since 8 and the likelihood principle]<sup>24</sup>

Is this a good argument showing that the existence of evil provides some disconfirmation of the existence of God? I think not. I believe that premise 6 is questionable.

My reason to doubt premise 6 is this. According to theists, especially Christian theists, God created human beings as beings possessing libertarian free-will. So God cannot possibly *make* human beings to do good and refrain from evil without violating their libertarian freewill. Since God respects human free-will, God does not *make* human beings to choose good and refrain from evil. God allows human beings to make the decision to do either good or evil. Suppose that, possessing freewill, every human person has a certain probability, which is greater than 0 and less

than 1, to do good and refrain from evil (suppose the probability to be 9/10). Given that there are indefinitely many human persons, the probability that *every* person chooses only to do good is very near to zero. In other words, the probability that some people commit evil is near to 1. So  $p(\sim E \setminus T)$  is nearly zero and premise 6 of Carroll's argument from evil is questionable. Therefore, Carroll's argument from evil against theism is not a good argument.

Carroll, however, rebuts the above lines of defense of theism against those criticisms in this way. The above lines of defense are merely using *ad hoc hypotheses* (e.g., the hypothesis that God created human beings as beings possessing libertarian freewill) to save theism from refutation. Such a move would make theism immune to empirical disconfirmations and thus make theism to be empirically untestable. If theism is not an empirically testable hypothesis, then by scientific standards, it is not a viable explanation.

There is an inevitable tension between any attempt to invoke God as a scientifically effective explanation of the workings of the universe, and the religious presumption that God is a kind of person, not just an abstract principle. God's personhood is characterized by an essential unpredictability and the freedom to make choices. These are not qualities that one looks for in a good scientific theory. On the contrary, successful theories are characterized by clear foundations and unambiguous consequences.<sup>25</sup>

So Carroll's rebuttal is similar to this:

- I. God's personhood is characterized by an essential unpredictability and the freedom to make choices.
- II. Theism is saved by various *ad hoc* hypotheses from empirical refutations, whenever such refutations appear.
- ∴ III. Theism does not have predictive power. [Since I and II]
- ∴ IV. No empirical observations can possibly disconfirm theism (i.e., theism is not empirically disconfirmable). [Since III]
- ∴ V. Theism is not empirically testable. [Since IV]
- VI. A viable explanation of the workings of the universe must be empirically testable. (Since the requirements of scientific standards)

∴ VII. Theism is not a viable explanation of the workings of the universe. [Since V and VI]

Carroll's rebuttal is not cogent. I dispute his proposition I and, therefore, his propositions III and IV. Let me explain.

There is no reason to think that God's personhood is characterized by essential unpredictability. It is true that if God exists, God will have libertarian freedom to make choices. However, from this, it does not follow that God's personhood is characterized by essential unpredictability. Rather, God's personhood is characterized by the *essential* attributes of his nature, for example, essential goodness. God's behavior flows from the essential attributes of his nature, and it is impossible for God to act against his nature. This enables us to predict, though not with certainty, what God will do if he exists. For instance, if God exists, we would expect him to desire a good and deep relationship with us, for God is omnibenevolent. But we, human beings, are finite and unable to find God. So if God exists, he will take the initiative to approach us. In order for us to be able to identify his special revelation in the world of plurality of religions and worldviews, God might well perform miracles to testify to his revelation. So if theism is true, we would, to a certain degree, expect to find miracles in the world.

Let M be an observation of miraculous events, which are most easily explained by invoking God; let T be theism and N be naturalism.  $p(\sim M \setminus N)$  is approximately 1, but  $p(\sim M \setminus T)$  is significantly lower than 1. Therefore, by the likelihood principle,  $\sim M$  would confirm N over T. Since N logically entails  $\sim T$ , and since  $\sim M$  would confirm N over T,  $\sim M$  would confirm  $\sim T$ . In other words, if, after a serious and diligent search for miraculous events in the world, we still fail to find any, then this would disconfirm theism.

Because of the above considerations, we can reasonably draw these conclusions:

1. If theism is true, we would expect, to a certain degree, to have observations of miraculous events—observations of God's miraculous work; in other words, theism has predictive power;

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2. Theism is, accordingly, empirically disconfirmable by empirical evidence; and
3. God's personality cannot be characterized by an *essential* unpredictability.

Even Carroll admits,

There are several possible ways in which [a theist worldview could be judged more compelling than a materialist one]. Most direct would be straightforward observation of miraculous events that would be most easily explained by invoking God.<sup>26</sup>

If we can publicly *observe* such events, do these empirical observations not significantly confirm theism? And if theism is both confirmable and disconfirmable by empirical observations, it is empirically testable. So Carroll's argument for his conclusion VII, "Theism is not a viable explanation of the workings of the universe," fails.

Here I want to add one more remark. The degree of testability of *Christian* theism is even higher than that of bare theism. We can deduce definite and bold empirical predictions from Christian theism such that if our empirical evidence were to indicate that some of them are not borne out, then this would significantly disconfirm Christian theism. These predictions are (1) physical reality has a beginning; (2) Jesus of Nazareth has resurrected from the dead; and (3) human beings possess libertarian freewill.

Because of the above considerations, Carroll fails to show either that theism is already significantly disconfirmed by empirical evidence, or that theism is empirically untestable. In other words, he fails to show that his proposition 4.2, that either the God hypothesis is already significantly disconfirmed by empirical evidence, or it is empirically untestable and not well defined, is true.

Let's examine Carroll's proposition 4.3. This seems to be the argument presented:

- A. The *only* right way to know reality is through laws of nature.
  - B. There is no need for extra metaphysical baggage, such as the postulation of a transcendent cause.
- ∴ D. Asking for an external cause of the physical reality is unnecessary. [Since A and B]
- ∴ 4. Theism is not a viable explanation. [Since D]

Is this a good argument? I doubt it. First, premise A is questionable. Yes, a right way to know some aspects of reality is through laws of nature, but why should we think that this is the *only* way to know reality? Indeed, much of our knowledge of daily life does not come from knowledge of laws of nature. For example, I know that Tom is feeling pain now. How do I know it? Do I know it through appealing to a law of nature? No, I know it through observing Tom's pain behavior, as well as the circumstances in which his behavior occurs. Ancient people had little scientific knowledge, but they could still know when a person was in pain. Here is another example: I know that I feel uncomfortable now. How do I know it? Do I know it through any laws of nature? No, I know it through feeling it directly.

Carroll said, "What we need to do, rather, is to build complete and consistent physical models that fit with empirical data. This is *the* right way to know reality. We have no right to demand more than that."<sup>27</sup> But why should we believe that *all* aspects of reality can be grasped in this way? How does Carroll know that reality has no nonnatural aspects, which cannot be grasped by physical models? Carroll's premise A has begged the question against theism.

Premise B is also questionable. Why should we believe it? As stated in my assessment of Carroll's first argument, theism has many merits—for example, simplicity and explanatory power—and deserves our serious consideration. The *ultimate explanation* provided by theism starts with God, and this may well be simpler than the ultimate explanation provided by materialism, which starts with the universe. Theism also posits fewer brute facts than materialism. So why should we think that theism is "an unnecessary extra metaphysical baggage" and not the best *ultimate explanation* of reality? Because of these considerations, I doubt premise B.

Since premises A and B are questionable, I do not think that Carroll's argument 4.3 can cogently support his premise 4, "Theism is not a viable explanation."

Carroll provides three arguments, 4.1, 4.2, 4.3, to support his premise 4. However, all of them fail. Therefore, Carroll fails to show that theism is not a viable explanation.



### Premise 5 of Carroll's Argument

Premise 5 of Carroll's second argument for his main thesis C says that materialism is well confirmed by empirical evidence. Is this premise true? Why should we believe it? Let me quote in full Carroll's empirical evidence used to confirm materialism and disconfirm theism:

I've claimed that over and over again the universe we would expect matches the predictions of naturalism not theism. So the amount of tuning, if you thought that the physical parameters of our universe were tuned in order to allow life to exist, you would expect enough tuning but not too much. Under naturalism, a physical mechanism could far over-tune by an incredibly large number that has nothing to do with the existence of life, and that is exactly what we observe. For example, the entropy of the early universe is much, much, much, much lower than it needs to be to allow for life. You would expect under theism that the particles and parameters of particle physics would be enough to allow life to exist and have some structure that was designed for some reason, whereas under naturalism you'd expect them to be kind of random and a mess ... You would expect, under theism, for life to play a special role in the universe. Under naturalism, you would expect life to be very insignificant. I hope I don't need to tell you that life is very insignificant as far as the universe is concerned.

... What you should be doing over and over again is comparing the predictions or expectations under theism to [those] under naturalism and you find that over and over again naturalism wins. I'm going to zoom through these ...

- If theism were really true, there's no reason for God to be hard to find. He should be perfectly obvious, whereas in naturalism you might expect people to believe in God but the evidence to be thin on the ground.
- Under theism you'd expect that religious beliefs should be universal. There's no reason for God to give special messages to this or that primitive tribe thousands of years ago. Why not give it to anyone? Whereas under naturalism, you'd expect different religious beliefs inconsistent with each other to grow up under different local conditions.
- Under theism you'd expect religious doctrines to last a long time in a stable way.

Under naturalism you'd expect them to adapt to social conditions.

- Under theism you'd expect the moral teachings of religion to be transcendent, progressive, sexism is wrong, slavery is wrong. Under naturalism you'd expect they reflect, once again, local mores, sometimes good rules, sometimes not so good.
- You'd expect the sacred texts under theism to give us interesting information. Tell us about the germ theory of disease. Tell us to wash our hands before we have dinner. Under naturalism you'd expect the sacred texts to be a mishmash—some really good parts, some poetic parts, and some boring parts and mythological parts.
- Under theism you'd expect biological forms to be designed; under naturalism they would derive from twists and turns of evolutionary history.
- Under theism, minds should be independent of bodies. Under naturalism, your personality should change if you're injured, tired, or you haven't had your cup of coffee yet.
- Under theism you'd expect that maybe you can explain the problem of evil—God wants us to have free will. But there shouldn't be random suffering in the universe. Life should be essentially just.
- At the end of the day with theism you basically expect the universe to be perfect. Under naturalism it should be a kind of mess—this is very strong empirical evidence.<sup>28</sup>

In response, I think the above empirical observations do *not* significantly disconfirm theism. We have no reason to think that if God exists, God would not overturn the universe, or God would not allow sufferings to occur in the world in the ways we observe, or God would manifest God's existence clearly and irresistibly before all human beings, or God would create human beings in such a way that their minds are independent of their bodies, and so on. There are already a lot of good discussions of these points in the literature. To show that the above empirical observations significantly disconfirm theism, Carroll needs to forcefully rebut these theistic defenses.<sup>29</sup>

But do the above empirical observations *significantly* confirm materialism? In order to determine whether

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materialism is well confirmed by empirical evidence, we need to consider this question:

- (a) If theism is true, would it equally lead us to expect the above empirical observations as materialism would? (If yes, then the above empirical observations would not be able to *significantly* confirm materialism. This is what we call the "Surprise Principle" in confirmation theory.)

To question (a), my answer is this. Many theists, such as Richard Swinburne and John Hick, have argued that the majority of the aforementioned empirical phenomena are expected if theism is true.<sup>30</sup> For example, according to these theists, if God exists, we would expect that there would be a significant degree of divine hiddenness (e.g., that God would not appear in the sky to be seen by all human beings) for the sake of human freedom. God wants human beings to freely seek God, rather than being forced in fear to believe God. And God would allow sufferings to occur on human beings, because sufferings can have soul-making functions. And so on. In other words, we have reason to think that theism leads us to expect the majority of the aforementioned empirical observations, but which are taken by Carroll as confirming materialism. Hence, Carroll's claim that these empirical observations significantly confirm materialism is doubtful.

Because of these considerations, Carroll's claim—that is, premise 5 in his second argument—that materialism is well confirmed by empirical evidence, is doubtful.

Since some of the major premises, premises 4 and 5, in his second argument for thesis C are questionable, Carroll's second argument for naturalism and against theism fails to be convincing.

## Conclusion

After a critical and careful examination of Carroll's two arguments for naturalism and against theism, my final conclusion is that both of them are not good arguments. The earlier argument fails because there is a step of inference in the argument, which is logically incorrect—its statement 3 does not follow from its statements 1 and 2; the later argument fails because some of its major premises—premises 4 and 5—are questionable.

## Appendix

### Initial Brief Comments on Carroll's Criticisms of the Kalam Cosmological Argument and the Fine-Tuning Argument

This is the kalam cosmological argument (The Craig-Carroll Debate):

*First premise:* If the universe (physical reality) began to exist, then there was a transcendent cause that brought the universe into existence.

*Second premise:* The universe began to exist.

*Conclusion:* There was a transcendent cause that brought the universe into existence.

Carroll's criticism challenges the second premise:

Since there are cosmological models (e.g., the Hartle-Hawking no-boundary proposal and other eternal-universe models) which avoid a boundary for the universe, and since these cosmological models deserve serious consideration, we do not have good reason to believe that the universe has a boundary (beginning).

However, Carroll's criticism is not sufficient to undermine the second premise of the kalam argument, since there is no good evidence yet to support the cosmological models mentioned by Carroll, and since the second premise is supported by not only scientific arguments, but also by powerful metaphysical arguments (e.g., the Hilbert-Hotel argument).<sup>31</sup> The cosmological models mentioned by Carroll simply cannot threaten the metaphysical arguments.

With respect to the fine-tuning argument, Carroll has put forward four criticisms. To Carroll's criticism (i), Jeffrey Koperski has provided a reply:

[Some] fine-tuning examples allow for no inhabitable universe whatsoever outside of the life-permitting range ... A slight change in the cosmological constant would produce either a Big Crunch singularity or a universe devoid of atoms. Either way, life—any sort of life—would be physically impossible. In short, the appeal to other possible types of life ignores that a universe with any discernible structure depends on fine-tuning.<sup>32</sup>

To Carroll's criticism (ii), I have provided a detailed reply in the article that precedes this appendix.

To Carroll's criticism (iii), Robin Collins responds:

[Hypothesizing such a fundamental law] merely moves the epistemic improbability of the fine-tuning of the laws and constants up one level, to that of the postulated fundamental law itself. Even if such a law existed, it would still be a huge coincidence that the fundamental law implied just those lower-level laws and values of the constants of physics that are life-permitting, instead of some other laws or values.<sup>33</sup>

To Carroll's criticism (iv), my reply is that the multiverse hypothesis is unable to explain the fine-tuning phenomena in our universe. Yes, if a multiverse exists, then it will not be surprising that there is a universe whose laws are fine tuned to the existence of intelligent life. However, even if a multiverse exists, the probability of fine-tuning in *our* universe (*this* universe) would not thereby be increased at all. It would still be extremely improbable and very surprising that *this* universe is fine tuned to the existence of intelligent life. To suppose that the postulation of a multiverse is sufficient to explain the fine-tuning phenomena in our universe is to commit the Inverse Gambler's Fallacy.<sup>34</sup> Accordingly, it is doubtful that the multiverse hypothesis can threaten the fine-tuning design argument. \*

### Acknowledgment

Here I would like to give thanks to Lydia McGrew, Andrew Loke, and the anonymous reviewers of the journal for their very useful comments on my paper.

### Notes

<sup>1</sup>I think in Carroll's language, the words "naturalism" and "materialism" are interchangeable. By "naturalism," Carroll means this:

The broader ontology typically associated with atheism is naturalism—there is only one world, the natural world, exhibiting patterns we call the "laws of nature," and which is discoverable by the methods of science and empirical investigation. There is no separate realm of the supernatural, spiritual, or divine; nor is there any cosmic teleology or transcendent purpose inherent in the nature of the universe or human life. "Life" and "consciousness" do not denote essences distinct from matter; they are ways of talking about phenomena that emerge from the extraordinarily complex systems. (Sean Carroll, *The Big Picture: On the Origins of Life, Meaning, and the Universe Itself* [New York: Dutton, 2016], 11)

In a word, naturalism in Carroll's sense is the doctrine that physical reality is *all* there is.

<sup>2</sup>Sean M. Carroll, "Why (Almost All) Cosmologists Are Atheists," accessed June 16, 2017, <https://preposterousuniverse.com/wp-content/uploads/nd-paper.pdf>. This article was prepared for "God and Physical Cosmology: Russian-Anglo American Conference on Cosmology and Theology," Notre Dame, January/February 2003, and was published in *Faith and Philosophy* 22, no. 5 (2005): 622–35.

<sup>3</sup>Sean Carroll's later works: "Does the Universe Need God?," in *The Blackwell Companion to Science and Christianity*, ed. J. B. Stump and Alan G. Padgett (Malden, MA: Wiley-Blackwell, 2012), chap. 17; "Post-Debate Reflections," accessed June 16, 2017, <http://www.preposterousuniverse.com/blog/2014/02/24/post-debate-reflections/>; *The Big Picture*; and video debate, William Lane Craig vs. Sean Carroll, "God and Cosmology: The Existence of God in Light of Contemporary Cosmology," New Orleans Baptist Theological Seminary, New Orleans, LA, March 2014, accessed June 16, 2017, <https://www>

[reasonablefaith.org/videos/debates/craig-vs.-carroll-new-orleans/](https://www.reasonablefaith.org/videos/debates/craig-vs.-carroll-new-orleans/); transcript, <https://www.reasonablefaith.org/media/debates/god-and-cosmology-the-existence-of-god-in-light-of-contemporary-cosmol/>.

<sup>4</sup>Carroll, "Does the Universe Need God?," 189.

<sup>5</sup>Carroll, "Why (Almost All) Cosmologists Are Atheists," 12.

<sup>6</sup>Ibid.

<sup>7</sup>Carroll, "Does the Universe Need God?," 191; and Richard Swinburne, *The Existence of God*, 2nd ed. (Oxford, UK: Clarendon Press, 2004), 53.

<sup>8</sup>Carroll, "Why (Almost All) Cosmologists Are Atheists," 7.

<sup>9</sup>For an explication of the concept of a maximally perfect being, as well as a defense of its coherence, see Thomas V. Morris, *Our Idea of God: An Introduction to Philosophical Theology* (Downers Grove, IL: InterVarsity Press, 1991), see especially chap. 2; and Charles Taliaferro and Chad Meister, *Contemporary Philosophical Theology* (New York: Routledge, 2016), chap. 5.

<sup>10</sup>Swinburne, *The Existence of God*, 2nd ed., 54.

<sup>11</sup>Indeed Sean Carroll's conception of simplicity is very similar to that of Richard Swinburne. See Carroll, "Why (Almost All) Cosmologists Are Atheists"; and "Does the Universe Need God?," 191–92; and Swinburne, *The Existence of God*, 2nd ed., 53–61. Both of them attempt to apply the principles of the methodology of science (one of which is the principle of simplicity) to the critical evaluation of ultimate explanations of reality. Swinburne said clearly, All that I have been concerned to show here is the crucial influence of the criterion of simplicity within science. If we are to adopt in our investigations into religion the criteria of rational inquiry that are used in science and ordinary life, we must use this criterion here. (*The Existence of God*, 2nd ed., 60)

<sup>12</sup>Carroll, "Why (Almost All) Cosmologists Are Atheists," 7.

<sup>13</sup>Swinburne, *The Existence of God*, 2nd ed., 145–46.

<sup>14</sup>"Guest post, Don Page on God and Cosmology," posted by Sean Carroll on March 20, 2015, Don Page, "Open Letter to Sean Carroll and William Lane Craig," <http://www.preposterousuniverse.com/blog/2015/03/20/guest-post-don-page-on-god-and-cosmology/>.

<sup>15</sup>Craig vs. Carroll Debate, "God and Cosmology."

<sup>16</sup>Ibid.

<sup>17</sup>Carroll, "Does the Universe Need God?," 193.

<sup>18</sup>Ibid., 196.

<sup>19</sup>Carroll, "Why (Almost All) Cosmologists Are Atheists," 12.

<sup>20</sup>Carroll, "Does the Universe Need God?," 192.

<sup>21</sup>Carroll, "Why (Almost All) Cosmologists Are Atheists," 12.

<sup>22</sup>I am indebted to the anonymous reviewer for this possibility.

<sup>23</sup>Carroll, *The Big Picture*, 147.

<sup>24</sup>Robin Collins has provided a clear explanation of the likelihood principle:

[It] is a general principle of reasoning which tells us when some observation counts as evidence in favor of one hypothesis over another. *Simply put, the principle says that whenever we are considering two competing hypotheses, an observation counts as evidence in favor of the hypothesis under which the observation has the highest probability (or is the least improbable).* (Or, put slightly differently, the principle says that whenever we are considering two competing hypotheses,  $H_1$  and  $H_2$ , an observation,  $O$ , counts as evidence in favor of  $H_1$  over  $H_2$  if  $O$  is more



# Article

## On Sean Carroll's Case for Naturalism and against Theism

probable under  $H_1$  than it is under  $H_2$ .) Moreover, the degree to which the evidence counts in favor of one hypothesis over another is proportional to the degree to which the observation is more probable under the one hypothesis than the other. (Collins, "The Fine-Tuning Design Argument," accessed June 16, 2017, <http://home.messiah.edu/%7Ercollins/Fine-tuning/FINETLAY.HTM>)

<sup>25</sup>Carroll, "Does the Universe Need God?," 195.

<sup>26</sup>Carroll, "Why (Almost All) Cosmologists Are Atheists," 7.

<sup>27</sup>Craig vs. Carroll Debate, "God and Cosmology," italics mine.

<sup>28</sup>Ibid.

<sup>29</sup>For a good summary of theistic responses to the problem of evil and the problem of divine hiddenness, see Michael J. Murray and Michael Rea, *An Introduction to the Philosophy of Religion* (Cambridge, UK: Cambridge University Press, 2008), chap. 6. For a good explication of a Christian/biblical conception of the mind-body relation, see John W. Cooper, *Body, Soul and Life Everlasting: Biblical Anthropology and the Monism-Dualism Debate* (Grand Rapids, MI: Eerdmans, 1989).

<sup>30</sup>See, for example, Swinburne, *Is There a God?*, rev. ed. (Oxford, UK: Oxford University Press, 2010), chap. 6; John Hick, *Evil and the God of Love*, 2nd ed. (New York: Harper and Row, 1977).

<sup>31</sup>William Lane Craig and James D. Sinclair, "The Kalam Cosmological Argument," in *The Blackwell Companion to Natural Theology*, ed. William Lane Craig and J. P. Moreland (West Sussex, UK: Wiley-Blackwell, 2012), 103–25.

<sup>32</sup>Jeffrey Koperski, *The Physics of Theism: God, Physics, and the Philosophy of Science* (Malden, MA: Wiley Blackwell, 2015), 85.

<sup>33</sup>Robin Collins, "The Teleological Argument: An Explanation of the Fine-Tuning of the Universe," in *The Blackwell Companion to Natural Theology*, ed. Lane Craig and Moreland, 274–75.

<sup>34</sup>Klaas Landsman, "The Fine-Tuning Argument: Exploring the Improbability of Our Existence," in *The Challenge of Chance: A Multidisciplinary Approach from Science and the Humanities*, ed. Klaas Landsman and Ellen van Wolde (Switzerland: SpringerNature, 2016), 122–24.

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### ASTRONOMY, LIFE, AND OUR COSMIC CREATOR

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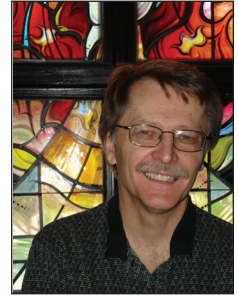


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Denis O.  
Lamoureux

# Intelligent Design Theory: The God-of-the-Gaps Rooted in Concordism

Denis O. Lamoureux

**THEISTIC EVOLUTION: A Scientific, Philosophical, and Theological Critique**  
by J. P. Moreland, Stephen C. Meyer, Christopher Shaw, Ann K. Gauger, and  
Wayne Grudem, eds. Wheaton, IL: Crossway, 2017. 1,000 pages. Hardcover;  
\$60.00. ISBN: 9781433552861.

In their 1,000-page *Theistic Evolution: A Scientific, Philosophical, and Theological Critique* (2017), proponents of Intelligent Design (ID) Theory reveal for the first time the theological foundations of their antievolutionary views.<sup>1</sup> During the last twenty-five or so years, ID theorists have repeatedly declared that their position on origins is based thoroughly on science and have carefully distanced their work from religion. Consequently, they have argued that their theory deserves to be presented in public schools and universities as an alternate scientific model to biological evolution.<sup>2</sup>

Since its inception, ID Theory has been criticized for being a God-of-the-gaps understanding of the origin of living organisms. In the book that launched this modern antievolutionary movement, *Darwin on Trial* (1991), lawyer Phillip Johnson notes that critics contend

it is a grave error to insert God into scientific accounts of (say) the origin of life, because this creates a “God of the gaps” who will inevitably be pushed aside as scientific knowledge advances.<sup>3</sup>

But the root of ID Theory has now been publically revealed. About one-quarter of *Theistic Evolution* is a strident defense of a concordist hermeneutic, which ultimately undergirds this antievolutionary God-of-the-gaps view of origins. Evidence of the theological underpinnings of ID Theory

is demonstrated by the inclusion in this book of a seven-page scripture index that cites over 1,500 Bible verses.

Before beginning this essay book review, three preliminary comments are required. First, according to a God-of-the-gaps approach to divine action, there are “gaps” in the continuum of natural processes, and these “discontinuities” in nature indicate places where God has miraculously intervened in the world.<sup>4</sup> Critics charge that this view portrays the Creator as a meddler who tinkers about sporadically in the origin and operation of the universe and life. However, it must be emphasized that God can act in the creation in any way and at any time he wants, including through dramatic interventions in origins.

If there are gaps in the continuum of natural processes, then science will identify them, and over time these gaps will “widen” with further research. That is, as scientists explore a true gap in nature where God has intervened, evidence will increase and demonstrate that there are no natural mechanisms to account for the origin or operation of a physical feature.

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# Essay Book Review

## *Intelligent Design Theory: The God-of-the-Gaps Rooted in Concordism*

If this ever happens, it would be reasonable to conclude that a divine intervention had occurred in the past.<sup>5</sup>

However, there is an indisputable pattern in the history of science. The God-of-the-gaps understanding of divine action has repeatedly failed.<sup>6</sup> Instead of the gaps in nature getting wider with the advance of science, they have always been closed or filled by the ever-growing body of scientific information. In other words, history reveals that these purported gaps have always been *gaps in knowledge* and not actual *gaps in nature* indicative of the intervening hand of the Lord. The belief in the God-of-the-gaps is ultimately based on a lack of information regarding the origin and operation of the natural world.

The second preliminary comment deals with concordism. This hermeneutical approach has appeared throughout church history and assumes that the Bible, in some way, aligns with the facts of nature.<sup>7</sup> Many evangelical Christians take for granted that God revealed some basic scientific truths in scripture well before their discovery by scientists today.<sup>8</sup> Concordism is then presented as proof that the Bible really is the inerrant Word of God. Only a Divine Being who is powerful and transcends time could have given modern scientific information to the ancient authors of scripture.<sup>9</sup> It must be acknowledged that concordism is a reasonable assumption. After all, God is the Creator of the world and he is also the Author of the Bible. The expectation that there is some sort of harmony or alignment between scripture and the facts of science is an assumption that makes sense to most Christians.

In recent years, there has been a trend moving away from concordism within evangelical biblical scholarship. For example, John Walton, professor of Old Testament at Wheaton College, observes,

Through the entire Bible, there is *not a single instance* in which God revealed to Israel a science beyond their own culture. No passage offers a scientific perspective that was not common to the Old World science of antiquity.<sup>10</sup>

Stated another way, scripture features what could be termed an “ancient science.” With this being the case, concordism is not possible. Ancient ideas about nature (e.g., a flat earth) cannot align with modern science (e.g., a spherical earth). To move beyond the use of the Bible as a source of scientific information, a nonconcordist hermeneutic suggests that the Holy

Spirit descended to the intellectual level of the biblical writers and allowed their ancient knowledge of nature to be used as a vessel to deliver inerrant spiritual truths. In other words, God accommodated by permitting the inclusion of an incidental ancient science during the process of inspiring scripture.

Thirdly, I have written this essay book review from the perspective of evolutionary creation.<sup>11</sup> This evangelical Christian view of origins asserts that *the Father, the Son, and the Holy Spirit created the universe and life, including humans, through an ordained, sustained, and intelligently designed evolutionary process* (see Appendix). In particular, evolution is teleological and features a plan, a purpose, and a final goal.<sup>12</sup> Evolutionary creationists firmly reject dysteleological evolution and the belief that the evolutionary process is the result of irrational necessity and blind chance. Instead, these evangelical Christians believe that biological evolution is intelligently designed and creates intelligently designed living creatures that “declare the glory of God” (Ps. 19:1).<sup>13</sup>

The term “evolutionary creation” became popular during the mid-1990s as part of an effort to distinguish evangelical Christians who accept biological evolution from a variety of liberal theisms that are often categorized under the general term “theistic evolution,” such as panentheism and process theism.<sup>14</sup> Evolutionary creationists are also adamantly opposed to secular interpretations of evolution such as deistic evolution, Darwinian evolution, Neo-Darwinism, atheistic evolution, and dysteleological evolution.<sup>15</sup> Regrettably, antievolutionists often misrepresent evolutionary creation by conflating this distinctly evangelical Christian view of origins with these liberal theisms and secular evolutionisms. In proceeding through this essay book review, it will become evident that many criticisms launched at so-called “theistic evolution” by ID theorists are, for the most part, against these liberal and secular ideologies, which evolutionary creationists firmly reject.

## Definitions of Evolution

Stephen Meyer, Discovery Institute Director of Science and Culture, is the most important ID theorist in the world today. In the opening chapter of *Theistic Evolution*, he defines the term “evolution” and offers three meanings: (1) “change over time,” (2) “common descent or universal common descent,” and (3) “the creative power of the natural selection/random variation (or mutation) mechanism.”<sup>16</sup>



Meyer then makes an important qualification to his third definition, which he labels “#3a.” He adds, “The natural selection/random variation (or mutation) mechanism can explain the appearance of design in living systems apart from the activity of an actual designing intelligence.”<sup>17</sup>

Meyer does not object to his first definition of evolution. In fact, he asserts that “neither in this section [i.e., his chapter], nor in any other [in this book], do we critique theistic evolution where evolution is defined as meaning merely ‘change over time.’”<sup>18</sup> As a former geophysicist in the oil industry, Meyer accepts that the earth is 4.6 billion years old and acknowledges, “The fossil record provides strong support for this idea [change over time].”<sup>19</sup> He then extends this meaning of evolution to also include “micro-evolution,” which he defines as “small-scale changes” within a species, such as color changes in pepper moths.<sup>20</sup> And even though Meyer entitles his opening chapter of the book “Scientific and Philosophical Introduction,” he fully reveals his theological beliefs and concordist hermeneutic. He contends that the “Jewish and Christian scriptures clearly affirm that God has caused change over time, not only in human history but also in the process of creating the world and different forms of life.”<sup>21</sup>

But Meyer rejects his second and third definitions of evolution. He correctly defines “common descent” as the notion that “relatively simple organisms can, with adequate time, change into much more complex organisms.”<sup>22</sup> In dismissing this form of evolution, commonly termed “macroevolution,” Meyer’s concordism is once again on full display:

[S]ome biblical theists question universal common descent based on their interpretation of the biblical teaching in Genesis [1] about God creating distinct “kinds” of plants and animals, each of which “reproduce after their own kind.” Those who think a natural reading of the Genesis account suggests that different kinds of plants and animals reproduce only after their kind, and do not vary beyond some fixed limit in their morphology [i.e., microevolution], question the theory of universal common descent on biblical grounds ... Indeed, the Bible describes God as not only acting to create the universe in the beginning; it also describes him as presently upholding the universe in its orderly concourse and also describes him as *acting discretely as an agent within the natural order*.<sup>23</sup>

It is quite evident from this passage that Meyer’s concordism is the root of his God-of-the-gaps view of origins. His “natural reading” of Genesis 1 leads him to believe in a Creator who acts “discretely as an agent” in the origin of “distinct ‘kinds’ of plants and animals.” The phrase “after their/its kind/s” appears ten times in Genesis 1 (vv. 11; 12, twice; 21, twice; 24, twice; 25, thrice) and it is a key concept that undergirds ID Theory. But is a concordist interpretation of this phrase correct? More anon.

Meyer’s third definition of the term “evolution” deals with the mechanisms of evolution and their relationship to intelligent design. In assuming that biological evolution is based entirely on natural selection and random mutations, he argues that this view of evolution leads to the belief that design in nature is only an appearance and merely an illusion. To support his case, Meyer quotes well-known atheists and their dysteleological view of evolution. For example, Richard Dawkins claims that “biology is the study of complicated things that give the appearance of having been designed for a purpose.”<sup>24</sup> Similarly, Francis Crick states that biologists need to “constantly keep in mind that what they see was not designed, but rather evolved.”<sup>25</sup> George Gaylord Simpson also asserts that “man is the result of a purposeless and natural process that did not have him in mind.”<sup>26</sup> And to further his argument, Meyer cites liberal Christian and theistic evolutionist Kenneth Miller, who maintains that “evolution works without either plan or purpose ... Evolution is random and undirected.”<sup>27</sup>

But Meyer’s strategy is quite obvious. He conflates so-called “theistic evolution” with secularist evolutionism and liberal theism. In particular, Meyer not only misrepresents evangelical Christians who accept evolution, but his rhetorical tactic is a straw man argument. As noted previously, evolutionary creation firmly rejects secular, dysteleological, and liberal theistic interpretations of evolution, and it definitely upholds the reality of intelligent design in nature. Moreover, this evangelical Christian view of evolution asserts that God planned men and women to be the pinnacle of creation because we are the only living organisms who have been created “in the image of God” (Gen. 1:27).

Now it must be noted that natural selection and random mutations are important mechanisms in biological evolution. What Meyer and his ID colleagues

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fail to grasp is that these natural processes operate within the boundaries of an overarching set of physical laws that are ordained and sustained by the Lord. Regrettably, most antievolutionists deprecate the notion of randomness. But randomness is an essential component of God's "very good" creation (Gen. 1:31).<sup>28</sup> For example, Brownian motion is the random movement of particles within a fluid. If this motion did not exist in our cells, we would die. Brownian motion drives biomolecules to assemble and disassemble according to their God-designed properties and the God-designed biochemical pathways within the cell.<sup>29</sup> To further explain randomness, consider a set of loaded (weighted) dice. Tossing these intelligently designed dice in any random way will in the end have the winning number appear most of the time. Evolutionary creation contends that this is also the case with biological evolution. With unfathomable foresight, the Creator set in motion and upheld over time intelligently designed self-assembling natural processes, including random processes, to create the universe and life as well as humans.

From the passages above, it is obvious that Meyer is a progressive creationist (or old earth creationist; see Appendix). To claim that he and his ID proponents in *Theistic Evolution* accept evolution as "change over time" is inaccurate. The term "evolution" is not properly associated with God-of-the-gaps miraculous interventions. As a research associate who has worked in a university paleontology department for over fifteen years, I have never met a scientist who defines evolution in this way. To repeat, Meyer's belief in a God who acts "discretely as an agent" to make "distinct 'kinds' of plants and animals" is progressive creation. His concordist hermeneutic and "natural reading" of Genesis 1 forces him to view living organisms through an antievolutionary paradigm. Even before opening the Book of Nature, Meyer already has the answer to the question of origins—a concordist reading of the Book of Scripture leads him to a God-of-the-gaps who creates plants and animals "after their own kind."

### Conflated Definitions of Intelligent Design and the "Theistic Evolution vs. Intelligent Design" False Dichotomy

One of the most surprising aspects of this 1,000-page tome is that contributors never explicitly or for-

mally define the term "intelligent design," which appears nearly three hundred times.<sup>30</sup> As noted above, Meyer in the first chapter of the book offers three precise definitions of the term "evolution," and takes six pages to do so. Other authors also make similar efforts to define evolution.<sup>31</sup> But Meyer and his twenty-four colleagues simply assume the meaning of intelligent design. In my reading of *Theistic Evolution*, I can identify two basic definitions of this term, and these are often conflated.

The most common use of the term "intelligent design" by ID proponents is that it refers to physical features in living organisms that arose through miraculous interventions. More specifically, the unique and central concept of ID Theory is that intelligent design in nature is "empirically detectable," "scientifically detectable," and "physically detectable."<sup>32</sup> Meyer notes that "advocates of intelligent design affirm, namely, that the past activity of a designing intelligence, including God's intelligence, is *detectable* or discernible in living systems."<sup>33</sup> In offering an example, he argues, "The abrupt appearance of novel fossil forms represents the paleontological signal, or *detectable* consequence, of some earlier-acting cause(s) that were sufficient to build animal structural and functional complexity within the time available."<sup>34</sup> References to the "past activity of a designing intelligence" and "earlier-acting cause(s)" are definitely indicative of a Creator who intervenes miraculously in the origin of living organisms. I term this the "God-of-the-gaps definition of intelligent design."

Like many chapters in *Theistic Evolution*, the Bible is used to undergird ID Theory, including this understanding of intelligent design. In criticizing theistic evolution, Meyer contends,

Yet, denying the *detectability* of design in nature generates another theological difficulty [for theistic evolution]. In particular, this view seems to contradict what the biblical record affirms about the natural world (or "the things that are made") revealing the reality of God and his "invisible qualities" such as his power, glory, divine nature and wisdom.<sup>35</sup>

Of course, Meyer is appealing to Romans 1:19–20. "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, so that men and women are without excuse." However, is the apostle Paul in this passage

referring to intelligently designed gaps in the creation that are “empirically detectable,” “scientifically detectable,” and “physically detectable”?

No, not at all. And here lies a deep theological problem with ID Theory. It assumes that intelligent design is scientifically provable through identifying gaps in nature. But ID theorists fail to fully understand the biblical notion of natural revelation. It is a nonverbal divine disclosure inscribed in the Book of Nature. As Psalm 19:1 states, “The heavens declare the glory of God.” This verse does not read, “The heavens declare God’s scientifically detectable gaps in nature.” Instead, the creation, through its beauty, complexity, and functionality, powerfully impacts everyone, and it leads us toward a *belief* in the Creator and some of his attributes. But even more problematic from a theological perspective, in attempting “to place God in a test tube,” so to speak, ID theorists undermine an indispensable component of biblical Christianity—faith. In the great biblical chapter on faith, Hebrews 11:6 states, “Without faith it is impossible to please God.” And Hebrews 11:3 asserts, “By faith we understand that the universe was formed at God’s command.” It is not by scientifically detectable gaps in nature that we can *prove* that God formed different kinds of living organisms. Inadvertently, proponents of ID Theory undercut the necessity of faith by claiming that design is “scientifically detectable.” To put it bluntly, the God-of-the-gaps definition of intelligent design is unbiblical.

Now there is a subtle and important point that needs to be made. Scientific evidence can certainly contribute to the belief that the world is intelligently designed. The history of science reveals that as scientists have probed deeper into nature, greater and more astonishing examples of beauty, complexity, and functionality have been discovered, thus declaring God’s glory. But the facts of science do not *prove* that the universe and life are designed. To be more accurate, scientific evidence contributes to a powerful *argument* for the reality of intelligent design. Everyone is deeply affected by the nonverbal revelation in the creation, including antireligious individuals.<sup>36</sup> And as Romans 1:19–20 states, every man and woman is accountable to this “plain” and “clearly seen” natural revelation so much so that we “are without excuse” if we reject it.<sup>37</sup>

The second meaning of intelligent design that appears in *Theistic Evolution* is what I term the “traditional and biblical definition of intelligent design.”

For example, John West, vice president of the Discovery Institute, asserts,

Both the Old and New Testaments clearly teach that human beings can recognize God’s handiwork in nature through their own observations rather than [through] special divine revelation [i.e., scripture]. From the psalmist who proclaimed that the “heavens declare the glory of God” (Psalm 19) to the Apostle Paul who argued in Rom. 1:20 that “since the creation of the world His invisible attributes are clearly seen, being understood by the things that are made,” the idea that we can see design in nature was clearly taught. Jesus himself pointed to the feeding of birds, the rain and the sun, and the exquisite design of the lilies of the field as observable evidence of God’s active care towards the world and its inhabitants (Matt. 5:44–45, 48; 6:26–30).<sup>38</sup>

It is important to note that these passages cited by West regarding Jesus’s view of nature do not deal with any God-of-the-gaps events. Instead, they appeal to God’s ordained and sustained natural processes from the realms of ecology, meteorology, and astronomy. With this being the case, West unsuspectingly opens the door to the possibility that evolutionary processes are also a revelation of God’s glory and attributes.

Leading ID theorist and molecular biologist Douglas Axe also affirms a traditional biblical understanding of intelligent design. He writes,

The book of Job, for example, tells us how Job was reminded of his smallness when asked by his Creator, “Is it by your understanding that the hawk soars and spreads his wings toward the south? Is it at your command that the eagle mounts up and makes his nest on high?” (Job 39:26–27). Those questions have the same humbling effect on us, thousands of years later ... I see no way around the fact that the arresting awe we’re meant to have for the maker of the majestic eagle is lost the moment we accept that accidental physical processes could have done the making instead.<sup>39</sup>

Axe is quite correct in identifying the overwhelming power of God’s revelation in nature. He is also right in believing that living organisms such as the eagle are not a result of mere “accidental physical processes.” Axe adds that such a dysteleological view of biology fails because it clashes with a “common sense fact—a plain truth testified to by our strong intuition that life is designed.” I completely agree.



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But it is critical to point out that it is “our strong intuition,” and not gaps in nature, that leads us to experience the “arresting awe” for the Creator.

*Theistic Evolution* presents two different meanings of the term “intelligent design.” In failing to distinguish between the God-of-the-gaps definition of design and the traditional biblical definition of design, a serious conflation arises. The authority of the Bible’s inerrant revelation that nature reflects intelligent design (Ps. 19:1; Rom. 1:20) is inadvertently transferred to ID Theory’s antievolutionary God-of-the-gaps view of design. *This conflation leaves unsuspecting readers with the impression that the existence of scientifically detectable gaps in nature is a thoroughly biblical doctrine and that scripture is adamantly opposed to evolution.*

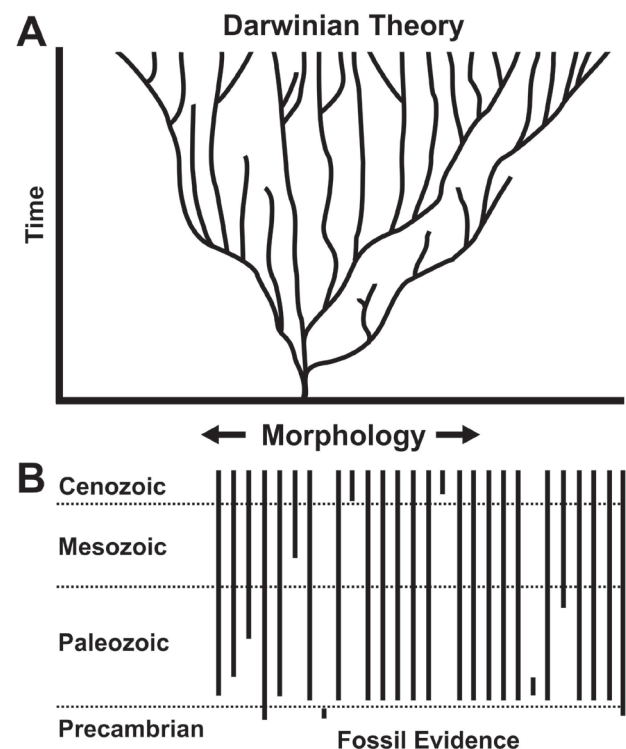
By conflating the biblical view of design with the God-of-the-gaps understanding of design, ID theorists in *Theistic Evolution* entrench a false dichotomy between biological evolution and intelligent design. This dichotomy is recast by philosopher and book editor J. P. Moreland into “theistic evolution versus intelligent design.” He repeats this phrase four times in his chapter opening the philosophical critique of theistic evolution, and he also refers to “theistic evolution/intelligent design” twice.<sup>40</sup> As a result, Moreland controls the categories of the discussion. Chained to this simplistic false dichotomy and black-and-white form of thinking, proponents of ID Theory and their supporters are blinded from seeing the possibility that evolution is an intelligently designed process that creates intelligently designed living organisms, as proposed by evolutionary creation.

### Evolution: A Collapsing Theory of Origins?

A central theme in *Theistic Evolution* is that the modern theory of biological evolution is in the process of breaking down. Meyer contends that the “theory [of evolution] is being abandoned by its own philosophical allies as empirically insufficient, or simply false.”<sup>41</sup> Similarly, philosopher Paul Nelson claims that “the theory of common descent is in trouble: possibly very serious trouble, from which it may never escape.”<sup>42</sup> And molecular biologist Ann Gauger with Meyer and Nelson asserts that biological evolution is a “scientifically failing theory of origins.”<sup>43</sup> Let’s examine some of the arguments used by ID theorists to support their belief that evolutionary theory is collapsing.

A claim repeatedly made by proponents of ID Theory is that the tree of life representing the evolution of living organisms as outlined by Charles Darwin does not align with the pattern found in the fossil record.<sup>44</sup> Figure 1 presents two contrasting patterns that often appear in ID literature. Pattern A is referred to as “Bottom-Up”; Pattern B, “Top-Down.”<sup>45</sup> For anyone not familiar with this scientific evidence, the abrupt appearance of numerous straight lines in Pattern B certainly gives the impression that most living organisms were made at about the same time, and that different kinds of creatures were created quickly and separately near the beginning of the Paleozoic period (541 million years ago). Moreover, these straight lines also seem to indicate that the morphology (anatomy) of these life forms has not changed since their first appearance in the fossil record.

Pattern B, however, is dealing with different *body plans* of animals, whereas Darwin’s tree of life in Pattern A employs different *species* of animals. For example, the body plan of chordates has four features: notochord, pharyngeal slits, dorsal hollow nerve cord, and post-anal tail. It appeared near the start of the Paleozoic period as a small worm-like creature similar to a lancelet. But the chordate body



**Figure 1.** The “Bottom-Up” Darwinian Fossil Pattern (A) and the “Top-Down” Pattern of the Appearance of Body Plans in the Fossil Record (B).

plan is also found in vertebrates—fish, amphibians, reptiles, birds, and mammals. Though the body plan of chordates has remained constant through time, the dramatic anatomical differences between these animals are completely overlooked in Pattern B. In other words, if the morphological features of vertebrate species were included, the pattern would not be one single straight line, but instead a tree-like pattern with countless branches. This frequent placement of Darwin's tree of life next to the appearance of body plans by ID theorists misleads unsuspecting readers and gives them the impression that the fossil record presents an antievolutionary view of biological origins.

Another argument that reappears throughout *Theistic Evolution* and ID literature deals with the purported problem of the origin of biological information.<sup>46</sup> In appealing to the God-of-the-gaps, Meyer and Nelson openly admit,

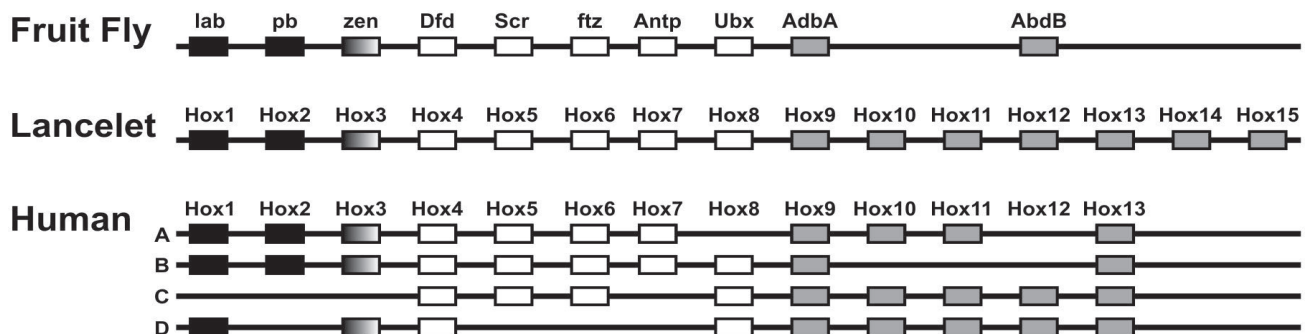
Intelligent design invokes a past event—albeit a mental event—rather than a law [i.e., a natural process] to explain the origin of information necessary to produce various novel forms of life as well as the complexity of the cell.<sup>47</sup>

However, there are well-known mechanisms in nature that increase biological information. To cite just two: gene duplications and chromosome duplications. And these can account for the Cambrian Explosion and the origin of vertebrates.<sup>48</sup> With duplications, the original genes and chromosomes continue to keep cells functioning normally, while the duplicated genetic material can evolve into new genes, resulting in new biological features. For example, a series of genes directs the formation of the body plan in animals. The similarity between

individual genes and the sequential order of them on separate chromosomes points back to numerous gene and chromosome duplication events in the past. Figure 2 shows the remarkable similarities between the body plan genes in a fruit fly, lancelet, and human.<sup>49</sup> Notably, when ID theorists discuss these genes, they do not present this diagram because it is striking evidence that all living organisms are genetically related through evolution.

Throughout the history of antievolutionism, a claim that incessantly appears is that there are no transitional fossils. For example, ID theorists Günter Bechly and Meyer assert that “alleged transitional sequences” with mammal-like reptiles are “at best, extremely rare exceptions” or “at worst, not at all the evidence of a continuous transformation that proponents of universal common descent claim.”<sup>50</sup> But this series is one of the most complete records of transitional fossils boasting over 1,000 species and more than 10,000 specimens.<sup>51</sup> The fact that paleontologists use the term “mammal-like reptile” speaks of their transitional character between reptiles and mammals. To offer just one spectacular example, consider *Probainognathus*. It has *two* jaw joints—a reptilian joint between the articular and quadrate bones, and a mammalian joint between the squamosal and dentary bones.<sup>52</sup> This is clear evidence of an evolutionary transition, going from reptiles to mammals.

In a similar way, ID theorist Casey Luskin claims that the fossil evidence for human evolution is “sparse,” “so weak,” and “simply isn't that clear.”<sup>53</sup> But this is also factually inaccurate. Paleoanthropologist Richard Potts, the director of the Smithsonian Human Origins Program, states that there are “approximately 6,000 fossil individuals of early humans,



**Figure 2.** Body Plan Genes. Animals have a series of genes on a chromosome/s that instructs the development of a basic head-thorax-abdomen body pattern. The genes in the same columns in this diagram are very similar (homologous). The boxes represent genes labeled in groups: anterior (black), group 3 (gradient), middle (white), and posterior (gray).

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spanning the past six million years.”<sup>54</sup> Moreover, the 1,800 pages and four volumes of the well-illustrated *The Human Fossil Record* present indisputable evidence of the evolutionary transition of prehuman ancestors into humans. There is no lack of human transitional fossils.

It must be acknowledged that a remarkable aspect of *Theistic Evolution* is that it offers readers a rich review of amazing new biological research that supports a traditional and biblical understanding of intelligent design. For example, zoologist Sheena Tyler describes many exquisitely “orchestrated” and “choreographed” natural processes in developmental biology.<sup>55</sup> In outlining processes that form the heart, she notes that

cardiac transcription factors [proteins that influence genes] “choreograph” the expression of *thousands of genes* at each stage of heart development, by interacting with cofactors, and by binding with a constellation of regulatory DNA elements.<sup>56</sup>

Tyler asks whether these developmental mechanisms “are assembled according to random and unguided Darwinian processes, or are these assemblies orchestrated, bearing hallmarks of intelligent design?”<sup>57</sup> But being entrenched in this dysteleological evolution versus intelligent design dichotomy, Tyler is blocked from seeing the possibility that God intelligently designed evolutionary processes in a manner similar to the mind-numbing orchestration of natural mechanisms in developmental biology.<sup>58</sup> As a result, Tyler and her ID colleagues have a narrow and limited design argument compared to evolutionary creationists, who have a much greater and more powerful view of intelligent design in affirming that God is behind each and every natural process in the world, including the mechanisms of evolution.

### God-of-the-Gaps Arguments: Unwitting Support for Evolution?

In declaring the collapse of evolutionary theory, many ID theorists in *Theistic Evolution* argue that the dramatic appearance of new fossils in the geological record is scientific evidence that proves God employed miraculous interventions in the creation of different kinds of plants and animals. These God-of-the-gaps antievolutionists also contend that the remarkably similar genetic and biomolecular features in living organisms point away from a random and undirected evolutionary process. To account for these similarities, they assert that the Creator

repeatedly reused the same intelligently designed biological programs in making separate forms of life. Let’s examine these two central ID theory arguments and consider the possibility that they might inadvertently affirm biological evolution.

### *Fossil Explosions Argument*

In their chapter “The Fossil Record and Universal Common Ancestry,” paleontologist Günter Bechly and Stephen Meyer argue that “the many discontinuous or abrupt appearances of new forms of life in the fossil record” is “a pattern that contradicts the continuous branching tree pattern of biological history postulated by proponents of universal common descent.”<sup>59</sup> Bechly and Meyer accept modern geology and a 4.6-billion-year-old Earth. They list nineteen examples of these bursts of organisms and the dates when these occurred during the past.<sup>60</sup>

1. Origin of Life (4.1 billion years ago), first cells
2. Origin of Photosynthesis (3.7 bya)
3. Archaean Genetic Expansion (3.3–2.8 bya)
4. Avalon Explosion (575–565 million years ago), first marine organisms
5. Cambrian Explosion (540–515 mya), marine animals
6. Great Ordovician Biodiversity Event (485–460 mya), marine invertebrates
7. Odontode Explosion (425–415 mya), jawed fish with teeth
8. Devonian Nekton Revolution (410–400 mya), swimming animals
9. Silurian-Devonian Radiation of Terrestrial Biotas [427–393 mya],<sup>61</sup> land plants
10. Carboniferous Insect Explosion (318–300 mya)
11. Triassic Explosion (252–235 mya)
12. Early Triassic Terrestrial Tetrapod Radiation (251–240 mya)
13. Early Triassic Marine Reptile Radiation (248–240 mya)
14. Mid-Triassic Gliding and Flying Reptile Radiation (230–228 mya)
15. Radiation of Flowering Plants (130–115 mya)
16. Mosasaur Radiation (91–66 mya)
17. Radiation of Modern Birds (65–55 mya)
18. Radiation of Modern Placental Mammals (62–49 mya)
19. Genus *Homo* (2 mya)

Of course, the use of terms such as “explosion” and “radiation” in modern geology unintentionally plays



into the hands of antievolutionists like Bechly and Meyer, and can mislead their unsuspecting readers. Such terminology gives the impression that there is scientific evidence for God's miraculous intervention in nature to create different kinds of living organisms, echoing back to the phrase "after their/its kind/s" in Genesis 1. Bechly and Meyer argue that the "discontinuous origins of novel forms of life as attested in the fossil record would have required the production of new genetic and epigenetic forms of information," and that these "*intelligently designed infusions* of new information into the biosphere" reflect "a rational order in the mind of a designer or creator."<sup>62</sup> Again, this is the God-of-the-gaps of progressive creation.

However, the terms "explosion" and "radiation" need to be understood within the context of modern geology. The appearance of new living organisms over periods of tens of *millions* of years (note the dates in the list) is quite rapid from the perspective of a 4.6-billion-year-old Earth.<sup>63</sup> Moreover, it must be underlined that these bursts of new plants and animals often occur after mass extinctions in which 50 to 90 percent of species disappear in the "blink of an eye" (understood from the perspective of geological time). For example, the well-known Cretaceous-Tertiary (K-T) extinction event that killed the dinosaurs 66 million years ago also eliminated about 75 percent of species on Earth. This produced a dramatic decrease in competitive pressures to survive, leaving newly evolving creatures to increase unimpeded. Following the K-T extinction, the number of placental mammal species "exploded" 62–49 mya. Plants and animals also diversify quickly when they gain the ability to enter a new environment. For example, with the evolution of flight, modern birds "radiated" 65–55 mya.

Again, it must be emphasized that these bursts of new forms of life occurred over long periods of time that lasted tens of *millions* of years. Consequently, they cannot be aligned with a "natural reading" of Genesis 1 as proposed by Meyer's concordist hermeneutic.<sup>64</sup> Consider the origin of sea creatures in scripture. There is only one single divine command on the fifth creation day to create marine life. "God said, 'Let the water teem with living creatures'" (Gen. 1:20). But this obviously does not align with the five bursts of marine creatures in the fossil record over a period of 175 million years from the Avalon Explosion (575–565 mya) to the Devonian

Nekton Revolution (410–400 mya). In addition, the sequence of fossils in the geological record does not match the order that God creates plants and animals in Genesis 1. For instance, marine life and birds are created at the same time on the fifth day of creation; but as Bechly and Meyer record, the former (575–400 mya) precedes the latter (65–55 mya) by roughly 500 million years. Similarly, the Bible states that fruit trees (i.e., flowering plants) were created on creation day 3, before sea creatures on day 5. However, as Bechly and Meyer's list shows, the first marine organisms (575 mya) appeared before the first fruit trees (130 mya) by about 450 million years.

Finally, it must be underlined that Bechly and Meyer make a striking admission with regard to the pattern of fossils in the geological record. They note that there is a "progression" or "succession" in the order in which living organisms appear on Earth from simple forms of life to more complex forms, and they even concede that this "general pattern of successive temporal appearances *agrees nicely* with the Darwinian picture of the history of life."<sup>65</sup> Of course, this creates a quandary for ID Theory antievolutionists. If indeed our Creator employed God-of-the-gaps "infusions of new information" to make plants and animals, then why would he have ordered them to look as though living organisms had evolved? From my point of view, Bechly and Meyer unwittingly affirm biological evolution.

### Common Designer Argument

In his chapter entitled "Universal Common Descent: A Comprehensive Critique," former Discovery Institute research coordinator Casey Luskin makes a remarkable admission about the genetic and biochemical similarities between all living organisms. He begins by stating that "it is *true* that the vast majority of organisms use the same 'standard code,' and all life forms employ similar types of biomolecules, such as, DNA, RNA nucleotides, and proteins."<sup>66</sup> Luskin then concedes, "*True*, universal common ancestry is one possible explanation for many genetic similarities we observe between organisms."<sup>67</sup> In other words, the molecular evidence in living organisms certainly supports biological evolution.

Of course, Luskin is quick to ask the question, "[A]re there other viable explanations?" And he answers,

Indeed there are. Intelligent agents frequently *re-use* the same parts in different designs to meet

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functional requirements, such as *reusing* wheels on cars and airplanes, or *reusing* key computer codes in different versions of Microsoft Windows ... Thus, common design—the intentional *reuse* of a common blueprint or components—is a viable explanation for the widespread functional similarities among the biomolecules found in different types of organisms. Universal common ancestry is not the only possible explanation.<sup>68</sup>

According to this antievolutionary view of origins, God reused genetic and biochemical components from earlier plants and animals, and then placed them into newly created kinds of living organisms.

The Common Designer argument is popular within antievolutionary circles. But in my opinion, it creates more problems than it solves. Take, for example, the creation of toothless whales. They have huge mouths and trap small marine organisms with fibrous mats that hang from their upper jaws. These mats are called a “baleen.” Yet when a toothless whale develops in the womb (whales are mammals), teeth appear in its mouth.<sup>69</sup> These are malformed and never attach to the jaws to become functional. In fact, most are lost before birth. But why would the Common Designer recycle the tooth genes from toothed animals and place them in whales with a baleen? Another notable feature about whales is that they have genes similar to those found in land animals that are used to make receptors for smelling chemicals *in air*. However, these genes are defective in whales and do not function.<sup>70</sup> Such genes are termed “pseudo-genes.” Yet again, why would the Creator reuse genes that are intended for land animals and put malfunctioning forms of these genes in whales that live *in water*? The evolutionary explanation is much simpler and more convincing. Whales evolved from land animals with teeth and a keen sense of smell, and after entering the oceans, they no longer needed these two features to survive and were lost, though genetic remnants for these characteristics remain in their chromosomes.

Let’s also consider the origin of humans in the light of the Common Designer argument. According to the contributors of *Theistic Evolution*, Adam was a real historical person. In using a concordist hermeneutic to interpret Genesis 2:7, they conclude that Adam was not “born from human parents” and that God created him “directly and specially.”<sup>71</sup> Return now to genes that make smell receptors. Land mammals have about 1,000 of these, but in humans nearly 60% of them are pseudo-genes.<sup>72</sup> Are we to believe

that the Creator took these mammalian genes, made over half of them nonfunctional, and then placed these defective genes in Adam? Similarly, we share with chimpanzees the same pseudo-gene involved in the production of vitamin C.<sup>73</sup> Most animals can produce this essential vitamin because the gene is functional, but chimps and humans need to consume foods with vitamin C. Does it make sense that after creating chimps with this pseudo-gene, the Common Designer reused this flawed gene in Adam? Why not give him a fully functional gene for this vitamin? After all, we are the Creator’s most treasured creation bearing the image of God.

Finally, we know that humans and chimpanzees have about 25,000 functional genes and roughly 99% of these genes are identical at the DNA level.<sup>74</sup> More remarkably, people and chimps share approximately 10,000 pseudo-genes.<sup>75</sup> According to the Common Designer argument, after God made animals on the sixth day of creation, he then created Adam “directly and specially” by reusing and recycling nearly every chimpanzee gene, *including their 10,000 defective genes*. But does this sound reasonable? A more convincing reason for the genetic similarities between us and chimps is that we are genetic “cousins” that descended from a common ancestor in the past.

The Common Designer argument strikes most people as special pleading. If ID theorists were not concordists, it is doubtful they would argue for a God-of-the-gaps who reuses “a common blueprint or components” in the creation of plants, animals, and humans. But by admitting that “universal common ancestry is one possible explanation for many genetic similarities we observe between organisms,” Casey Luskin unwittingly affirms biological evolution. And coupling this biomolecular data with Bechly and Meyer’s admission that the fossil record “agrees nicely with the Darwinian picture of the history of life,” it provides powerful *independent* and *complementary* evidence that living organisms have evolved.<sup>76</sup> To write off this scientific evidence as merely an “appearance” of evolution is no different than when some Christians claim that God created the universe to “look” old when in fact it is young. Old earth creationists like ID theorists would never accept this appearance-of-age argument, and to be consistent, nor should they embrace an appearance-of-evolution argument. It is only an unquestioning precommitment to a concordist hermeneutic that leads to a belief in a Common Designer who recycles

biological features through God-of-the-gaps miraculous interventions.

## Concordism: An Appropriate Biblical Hermeneutic?

The truly unique aspect of *Theistic Evolution* is that proponents of ID Theory for the first time openly reveal their concordist hermeneutic and how it undergirds their God-of-the-gaps antievolutionism. In the second chapter entitled “Biblical and Theological Introduction,” theologian and book editor Wayne Grudem correctly states that the debate about origins

is primarily about the proper interpretation of the first three chapters of the Bible, and particularly whether those chapters should be understood as truthful historical narrative, reporting events that actually happened.<sup>77</sup>

In the final quarter of this 1,000-page book, Grudem and his theological colleagues come to the conclusion that “Genesis 1–3 should not be understood as primarily figurative or allegorical literature, but should rather be understood as historical narrative.”<sup>78</sup>

Regrettably, Grudem’s contributions are marred by misinformation about so-called “theistic evolution.” He contends that according to theistic evolution, plants and animals

evolved over billions of years and new forms of life are the result of random mutations, not God’s commands. The driving force that brings about mutations in living things is randomness, not God’s command.<sup>79</sup>

In dealing with natural revelation and citing Romans 1:20, Grudem claims that “theistic evolution says that *no living creature* in nature bears witness to God,” and that “theistic evolution completely nullifies the evidence for God’s existence, and therefore significantly hinders evangelism.”<sup>80</sup> With regard to hermeneutics, he asserts that a “nonhistorical reading of Genesis 1–3 does not arise from factors *in the text itself* [i.e., the Bible] but rather depends upon a prior commitment to an evolutionary framework of interpretation.”<sup>81</sup> Finally, Grudem charges that “theistic evolution significantly undermines the doctrine of the atonement” and “theistic evolution undermines the effectiveness of the resurrection to give new life to all who are saved by Christ.”<sup>82</sup>

Let me personally respond to these misrepresentations. As an evolutionary creationist, I wrote at the

beginning of this essay book review that “*the Father, the Son, and the Holy Spirit created the universe and life, including humans, through an ordained, sustained, and intelligently designed evolutionary process.*” Grudem’s attempt to yoke evangelical Christians who accept evolution with a dysteleological view of evolution based only on “random mutations” is not right and results in a misleading conflation (2 Cor. 6:14).

Regarding natural revelation, I stated earlier that “biological evolution is intelligently designed and creates intelligently designed creatures that ‘declare the glory of God’ (Ps. 19:1).” In fact, I consider antievolutionary views such as ID Theory to be a “stumbling block” between the Lord and non-Christians who have actually seen the evidence for evolution (2 Cor. 6:3). I must also emphasize that my shift away from a concordist (historical) reading of Genesis 1–3 was not due to “a prior commitment to an evolutionary framework of interpretation.” At that time I was a vociferous antievolutionist. It was evidence *within the Word of God itself* that made me realize that the Bible is not a book of science and that concordism fails (I will share some of this biblical evidence in the next section).

Lastly, Grudem’s claim that evolutionary creation undermines the doctrines of the atonement and resurrection is simply not true. Evangelical Christians like me, who accept biological evolution, believe that Jesus died for our sins and rose bodily from the grave. Salvation is only found in Jesus Christ (Rom. 10:9; Acts 4:12).<sup>83</sup>

According to Grudem’s concordist hermeneutic, a “natural reading of the text of Genesis” and “simply reading the biblical text alone”<sup>84</sup> reveals twelve indisputable historical and scientific facts about origins that contradict theistic evolution:

1. Adam and Eve were the first human beings,
2. Adam and Eve were not born from human parents,
3. God acted directly or specially to create Adam out of dust from the ground,
4. God created Eve directly from a rib taken from Adam’s side,
5. Adam and Eve were at first sinless human beings,
6. Adam and Eve committed the first human sins,
7. Human death began as a result of Adam’s sin,
8. All human beings have descended from Adam and Eve,



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9. God acted directly in the natural world to create different “kinds” of fish, birds, and land animals,<sup>85</sup>
10. God rested from his work of creation,
11. God created an originally “very good” natural world in the sense of a world that was a safe environment, free of thorns and thistles and similar harmful things, and
12. After Adam and Eve sinned, God placed a curse on the world that changed the workings of the natural world and made it more hostile to humankind.<sup>86</sup>

Items 1–8 deal with the origin of Adam and humans; item 9, the origin of animals; and items 11–12, the cosmic fall.<sup>87</sup>

Grudem’s concordist reading of the Bible is further demonstrated by his endorsement of John Lennox’s *Seven Days That Divide the World: The Beginning according to Genesis and Science*. He writes,

Lennox favors the view (*which I find quite plausible*) that Genesis 1 speaks of “a sequence of six creation days; that is, days of normal length (with evenings and mornings as the text says) in which God acted to create something new, but days that might well have been separated by long periods of time” ... He [Lennox] also favors the view that the original creation of the heavens and earth in Genesis 1:1–2 may have occurred long before the first “creation day” in Genesis 1:3–5, which would allow for a very old earth and universe.<sup>88</sup>

Grudem’s concordism is also the root of his God-of-the-gaps view of origins. Again, he approvingly quotes Lennox, “According to Genesis, then, creation involved not just one, but a sequence of several discrete creation acts, after which God rested.”<sup>89</sup> This antievolutionary understanding of origins falls in the camp of progressive creation (old earth creation and day-age creation), and it could be termed “days and ages creation.”

However, hermeneutical problems abound in Grudem’s approach to the opening chapters of the Word of God. First, he betrays his own “natural reading of the text of Genesis” and “simply reading the biblical text alone.” Such a reading would never result in Lennox’s interpretation that the days of Genesis 1 are literal days describing God’s actual creative events separated by periods of time hundreds of millions of years long. Moreover, the order in which living organisms are created in Genesis 1

does not align with the appearance of living organisms in the fossil record. Scripture presents the creation of land plants on creation day 3, sea creatures (fish and whales) and birds on day 5, and land animals and humans on day 6. But the sequence in the fossil record reveals fish, land plants, land animals (amphibians, reptilians, and mammals), birds, whales, and humans. Obviously, this concordist hermeneutic fails.

Items 11 and 12 in Grudem’s list of twelve creative events in Genesis 1–3 “that actually happened” deal with the cosmic fall. He contends that in judgment for the sin of Adam, God cursed the ground (Gen. 3:17) and introduced thorns and thistles into the world (Gen. 3:18). As a result, the “very good” creation (Gen. 1:31)<sup>90</sup> was dramatically changed (Rom. 8:20–22) and became hostile to humans. Grudem explains,

Indeed, the kind of earth we have today, with frequent earthquakes, hurricanes, floods, droughts, poisonous snakes and venomous scorpions, malaria-spreading mosquitoes, and man-eating sharks and lions, can hardly be thought to be the best kind of creation that God could make, a creation that would cause God to say, “and behold, it was very good” ... God’s statement that the ground would now produce “thorns and thistles” is best understood as a synecdoche, a common feature in biblical speech by which two or three concrete examples represent an entire category of things. Taken in this way, God’s words of judgment mean that the earth would not only produce thorns and thistles, but would also harbor insects that would destroy crops (such as locusts, Deut. 28:38; Amos 7:1), diseases that would consume them (see Deut. 28:22), foraging animals that would eat crops before they could be harvested, and floods and droughts, tornadoes and hurricanes that would make farming difficult and life precarious (see Eccles. 11:4).<sup>91</sup>

There is one simple and fatal problem with Grudem’s belief in the cosmic fall. If indeed human sin is the reason that God launched the cosmic fall, then humans should appear in the fossil record *before* the appearance of the many deleterious and deadly events and creatures listed by Grudem above. However, the first human fossils appear at the very top of the geological record hundreds of millions of years *after* “earthquakes, hurricanes, floods, droughts, poisonous snakes and venomous scorpions, malaria-spreading mosquitoes, and man-eating

sharks and lions.” Using the Bible to draw out modern scientific information always fails.

The concordist interpretation of scripture outlined in *Theistic Evolution* also suffers from a serious hermeneutical asymmetry (or inconsistency). Grudem’s list of twelve “events that actually happened” in Genesis 1–3 is limited to living organisms only.<sup>92</sup> He makes no mention of the creation of the inanimate world. But a “natural reading” of Genesis 1 definitely states that God created the heavens on creation day 2, the earth and seas on day 3, and the sun, moon, and stars on day 4. And by “simply reading the biblical text alone,” Genesis 1 asserts that the Creator made these inanimate structures through dramatic miraculous interventions—just like those divine creative events used to create different “kinds” of living creatures.

It is worth adding that ID theorists also have a problematic scientific asymmetry. Being old earth creationists, they believe that God initiated the Big Bang about 14 billion years ago and that he used the natural process of cosmological evolution to create suns, planets, moons, and so forth. But for 10 billion years after the Big Bang, he did not intervene in the universe until 4.1 billion years ago when he miraculously made living cells.<sup>93</sup> Since the Creator formed the inanimate world through a natural process and did not use God-of-the-gaps interventions as stated in Genesis 1, does it mean that proponents of ID Theory are liberal theists? Or worse, for the first 10 billion years after the Big Bang, are they in effect deists?

By completely overlooking statements in Genesis 1 regarding the creation of the heavens and the earth, the theologians of *Theistic Evolution* squandered an opportunity to reconsider whether concordism is a feature of the Word of God.<sup>94</sup> Let me explain in the next section.

## Moving Beyond Concordism

To the surprise of most evangelical Christians, the structure of the world that appears in the Bible is a 3-tier universe as depicted in figure 3. The creation of the heavens in Genesis 1 is the best evidence *within scripture itself* that undermines concordism. On the second day of creation, God creates a solid firmament to separate the heavenly seas (“waters above”) from the earthly seas (“waters below”).<sup>95</sup> The Creator on the fourth day places the sun, moon, and stars in the firmament. From an *ancient* phenomenologi-

cal perspective, this conception of the structure of the heavens made perfect sense.<sup>96</sup> The dome of the sky looks like an inverted bowl holding back a blue body of water; and the sun, moon, and stars appear to be positioned in the surface of the firmament. This ancient science was the astronomy-of-the-day in the ancient Near East.<sup>97</sup> In addition, the 3-tier universe is mentioned in one of the most important passages in the Bible—the Kenotic Hymn (Phil. 2:6–11). The apostle Paul writes in verses 9–10, “Therefore God exalted him [Jesus] to the highest place and gave him the name that is above every name, that at the name of Jesus every knee should bow, [1] in heaven and [2] on earth and [3] in the underworld.”<sup>98</sup>

The Word of God features an ancient astronomy, and it is only consistent that it also has an ancient biology. Scripture presents living organisms as *immutable*. Ancient people saw that wheat produced seeds that when sown gave rise to only wheat plants. Similarly, the seeds found inside fruit grew into trees that always produced the same fruit. The ancients also observed that hens laid eggs that hatched only chicks, female sheep continually gave birth to lambs, and women were always the mothers of human infants. From an ancient phenomenological perspective, plants and animals never changed. It becomes evident why the inspired ancient writer of Genesis 1 referred ten times to God creating plants and animals

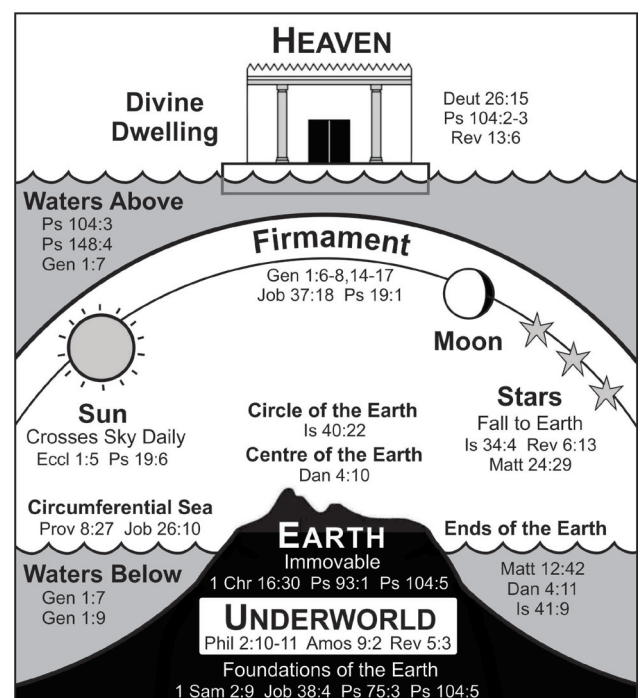


Figure 3. The 3-Tier Universe in Scripture.

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“after their/its kind/s.” Ancient individuals saw that living organisms were immutable, and it made perfect sense for them to think that God had created each different kind of plant and animal quickly and fully formed. This ancient understanding of origins is termed “*de novo* creation.” It appears in most ancient accounts of origins and features a Creator/s who act/s dramatically through miraculous interventions.<sup>99</sup> In this way, God’s creative action in Genesis 1 is filtered through this ancient view of the origin of living organisms. The Holy Spirit accommodated and descended to the intellectual level of the inspired biblical writer and allowed him to use his ancient biology.

Therefore, the *de novo* creation of plants and animals as recorded in the Bible is not to be “understood as historical narrative.” More specifically, Grudem’s item 9—God acted directly in the natural world to create different “kinds” of fish, birds, and land animals—fails to identify the ancient biological notions of immutability and *de novo* creation. The phrase “after their/its kind/s,” which is so foundational to ID Theory, is rooted in an ancient biology. This interpretive error is no different from failing to recognize the ancient astronomy in Genesis 1 and then claiming that God really created a domed firmament overhead. The ancient biology in Genesis 1 is clear evidence that the Bible does not reveal how the Lord actually created plants and animals.

The ancient concept of *de novo* creation has a crucial implication for Grudem’s items 1–8 and the origin of Adam and humans. The dramatic and miraculous creation of humans in Genesis 1:26–27, and in particular the formation of Adam from the dust of the earth in Genesis 2:7, is an ancient biological understanding of human origins. Similar to the origin of plants and animals, scripture does not reveal how God actually created humanity. Therefore, the origin of humans recorded in the Bible is not to be “understood as truthful historical narrative, reporting events that actually happened.”<sup>100</sup> In the same way that the Holy Spirit accommodated and allowed the biblical writers to employ an ancient understanding of astronomy in the creation of the heavens, the Lord also permitted an ancient biology in conceptualizing the origin of men and women. The *de novo* creation of humans in Genesis 1 and 2 is an incidental ancient vessel that delivers the inerrant spiritual truths that the Lord created us and that we bear the image of God.

The biblical scholars in *Theistic Evolution* completely overlook the ancient understanding of origins *within scripture itself*.<sup>101</sup> In particular, theological editor Wayne Grudem and New Testament scholar Guy Prentiss Waters cite dozens of passages from throughout the Bible in an attempt to justify that Genesis 1–3 is a “historical narrative.” However, should anyone be surprised that the biblical writers accepted the *de novo* creation of the universe and life, including humans? No. This was the origins science-of-the-day in the ancient world. And, of course, the apostle Paul believed in a historical Adam as stated in Romans 5 and 1 Corinthians 15.<sup>102</sup> However, does this apostle’s belief that Adam was a real person mean that Adam actually existed? No. If one attempts to use this argument, then consistency demands that Paul’s belief in a 3-tier universe in Philippians 2:10 must also be accepted as a scientific truth. I doubt that any of the contributors to *Theistic Evolution* believe that the world has three levels. Paul’s belief in the historicity of Adam as stated in Romans 5 and 1 Corinthians 15 is based on an incidental ancient origins science that delivers inerrant spiritual truths: (1) humans are sinners, (2) God judges humans for their sins, (3) Jesus died for sinful humans, (4) Jesus rose physically from death, and (5) Jesus offers humans the hope of eternal life. These five items summarize the Gospel, and they are passionately embraced by evolutionary creationists like me.

## Final Thoughts

In 1998 the Center for the Renewal of Science and Culture at the Discovery Institute outlined a plan called “The Wedge.” Five-year objectives included “ten [Discovery Institute] Fellows teaching at major universities” and “two universities where design theory has become the dominant view.”<sup>103</sup> Two twenty-year goals envisioned “intelligent design theory as the *dominant* perspective in science” and “design theory permeat[ing] our religious, cultural, moral and political life.”<sup>104</sup> By the writing of this essay book review in 2018, none of these objectives or goals has materialized. I think it is fair to say that “The Wedge” plan has failed.<sup>105</sup> But was this unexpected? No. The history of science and the history of biblical interpretation offer a consistent pattern. God-of-the-gaps views of divine action and concordist readings of the Word of God have always failed.

Before ending this review of *Theistic Evolution*, two questions might have arisen in the mind of readers



that need to be addressed. First, why has ID Theory been so popular within evangelical Christianity over the last twenty-five or so years? I believe there are two contributing factors. Everyone experiences the impact of intelligent design in nature as affirmed by Psalm 1:1–4 and Romans 1:18–20. And everyone enjoys the fruits of science daily through medicine, engineering, computer science, and so on. The moment ID theorists juxtaposed the religious term “intelligent design” and the scientific term “theory,” they created an incredibly powerful polemical device. The idea that design in nature is scientifically detectable instantly captured evangelical Christians, both personally in affirming their faith and apologetically in defending it. But as I have argued, this purportedly scientific view of natural revelation and intelligent design is unbiblical because it lacks the essential element of faith. The Lord cannot be placed in a test tube.

Secondly, why are ID theorists in *Theistic Evolution* betraying their longstanding tradition of distancing their view of origins from religion? I submit the fol-

lowing speculation. ID Theory has made no inroads within universities, whereas evolutionary creation is currently growing within evangelicalism.<sup>106</sup> In an attempt to salvage their theory and institutions, proponents of ID are appealing directly to the evangelical community by revealing the theological and biblical foundations of their model of origins. Since most evangelicals embrace various forms of concordism and antievolutionism, many will be captured by the God-of-the-gaps view of origins and concordist hermeneutic in *Theistic Evolution*. But will this strategy work? For a short time, yes, but in the long term, no. Again, history is our teacher. As Christians we came to terms with Galileo and astronomy in the seventeenth century, and I fully expect we will come to terms with Darwin and biological evolution in the future. \*

### Acknowledgment

I am most grateful to Anna-Lisa Ptolemy, Lyn Berg, and Esther Martin for their excellent editorial assistance in the preparation of this essay book review.

## Appendix: Evangelical Christian Views of Origins

	YOUNG EARTH CREATION Six Day Creation	PROGRESSIVE CREATION Day-Age Creation	EVOLUTIONARY CREATION
<b>Intelligent Design</b>	Yes Nature reveals God	Yes Nature reveals God	Yes Nature reveals God
<b>Age of the Universe</b>	Young 6,000 years	Old 14 billion years	Old 14 billion years
<b>Evolution of Life</b>	Rejects macro-evolution Accepts micro-evolution	Rejects macro-evolution Accepts micro-evolution	Accepts macro-evolution
<b>God's Activity in the Origin of the Universe and Life</b>	Yes Miraculous interventions over six days	Yes 1. Miraculous interventions for “kinds” of living organisms across millions of years 2. Natural processes for inanimate universe	Yes God uses ordained and sustained self-assembling natural processes
<b>God's Activity in the Lives of Men and Women</b>	Yes God acts miraculously with people	Yes God acts miraculously with people	Yes God acts miraculously with people
<b>Interpretation of Genesis 1</b>	Accepts spiritual truths Accepts concordism Creation days = 24 hrs  <b>Bible is a source of scientific information</b>	Accepts spiritual truths Accepts concordism Creation days = millions of yrs  <b>Bible is a source of scientific information</b>	Accepts spiritual truths Rejects concordism Recognizes ancient science  <b>Bible is NOT a source of scientific information</b>

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## Intelligent Design Theory: The God-of-the-Gaps Rooted in Concordism

### Notes

<sup>1</sup>J. P. Moreland, Stephen C. Meyer, Christopher Shaw, Ann K. Gauger, and Wayne Grudem, eds., *Theistic Evolution: A Scientific, Philosophical, and Theological Critique* (Wheaton, IL: Crossway, 2017). Cited hereafter as *TE*.

<sup>2</sup>The best example of attempting to teach ID Theory in public schools was during 2004 in Dover, Pennsylvania. A legal trial ensued and the teaching of intelligent design was deemed to violate the Establishment Clause of the First Amendment. See “Decision in *Kitzmiller v. Dover*” by Judge John E. Jones, December 20, 2005, accessed February 20, 2018, [https://ncse.com/files/pub/legal/kitzmiller/highlights/2005-12-20\\_Kitzmiller\\_decision.pdf](https://ncse.com/files/pub/legal/kitzmiller/highlights/2005-12-20_Kitzmiller_decision.pdf). Recently, ID theorists have shifted their science education policy. See endnote 105.

<sup>3</sup>Phillip E. Johnson, *Darwin on Trial*, 2<sup>nd</sup> ed. (Downers Grove, IL: InterVarsity Press, 1993), 166. For my critique of Johnson’s acceptance of the God-of-the-gaps, see Phillip E. Johnson and Denis O. Lamoureux, *Darwinism Defeated? The Johnson-Lamoureux Debate on Biological Origins* (Vancouver, BC: Regent College Press, 1999), 37–40.

<sup>4</sup>It is important to underline that the God-of-the-gaps is limited to divine action in the origin and operation of the natural world. This notion does not extend to the Lord’s miraculous acts in the personal lives of men and women.

<sup>5</sup>This openness to the possibility of God-of-the-gaps events makes it clear that I am not uncritically committed to methodological naturalism. But Stephen Dilley complains that “this version is not a meaningful type of methodological naturalism” (*TE*, 620). Of course, ID theorists like Dilley need to cast methodological naturalism in a secular light in order to set up their false dichotomy between biological evolution and intelligent design. For example, Stephen Meyer and Paul Nelson claim, “Methodological naturalism asserts that, to qualify as scientific, a theory must explain all phenomena by reference to purely physical or material—that is, *non-intelligent*—causes or processes” (*TE*, 564; italics added). Again, this is a conflation of science and secularism. In contrast, as a Christian who practices science, I fully embrace that all natural mechanisms reflect intelligence and the mind of God.

<sup>6</sup>A classic example of the God-of-the-gaps is catastrophism in geology at the beginning of the nineteenth century. See Davis A. Young, *The Biblical Flood* (Grand Rapids, MI: Eerdmans, 1995), 98–117.

<sup>7</sup>For a history of concordist interpretations dealing with the creation of the inanimate world in the first four days of Genesis 1, see Stanley Jaki, *Genesis 1 through the Ages* (New York: Thomas More, 1992). Jaki notes,

Around 1900 or so, two leading Catholic exegetes, Lagrange and Hummelauer, admitted that none of the countless interpretations of Genesis 1 that had been offered during the previous eighteen hundred years could carry conviction. The source of that debacle was concordism, or the belief that Genesis 1 was cosmogenesis in a scientific sense, however indirectly. (Quoted from back cover)

<sup>8</sup>Of course, the question must be asked, why do the facts in scripture align with the science of *our* generation? To me, this seems rather self-serving.

<sup>9</sup>For example, progressive creationist Hugh Ross claims there is an alignment between Genesis 1 and the scientific record of origins. He concludes,

Obviously, no author writing more than 3,400 years ago, as Moses did, could have so accurately described and sequenced these events, plus the initial conditions,

without divine assistance ... [This is] powerful evidence of the scientific soundness of the Bible ... the book of Genesis must be supernaturally inspired. (Hugh N. Ross, *Creation and Time* [Colorado, CO: NavPress, 1994], 153–54)

<sup>10</sup>John H. Walton, *The Lost World of Genesis One: Ancient Cosmology and the Origins Debate* (Downers Grove, IL: IVP Academic, 2009), 19 (italics added). See also Kyle Greenwood, *Scripture and Cosmology: Reading the Bible between the Ancient World and Modern Science* (Downers Grove, IL: IVP Academic, 2015).

<sup>11</sup>The BioLogos Foundation is an invaluable resource of scientific and theological information explaining evolutionary creation. For an introduction to this evangelical view of evolution, see Denis O. Lamoureux, “Evolutionary Creation: A Christian Approach to Evolution,” accessed February 20, 2018, [https://biologos.org/uploads/projects/Lamoureux\\_Scholarly\\_Essay.pdf](https://biologos.org/uploads/projects/Lamoureux_Scholarly_Essay.pdf).

<sup>12</sup>Stephen Meyer dedicates a chapter to criticizing my acceptance of teleological evolution, which he simply writes off as “the difference it doesn’t make” (*TE*, 217–36). I find it incredible that as a philosopher he fails to appreciate the far-reaching implications of an evolutionary process that is teleological and intelligently designed. Such a view of evolution completely undermines every secularist worldview.

<sup>13</sup>Denis O. Lamoureux, “Do the Heavens Declare the Glory of God? Toward a Biblical Model of Natural Revelation,” *Faith and Thought: The Journal of the Victoria Institute* 59 (October 2015): 18–38.

<sup>14</sup>Theological editor Wayne Grudem objects to the term “evolutionary creation” and deems it “misleading.” He argues that the “ordinary sense” of the word “creation” refers to “God’s direct activity” in forming plants, animals, and humans (*TE*, 65). But Grudem overlooks the fact that most ID theorists accept cosmological evolution, and therefore, they do not understand the “creation” of the inanimate world in the “ordinary sense.” We will explore these hermeneutical and scientific asymmetries later in this essay book review.

<sup>15</sup>It is unfortunate that throughout *Theistic Evolution* the views of Charles Darwin are presented as being dysteleological. For example, Stephen Meyer writes, “As Darwin himself insisted, ‘There seems to be no more design in the variability of organic beings and in the action of natural selection, than in the course in which the wind blows’” (*TE*, 39). This passage comes from Darwin’s 1876 *Autobiography* in a twelve-page section entitled “Religious Belief.” What Meyer fails to report to his readers is that Darwin then offers two intelligent design arguments in response. In what could be termed his “rational design argument,” Darwin states,

Another source of conviction in the existence of God, connected with the reason and not with the feelings, impresses me as having much more weight. This follows from the extreme difficulty or rather impossibility of conceiving this immense and wondrous universe, including man with his capacity of looking backwards and far into futurity, as a result of blind chance or necessity. When thus reflecting I feel compelled to look to a First Cause having an intelligent mind in some degree analogous to that of man; and I *deserve* to be called a Theist. This conclusion was strong in my mind about the time, as far as I can remember, when I wrote the *Origin of Species*. (Charles Darwin, *The Autobiography of Charles*

*Darwin*, 1809–1882, ed. Nora Barlow [1876; London: Collins, 1958], 92–93; italics added)

In other words, Darwin believed in intelligent design and a personal God when he wrote his most famous book. Note the present tense of the term “feel” and “deserve” in this passage, indicating that he held these two beliefs late in life (he died in 1882). Also see endnote 58 and Denis O. Lamoureux, “Darwinian Theological Insights: Toward an Intellectually Fulfilled Christian Theism—Part I: Divine Creative Action and Intelligent Design in Nature,” *Perspectives on Science and Christian Faith* 64, no. 2 (2012): 108–19.

<sup>16</sup>Moreland et al., eds., *TE*, 34–40.

<sup>17</sup>*Ibid.*, 37.

<sup>18</sup>*Ibid.*, 49–50.

<sup>19</sup>*Ibid.*, 35.

<sup>20</sup>*Ibid.*

<sup>21</sup>*Ibid.*, 41. To claim that in Genesis 1 “God has caused change over time” and to assert that this is a form of evolution is surely stretching the meaning of the term “evolution” far beyond its normal understanding. I suspect that Meyer is doing this to make his theory more palatable to the scientific community.

<sup>22</sup>*Ibid.*, 36.

<sup>23</sup>*Ibid.*, 41, 45 (italics original).

<sup>24</sup>*Ibid.*, 39; and Richard Dawkins, *The Blind Watchmaker* (New York: Norton, 1986), 1.

<sup>25</sup>Moreland et al., eds., *TE*, 40; and Francis Crick, *What Mad Pursuit* (New York: Basic Books, 1988), 138.

<sup>26</sup>Moreland et al., eds., *TE*, 40; and George Gaylord Simpson, *The Meaning of Evolution*, rev. ed. (New Haven, CT: Yale University Press, 1967), 345.

<sup>27</sup>Moreland et al., eds., *TE*, 42; Kenneth R. Miller and Joseph S. Levine, *Biology* (Upper Saddle River, NJ: Prentice Hall, 1998), 658. In defining theistic evolution in a similar way, John West quotes Miller who asserts that “mankind’s appearance on this planet was not preordained, that we are here ... as an after-thought, a minor detail, a happenstance in a history that might just as well have left us out” (*TE*, 770–71); and Kenneth R. Miller, *Finding Darwin’s God* (New York: HarperCollins, 1999), 272.

<sup>28</sup>Kathryn Applegate’s four-part “Endless Forms Most Beautiful: Understanding Randomness” is an excellent series explaining the notion of randomness in nature from an evangelical Christian perspective, accessed February 2, 2018, <https://biologos.org/blogs/kathryn-applegate-endless-forms-most-beautiful/series/understanding-randomness>. In particular, the video in Applegate’s “That’s Random! A Look at Viral Self-Assembly,” <https://biologos.org/blogs/kathryn-applegate-endless-forms-most-beautiful/thats-random-a-look-at-viral-self-assembly> (March 16, 2013), was critical in the development of my understanding of how God uses randomness.

<sup>29</sup>I thank Justin Lorieau for his assistance in explaining some of the nuances of Brownian motion.

<sup>30</sup>In the “General Index” of *Theistic Evolution*, the term “intelligent design” does not include “definitions of,” as it does for the term “evolution.” At best, Matti Leisola offers a cursory definition of “design,” and states, “Merriam-Webster [dictionary] defines ‘design’ as ‘deliberate purposive planning’” (*TE*, 141). Of course, such a definition includes a teleological and intelligently designed view of evolution as promoted by evolutionary creation. C. John Collins, in his chapter, distinguishes between “large scale” and “small scale” design. An example of the former is the fine-tuning of the universe. The latter

includes God-of-the-gaps miraculous events in the origin of life and the human mind (*TE*, 670–72).

<sup>31</sup>Moreland et al., eds., *TE*, 141, 364–65, 757.

<sup>32</sup>*Ibid.*, 67, 566, 583, 599, 600, 620, 624, 625, 626, 649, 650, 663, 784, 812, 946, 947, 951.

<sup>33</sup>*Ibid.*, 48 (italics original).

<sup>34</sup>*Ibid.*, 110 (italics added).

<sup>35</sup>*Ibid.*, 48–49 (italics added).

<sup>36</sup>In a stunning admission regarding the power of intelligent design in nature, atheist Richard Dawkins confesses,

The problem is that of complex design ... The complexity of living organisms is matched by the elegant efficiency of the *apparent* design. If anyone doesn’t agree that this amount of complex design cries out for an explanation, I give up ... Our world is dominated by feats of engineering and works of art. We are entirely accustomed to the idea that complex elegance is an indicator of premeditated, crafted design. This is probably the most powerful reason for the belief, held by the vast majority of people that have ever lived, in some kind of supernatural deity. (Richard Dawkins, *The Blind Watchmaker* [London: Penguin, 1991], xiii, xvi; italics added)

In addition, the impact of natural revelation led to the shocking conversion of famed philosopher Antony Flew from atheism to a belief in a Creator. He argues,

Biologists’ investigation of DNA has shown, by the almost unbelievable complexity of the arrangements to produce life, that intelligence must have been involved ... The only satisfying explanation for the origin of such “end-directed [teleological], self-replicating” life as we see it on earth is an infinitely intelligent Mind. (Antony Flew, *There Is a God: How the World’s Most Notorious Atheist Changed His Mind* [New York: HarperOne, 2007], 123, 132)

<sup>37</sup>The notion of human accountability also appears in Wisdom 13:8–9: “Yet again, not even they are to be excused. For if they had the power to know so much that they could investigate the world, how did they fail to find sooner the Lord of these things?”

<sup>38</sup>Moreland et al., eds., *TE*, 49.

<sup>39</sup>*Ibid.*, 88–89.

<sup>40</sup>*Ibid.*, 547, 548 (twice), 549, 556, 559. This dichotomy is also prominently displayed in the title of Tapio Puolimäki’s chapter “The Origin of Moral Conscience: Theistic Evolution versus Intelligent Design” (*TE*, 731–53).

<sup>41</sup>*Ibid.*, 107.

<sup>42</sup>*Ibid.*, 404.

<sup>43</sup>*Ibid.*, 257.

<sup>44</sup>It amazes me that antievolutionists like ID theorists repeatedly attack the views of Charles Darwin. He was a nineteenth-century biologist and the academic discipline of biology has moved well past his ideas. Criticizing Darwin’s biology is similar to attacking Galileo’s heliocentric astronomy with heavenly spheres causing the motion of planets, and then claiming we do not live in a solar system. I do not know of any biologist who accepts Darwin’s tree of life as outlined in his famed 1859 *Origin of Species*. For a diagram of this tree, see *TE*, 379. Paleontologist Robert Carroll asserts,

Progressive increase in knowledge of the fossil record over the past hundred years emphasizes *how wrong Darwin was* in extrapolating the pattern of long-term evolution from that observed within populations and species. (Robert L. Carroll, *Patterns and Processes of Vertebrate Evolution* [Cambridge, UK: Cambridge University Press, 1997], 8; italics added)



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<sup>45</sup>Moreland et al., eds., *TE*, 351–53, 358. Figure redrawn from Stephen C. Meyer, *Darwin's Doubt* (New York: HarperOne, 2013), 35.

<sup>46</sup>Meyer contends, "According to neo-Darwinian theory, new genetic information arises first as random mutations occur [*sic*] in the DNA of existing organisms. 'Random' here means 'without respect to functional outcome,' entailing that there can be no inherent directionality or *telos* [i.e., teleology] to mutational events." (*TE*, 112). Like most of his ID colleagues, Meyer paints a dysteleological view of evolution with no plan, no purpose, and no end goal. Of course, this entrenches the false dichotomy of "theistic evolution versus intelligent design" found throughout *Theistic Evolution*.

<sup>47</sup>*Ibid.*, 579.

<sup>48</sup>Peter W. H. Holland, "Did Homeobox Gene Duplications Contribute to the Cambrian Explosion?," *Zoological Letters* 1, no. 1 (2015): 1–8; N. Soshnikova et al., "Duplications of Hox Gene Clusters and the Emergence of Vertebrates," *Developmental Biology* 378 (2013): 194–99.

<sup>49</sup>Diagram based on G. Panopoulou and A. J. Poustka, "Timing and Mechanism of Ancient Vertebrate Genome Duplications," *Trends in Genetics* 21 (2005): 559–67; Peter W. H. Holland, "Evolution of Homeobox Genes," *WIREs Developmental Biology* 2 (2013): 31–45; and Alison Heffer and Leslie Pick, "Conservation and Variation in Hox Genes: How Insect Models Pioneered the Evo-Devo Field," *Annual Review of Entomology* 58 (2013): 161–79. I am grateful to Bruce Hemming for this last citation.

<sup>50</sup>Moreland et al., eds., *TE*, 356.

<sup>51</sup>Personal communication with paleontologist Michael W. Caldwell, February 23, 2018. See also T. S. Kemp, "The Origin and Early Radiation of the Therapsid Mammal-Like Reptiles: A Paleobiological Hypothesis," *Journal of Evolutionary Biology* 19 (2006): 1231–47. I am grateful to Aaron R. H. LeBlanc for this citation.

<sup>52</sup>Robert L. Carroll, *Vertebrate Paleontology and Evolution* (New York: W. H. Freeman, 1988), 390.

<sup>53</sup>Moreland et al., eds., *TE*, 473.

<sup>54</sup>Richard Potts and Christopher Sloan, *What Does It Mean to Be Human?* (Washington, DC: National Geographic, 2010), 11.

<sup>55</sup>Moreland et al., eds., *TE*, 299.

<sup>56</sup>*Ibid.*, 303 (italics added). To offer an example from my scientific specialty of dental development and evolution, the formation of just one tooth takes about 15,000 genes! Shijia Hu, Joel Parker, and John Timothy Wright, "Towards Unraveling the Human Tooth Transcriptome: The Dentome," *PLOS One* (April 7, 2015): 1–13. Such developmental orchestration is mind numbing and leads me to believe that these natural processes are intelligently designed.

<sup>57</sup>Moreland et al., eds., *TE*, 290.

<sup>58</sup>In assisting Christians to understand evolution as God's method of creation, evolutionary creationists often point to our development in the womb. No one thinks that the Lord comes out of heaven and miraculously intervenes to attach an entire leg or arm to our developing bodies. Instead, we believe that God creates every person using intelligently designed embryological mechanisms that he ordered and upheld during each moment of our development. As Psalm 139:13–14 states, "For you [God] created my inmost being; you knit me together in my mother's womb. I praise you because I am fearfully and wonderfully made." Similarly, God "knitted together" every

living organism through his ordained and sustained natural process of evolution, creating plants and animals that are "fearfully and wonderfully made." Notably, Charles Darwin used this analogy between developmental biology and evolution in his most famous book, *Origin of Species*. He writes,

Authors of the highest eminence [i.e., progressive creationists] seem to be fully satisfied with the view that each species has been independently created. To my mind it accords better with what we know of the laws impressed on matter by the Creator, that the production and extinction of the past and present inhabitants of the world should have been due to secondary causes like those determining the birth and death of the individual. (Charles Darwin, *On the Origin of Species* [1859; Cambridge, MA: Harvard University Press, 1964], 488)

<sup>59</sup>Moreland et al., eds., *TE*, 331–32.

<sup>60</sup>*Ibid.*, 340–51.

<sup>61</sup>Precise dates were not included by Bechly and Meyer. They merely referred to "Late Silurian and Early Devonian" (*TE*, 345).

<sup>62</sup>*Ibid.*, 354 (italics added).

<sup>63</sup>For an introduction, see "Patterns of Radiation" in Carroll, *Patterns and Processes*, 340–61.

<sup>64</sup>See quotation with endnote 23.

<sup>65</sup>Moreland et al., eds., *TE*, 336 (italics added).

<sup>66</sup>*Ibid.*, 376–77 (italics added).

<sup>67</sup>*Ibid.*, 377 (italics added).

<sup>68</sup>*Ibid.*, 377–78 (italics added). This analogy fails because it is structured on an engineering analogy and mindset. Cars, airplanes, and computer codes do not give birth to cars, airplanes, and computer codes. Engineers have to intervene directly to make these things and to change their features in later versions of them. In contrast, living organisms have the ability to replicate and modify through their own natural processes.

<sup>69</sup>A. E. W. Miles and Caroline Grigson, eds., *Colyer's Variations and Diseases of the Teeth of Animals* (Cambridge, UK: Cambridge University Press, 1990), 101.

<sup>70</sup>Dennis R. Venema and Scot McKnight, *Adam and the Genome* (Grand Rapids, MI: Brazos, 2017), 37.

<sup>71</sup>Moreland et al., eds., *TE*, 72.

<sup>72</sup>Yoav Gilad, Orna Man, and Gustavo Glusman, "A Comparison of the Human and Chimpanzee Olfactory Receptor Gene Repertoires," *Genome Research* 15, no. 2 (2005): 224.

<sup>73</sup>Graeme Finlay, "Homo Divinus: The Great Ape that Bears God's Image," *Science and Christian Belief* 15 (2003): 24.

<sup>74</sup>Venema and McKnight, *Adam and the Genome*, 32. Two accessible introductions to evolutionary genetic evidence are Francis S. Collins, *The Language of God: A Scientist Presents Evidence for Belief* (New York: Free Press, 2006) and Daniel J. Fairbanks, *Relics of Eden: The Powerful Evidence of Evolution in Human DNA* (Amherst, NY: Prometheus, 2010).

<sup>75</sup>Zhaolei Zhang and Deyou Zheng, "Pseudogene Evolution in the Human Genome," *Wiley Online Library eLS* (February 2014): 1.

<sup>76</sup>Moreland et al., eds., *TE*, 336.

<sup>77</sup>*Ibid.*, 61.

<sup>78</sup>*Ibid.*, 64.

<sup>79</sup>*Ibid.*, 828.

<sup>80</sup>*Ibid.*, 830 (italics original). Grudem adds, "But according to theistic evolution, unbelievers have a gigantic excuse, for they could say that all living things can be explained as a result of the properties of matter without any spe-

cial creative action by God" (TE, 831). See my comments regarding human accountability associated with endnote 37.

<sup>81</sup>Ibid., 76 (italics added).

<sup>82</sup>Ibid., 835, 836.

<sup>83</sup>As I wrote in a recent book, "Jesus loves us so much that he died for us (John 3:16)" and "The Gospels are eyewitness accounts of actual historical events, including the Lord's teaching and miracles, and especially his physical resurrection from the dead." Denis O. Lamoureux, *Evolution: Scripture and Nature Say Yes!* (Grand Rapids, MI: Zondervan, 2016), 20, 120 (italics original). Moreover, BioLogos is the leading evolutionary creationist organization in the world and its fourth article of faith states:

We believe in the historical incarnation of Jesus Christ as fully God and fully man. We believe in the historical death and resurrection of Jesus Christ, by which we are saved and reconciled to God. ("What We Believe," accessed February 2, 2018, <https://biologos.org/about-us/our-mission>)

<sup>84</sup>Moreland et al., eds., TE, 73–74. Note that I have turned this list of theistic evolution negations into biblical affirmations upheld by Grudem's concordist hermeneutic.

<sup>85</sup>Grudem inexplicably overlooks the creation of plants in item 9.

<sup>86</sup>Moreland et al., eds., TE, 72–73; also 785.

<sup>87</sup>To buttress this list of purported historical and scientific events, theologian Gregg Allison contributes a chapter entitled "Theistic Evolution Is Incompatible with Historical Christian Doctrine." He concludes that "the early church affirmed that God the Father created, out of nothing, the heavens and the earth and all that is visible and invisible, through God the Son, in six days, a few thousand years ago" (TE, 934). In summarizing "Protestant doctrinal standards," Allison notes that they affirm "Adam and Eve were created as the first human beings and as the progenitors of the entire human race" (TE, 943).

But no one should be shocked that the formulators of Christian doctrines embraced young earth creation and a historical Adam and Eve. Scientists only discovered that the earth was older than six thousand years in the eighteenth century, and in the following century that living organisms had evolved. If antievolutionists like Allison want to appeal to the views held by Christians in history, then to be consistent, they should also include their views on astronomy. For example, Martin Luther claimed that "the earth is the center of the entire creation." Similarly, John Calvin confidently stated, "We indeed are not ignorant, that the circuit of the heavens is finite, and that the earth, like a little globe, is placed in the center." I doubt Allison and his ID Theory colleagues are geocentrists. And the fact that Protestant reformers Luther and Calvin believed the earth was at the center of the entire universe should raise concerns and doubts regarding their understanding of biology, and in particular, the origin of living organisms and humans. Martin Luther, *Luther's Works: Lectures on Genesis, Chapters 1–5*, ed. J. Pelikan (St. Louis, MO: Concordia, 1958), 35; John Calvin, *Commentary on Genesis*, 2 vols (Grand Rapids, MI: Christian Classics Ethereal Library, 2007 [1554]), I: 25–26, accessed February 22, 2018, <http://www.ccel.org/ccel/calvin/calcom01.pdf>.

<sup>88</sup>Moreland et al., eds., TE, 63 (italics added). See John C. Lennox, *Seven Days That Divide the World: The Beginning according to Genesis and Science* (Grand Rapids, MI: Zondervan, 2011), 53–54.

<sup>89</sup>Moreland et al., eds., TE, 817.

<sup>90</sup>The word limit of this review does not allow me to deal in detail with the notion of the term "good" (Hebrew *tōb*) in Genesis 1. Suffice it to say that the use of this term is utilitarian. In other words, the creation functions the way the Creator intended. This Hebrew word also carries a nuance of beauty. In this way, the world created by God works beautifully for his intended purposes. See Denis O. Lamoureux, "Beyond the Cosmic Fall and Natural Evil," *Perspectives on Science and Christian Faith* 68, no. 1 (2016): 51–53.

<sup>91</sup>Moreland et al., eds., TE, 818, 820. Interestingly, another contributor in *Theistic Evolution* offers a *Satan-of-the-gaps* view of the origin of natural evil. Garrett DeWeese claims,

Thus it is plausible that at least some natural evil is the result of the activity of *Satan and his hordes* [italics added]. Consider just one example, the movement of tectonic plates. Plate subduction recycles greenhouse gases, and contributes to the relative stability of the earth's surface temperature by conducting away the heat generated in the earth's radioactive core. While it seems to us today that such activity inevitably produces volcanism and earthquakes, it is certainly possible that, as God created the earth, the process of subduction was smooth, only later being subjected to forces, produced or directed with malevolent intent by *Satan's hordes* [italics added], that made the movement chaotic. It is also possible that such reasoning could apply to ecosystemic interactions such as predation, to weather events, and so on. (TE, 701)

<sup>92</sup>To be more accurate, Grudem limits his list to animals only and completely overlooks plant life.

<sup>93</sup>For Bechly and Meyer's list of miraculous divine interventions in the origin of life, see the list on page 120.

<sup>94</sup>I think that it is significant that the terms "concordism" or "concordist" do not appear once in the 1,000 pages of *Theistic Evolution*. Lacking awareness of this hermeneutical category, ID proponents cannot possibly deal directly with it.

<sup>95</sup>The word translated as "firmament" in Genesis 1 is the Hebrew noun *rāqīa'*. It is related to the verb *rāqā'* that has the meaning "to flatten," "hammer down," and "spread out." In particular, this verb has the sense of flattening something solid, and it is found in the context of pounding metals into thin plates. For example, Exodus 39:3 states, "They hammered out thin sheets of gold." The related noun *riqqūa'* refers to metal sheets. As Numbers 16:38 commands, "Hammer the [metal] censers into sheets to overlay the altar." The verb *rāqā'* is even found in a passage that refers to the creation of the sky, which is understood to be solid and similar to a metal. Job 37:18 asks, "Can you join him [God] in spreading out [*rāqā'*] the skies, hard as a mirror of cast bronze?"

<sup>96</sup>It is important to distinguish between *ancient* and *modern* phenomenological perspectives. Observation in the ancient world was limited to unaided physical senses, and what ancient people saw with their naked eyes they believed to be real, such as the literal rising and setting of the sun. In contrast, we have the advantage of having scientific instruments like telescopes. When we see the sun "rising" and "setting," we know that this is only an appearance or visual effect caused by the rotation of the earth.

<sup>97</sup>For images of the Egyptian 3-tier universe and the Mesopotamian heavenly sea and firmament, see Othmar Keel, *The Symbolism of the Biblical World* (New York: Seabury, 1978), 36, 174.



# Essay Book Review

## Intelligent Design Theory: The God-of-the-Gaps Rooted in Concordism

<sup>98</sup>English translations often refer to “under the earth” in verse 10. But the actual Greek word is *katachthoniōn*. It is made up of the preposition *kata* which means “down,” and the noun *chthonios* that refers to the “underworld” or “subterranean world.” Regrettably, Grudem fails to identify the apostle Paul’s acceptance of ancient science, and he unnecessarily incites evangelical Christian readers by repeatedly stating that theistic evolution forces us to believe that “Paul was wrong” (TE, 805, 806, 808, 810, 821 [twice]). But as Philippians 2:10 reveals, Paul believed in a 3-tier universe. Was Paul wrong? From our modern scientific perspective, he was wrong. Yet from his ancient phenomenological perspective, he was correct because this astronomy was the science-of-the-day. But more importantly, the inerrant spiritual truth in this verse transcends Paul’s incidental ancient science—Jesus is Lord of the entire world. It is worth noting that Grudem and theologians in *Theistic Evolution* do not once deal with Philippians 2:10 and the obvious ancient astronomy.

<sup>99</sup>For an excellent overview of ancient creation accounts throughout the world, see David A. Leeming, *Creation Myths of the World: An Encyclopedia*, 2 vols., 2nd ed. (Santa Barbara, CA: ABC-CLIO, LLC, 2010).

<sup>100</sup>Moreland et al., eds., TE, 61.

<sup>101</sup>Grudem is aware that evangelical theologians like me have argued that scripture features ancient science. But he quickly dismisses us and asserts that “standard evangelical commentaries contain reasonable, textually sensitive explanations that do not require us to conclude that the Bible anywhere affirms false statements about the natural world” (TE, 826). I would argue that recognizing the ancient Near Eastern science in scripture is without question “textually sensitive.”

<sup>102</sup>To further explain the Apostle Paul’s belief in a historical Adam, see Denis O. Lamoureux, “Was Adam a Real Person?,” *Christian Higher Education* 10, no. 2 (2011): 79–96.

<sup>103</sup>No Author, “The Wedge” (1998): 2. Published by the Center for the Renewal of Science and Culture at the Discovery Institute, accessed February 1, 2018, [https://ncse.com/files/pub/creationism/The\\_Wedge\\_Strategy.pdf](https://ncse.com/files/pub/creationism/The_Wedge_Strategy.pdf).

<sup>104</sup>Ibid. (italics original).

<sup>105</sup>In a dramatic strategic shift in July 2017, ID theorists now state,

Instead of recommending teaching about intelligent design in public K–12 schools, Discovery Institute seeks to increase [underline original] the coverage of evolution in curricula. It believes that evolution should be fully and completely presented to students, and they should learn more about evolutionary theory, including its unresolved issues. In other words, evolution should be taught as a scientific theory that is open to critical scrutiny, not as a sacred dogma that can’t be questioned. (Discovery Institute Staff, “Discovery Institute’s Science Education Policy,” July 3, 2017, accessed March 6, 2018, <https://www.discovery.org/a/3164>)

Of course, it is obvious what this strategic change is attempting to do. Since ID theorists now openly accept evolution as “change over time” (TE, 34), they will claim to be evolutionists and attempt, surreptitiously, to insert their God-of-the-gaps view of evolution into educational institutions. I thank James Stump for this link.

<sup>106</sup>John Currid acknowledges that “the evolutionary creation movement is stronger than it has ever been and is making inroads into evangelical thought today” (TE, 842–43).

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**TRACING THE LINES: Spiritual Exercise and the Gesture of Christian Scholarship** by Robert Sweetman. Eugene, OR: Wipf & Stock, 2016. 177 pages. Paperback; \$24.00. ISBN: 9781498296816.

I was recently in conversation with a faculty member at a conservative Christian school, and the topic drifted briefly to medieval Christianity. Somewhat out of the blue, my conversation partner interjected a question apparently designed to check whether I agreed that Aquinas was wrong about the relationship between faith and reason, although we had been discussing neither that theologian nor that topic. It seemed symptomatic of the tendency in some Christian circles to turn metadiscussions about the nature of knowledge into theological or ideological touchstones designed to help keep the boundaries clear and well patrolled and the barbarians at bay.

Robert Sweetman's new book on the nature of Christian scholarship takes a contrasting tack. Sweetman argues that various models of faith and learning—what he refers to as complementarist, integrationist, and holistic accounts—should all be seen as seeking to account for the “intrinsic Christian unity or integrality of scholarship across the disciplines” (p. 7). Each model emerges from a specific time with specific historical constraints and resources. Sweetman suggests that it may be helpful to view them less as candidates in a quest for the one true grail, and more as folk recipes, variant ways of cooking broadly the same dish but with different cooks and kitchens, some ingredients varying with the season and the local landscape. Christian scholarship becomes less like building border walls and more like making salsa.

Stated so briefly and starkly, this might sound to some like a lazy invitation to live and let live, or a dangerous dereliction of duty where truth is at stake. Such an impression would seriously underestimate the book, however, as at least three features of the argument suggest.

First, it is clear throughout that accepting historically located variation does not mean giving up on critique or on the concrete contribution of Christian commitment to careful scholarly delineation. Sweetman helpfully probes some key strengths and weaknesses of each model, including the holistic model that he himself confesses as his intellectual kitchen. Each approach, he suggests, is worthy of serious engagement as an attempt at fidelity, and each answers the needs of a particular time and place. Yet each also carries risks and shortcomings that resist the notion that it is a final solution. There is still good and bad salsa, even if more than one variety might be deemed a success.

Second, an important thread running through the argument is Sweetman's allegation that current accounts of the relationship of faith to learning tend to share, regardless of their preferred model, underlying Aristotelian assumptions regarding the nature of difference. Scholarship is assumed to be a genus of human activity with *Christian* scholarship one of its specific kinds, which must then be identified in terms of its specific and stable differences over against other kinds. This assumption creates the twin embarrassments of struggling both to constrain and affirm the degree of meaning shared with others in claims made about the world, and to identify actual differences in how Christian scholarship works. Sweetman suggests that a more helpful approach would focus on the ways the practice of scholarship is “attuned” to a Christian “heart” and contributes to tending that heart (pp. 155–56). What is offered is a kind of philosophical spirituality of scholarship in place of a mere difference calculus. This approach explicitly pushes back against the impulse to make the world of scholarship safe for faith by creating definitive ramparts to inscribe securely the boundaries of difference. There must still be conceptual determination, the ability to articulate carefully the traces connecting the Christian heart and scholarly judgment, but this determination will not be for the purposes of final demarcation. There is an inherent uncertainty as to exactly where the process will lead that is congruent with humility, openness to learning from others and from creation, and wisdom seeking.

Third, while the book advocates for a more irenic scholarship of the Christian heart, it does so, not through an anecdotal easing of the task of scholarly exactitude, but through careful and precise philosophical and historical argument. Indeed, this is true to a degree that might make this book less appealing to some faculty as an introduction to thinking about faith and scholarship, as compared to some of the volumes commonly used in faculty development. I suspect the book will be more accessible to liberal arts faculty than to those in scientific, technical, and professional disciplines, given the nature of its tools and narrative. The reader will need patience while working carefully through episodes in the history of Christian philosophy (unsurprisingly, since that is the disciplinary expertise that Sweetman brings to the conversation). The book leads the reader through thoughtful analyses of Justin Martyr, Augustine, Bonaventure, Gilson, John Paul II, Plantinga, Marsden, Dooyeweerd, and Runner. These are then located in the secularization of the medieval academy, the rise of ideology in the nineteenth century, and in twentieth-century efforts to critique secular society, allowing us to see some of the needs feeding theoretical choices.

This book is not a light or casual read. It is, however, a very helpful read. It is not long, and its careful and persuasive argument is both important and encouraging, especially to anyone for whom the idea of “creative

# Book Reviews

fidelity" holds any appeal. I hope that it is widely and thoughtfully engaged, and I recommend it warmly to any reader wishing to think carefully about the relationship between faith and learning.

*Reviewed by David I. Smith, Professor of Education, Calvin College, Grand Rapids, MI 49546.*



## HISTORY OF SCIENCE

**SCIENCE AND RELIGION: A Historical Introduction**, 2nd ed. by Gary B. Ferngren, ed. Baltimore, MD: Johns Hopkins University Press, 2017. 484 pages. Paperback; \$32.95. ISBN: 9781421421728.

What can one truthfully say about the second edition of a book? To say that the number of chapters remain the same (30) would be a triviality. Or to say that the price has increased by \$13 would be an obvious no-brainer. But, to say that the quality of the second edition has improved rather dramatically is worth exploring. Gary Ferngren, Professor of History at Oregon State University and a professor of the history of medicine at First Moscow State Medical University, has been compiling history of science and religion, medicine and religion readers for a number of years. The first edition of *Science and Religion: A Historical Introduction* (2002) was given a short review in *PSCF* 56, no. 1 (2004): 62–63. A snippet of Fraser Fleming's laudatory review is on the flyleaf of this newer edition.

Of the many introductory books on the topic of science and religion, Ferngren's *Science and Religion* set a standard. The first edition was a shortened version (selected entries) of the much longer *The History of Science and Religion in the Western Tradition: An Encyclopedia* (New York: Garland, 2000). Contributions by leading scholars, such as John H. Brooke, Ronald Numbers, David Lindberg, James Moore, Nicholaas A. Rupke, David Livingstone, among others, gave the book an authoritative voice and thus it served as an extremely attractive choice for instructors teaching undergraduate courses on science and religion. This new edition will certainly play a similar role.

This second edition is more expansive and more in tune with contemporary discussions. The book has a short introduction by Ferngren, stating that the purpose of the volume is "to provide a comprehensive survey of the historical relationship of the Western religious traditions with science from Aristotle to the early twenty-first century" (p. xii). Ferngren also widens the field of discussion to include various other non-Christian traditions, which have gained influence in the West, by adding chapters on Judaism, Asian traditions, and even atheism. This edition also has a revised and updated chapter on premodern Islam. In short, there are a number of chapters retained from the first edition that have been updated in content and given

a new bibliography. There are eleven new chapters to whet one's appetite, a number of them in the social sciences. Consequently, some chapters in the first edition were excised or retired. For example, chapters by Colin Russell on the conflict of science and religion and David Wilson on the historiography of science and religion have been dropped. Margaret Osler's chapter on mechanical philosophy and Ronald Numbers's on scientific creationism have also been excised. Interestingly, the chapter by William Dembski on intelligent design has also disappeared.

The book has six parts: Part I (one chapter): Science and Religion: Conflict or Complexity; Part II (four chapters): The Premodern Period; Part III (five chapters): The Scientific Revolution; Part IV (five chapters): Transformations in Geology, Biology, and Cosmology, 1650–1900; Part V (seven chapters): The Response of Religious Traditions; and Part VI (eight chapters): The Theological Implications of Modern Science. Part VI contains many of the new chapters, written by some new and younger contributors: "Causation" by Mariusz Tabaczek and John Henry, "The Modern Synthesis in Evolution" by Joshua M. Moritz, "Anthropology" by Timothy Larsen, "American Psychology" by Matthew S. Hedstrom, and "Neuroscience and the Human Person" by Alan C. Weissenbacher. Earlier parts of the book have chapters authored by newer voices as well, for example, "Isaac Newton" by Stephen D. Snobelen. Part III includes a revised chapter, "Early Modern Protestantism," written by Edward B. Davis.

It would take too much space to review each chapter. A brief word about the first chapter will suffice. The introductory essay in Part I by Stephen P. Weldon provides a good synthesis of the current state of discussion of science/religion issues, common among historians of science. In particular, he argues that discussions or debates surrounding the conflict, harmony, and separateness of science and religion rely too heavily on essentialist definitions of science and religion. Weldon maintains that we need a more nuanced appreciation of the complexity of this relationship. Any historical account that retains a form of essentialism, in which the quality and character of science and religion do not change over time and context, needs to be abandoned.

For Weldon this history is by and large "a modern western story" (p. 5). I found it disconcerting to read that Weldon considers it "problematic to call Buddhism or Confucianism a religion" (p. 5). Is religion only a western phenomenon? Could this position come from our penchant to equate religion with certain practices, rituals, institutions, social networks, or even with theological propositions and statements? That religion as practiced takes on nuances due to social and intellectual factors is historically viable. But religion, in my opinion, bores much deeper. Religion is our total response to a call outside ourselves. Being open to God's revela-

tion is, in the first place, a defining mark of our human response to God's loving address. It is a universal mark, "essential," one could say. As Charles A. Coulson once expressed it: "Religion is the total response of man to all his environment." Consequently, religion is not irrelevant to, or in conflict with, or complementary to, or simply an influence on, science, but rather the very ground of scientific practice.

For those who wish to get a good overview of the present status of science and religion as viewed by contemporary historians of science, this is a good book. It could also serve as an intellectually challenging introduction for undergraduates in a science/religion course. Whether it will satisfy historians of religion is another question. Nevertheless, we should take Weldon's encouragement to heart, namely that we "remain open to finding ways to talk about what we broadly and imprecisely call 'the history of science and religion'" (p. 16).

*Reviewed by Arie Leegwater, Calvin College, Grand Rapids, MI 49546.*



## ORIGINS

**EVOLUTION: Still a Theory in Crisis** by Michael Denton. Seattle, WA: Discovery Institute Press, 2016. 354 pages. Paperback; \$24.95. ISBN: 1936599325.

The genius of Darwin's *The Origin of Species* was that it provided a simple and elegant mechanism to account for the great diversity of life observed in the natural world. The textbook picture is that normal miniscule genetic variations in a population, when they confer reproductive advantage, are passed on to offspring and carried through the generations. The accumulation of these miniscule adaptations over extreme spans of time eventually leads to divergence of populations into distinct and reproductively isolated species that occupy their own ecological niches. Thus, the core of a Darwinian view is that features are only passed along through the generations if they confer reproductive advantages, and if the process leading to the genesis of distinct species is slow.

Michael Denton's recent book, *Evolution: Still a Theory in Crisis*, provides an extended argument against an extreme interpretation of Darwinian evolution in which all biological features must result from gradual adaptation driven by natural selection. His argument has two prongs: (1) that certain biological features cannot be explained by adaptation (i.e., there are features in animal biology that are apparently nonadaptive) and are thereby hidden from the process of natural selection; and (2) that many features that define distinct groups and species appear to have arisen either suddenly or without any conceivable step-wise process. Although he agrees with the power of natural selection to drive microevolution (evolution occurring within the boundaries of a species), his argument is that it is insufficient

to account for macroevolution (evolution that jumps boundaries, leading to novel clades and species).

In the introduction, Denton frames his argument by contrasting "functionalist" and "structuralist" visions for biology. In functionalism, adaptation to serve a particular function is the primary driver of biological organization, while for a structuralist paradigm, the structures themselves are not the result of an adaptive process, although adaptation can occur on top of foundational biological structures. Denton is firmly in the structuralist camp and argues that the features that differentiate one biological group from another cannot have arisen by a gradual process of natural selection. The first several chapters draw on contemporary biological perspectives as well as on older writing to defend this perspective, and to lay this the groundwork for the rest of the book.

A series of chapters called "Bridging Gaps" provides in-depth examples of biological structures that Denton argues cannot conceivably have arisen via a gradual adaptive process. One of these is the nearly ubiquitous five-fingered structure of tetrapod limbs, a feature shared by humans, whales, and bats but used for quite different behaviors by each (i.e., grasping, swimming, or flying). He argues that while adaptations have occurred in the context of this structure to allow humans, whales, and bats to employ their five-fingered limbs for starkly different behaviors, the plan itself appears to confer no special advantage. That same structure is used for quite different functions, indicating that the foundational structure itself could not have been the result of a gradual process of adaptation but must have instead arisen relatively suddenly by nonadaptive mechanisms. In other chapters, Denton provides similarly in-depth descriptions of other examples such as feathers, flowering plants, the enucleated red blood cell, bat wings, and language.

If not by a gradual process of adaptation, how did these structures arise? Denton seeks to address this question in the final chapters by arguing that rather than being the outcome of adaptation, these features and the biological order that they reflect have arisen due to the immutable laws of biology. Foundational structures, "taxa-defining novelties," have emerged from the self-organizing properties of biological matter rather than from variation and natural selection. Supporting this, he points to biological features such as the structure of cells, biomechanical influences affecting embryogenesis, and protein folding. Many readers will hear echoes of the "fine-tuned universe" and "anthropic principle" that are often employed to suggest that nature has favored the development of carbon-based and conscious life, although Denton uses this biological law perspective to explain features of life on Earth, rather than the existence of life.



# Book Reviews

My major critiques do not so much concern the details of Denton's book, although indeed, those details are worth puzzling over. Rather, in many ways, elements of Denton's approach and arguments contain echoes of other authors residing within the scientific mainstream who have described the importance of nonadaptationist and nongradualist evolutionary processes, such as Eldredge and Gould's "punctuated equilibrium" and Gould and Lewentin's "spandrels" papers. Rather than constituting a "crisis" for a Darwinian model of evolution, these additional mechanisms highlight that absolutism in any extreme (such as for an absolutist Darwinian framework) is unlikely to be convincing. In a 1997 essay, for example, Gould suggested a middle ground, in which we can recognize that a variety of mechanisms—such as natural selection, punctuated equilibrium, developmental constraints, chance, neutralism, genetic drift, and natural catastrophes—might be operating simultaneously and to varying extents to drive evolution (S. J. Gould, "Darwinian Fundamentalism," *The New York Review of Books*; June 12, 1997). And indeed, as Gould points out by quoting Darwin, even Darwin himself objected to an ultra-Darwinian vision:

I placed in a most conspicuous position—namely, at the close of the Introduction—the following words: "I am convinced that natural selection has been the main but not the exclusive means of modification." This has been of no avail. Great is the power of steady misrepresentation.

Thus, Denton seems to protest against a Darwinian absolutism not even held by Darwin. Given the multiplicity of evolutionary mechanisms probably operating in tandem with a Darwinian mechanism (a thoroughly mainstream view), it seems an overstatement to name the evolving scientific picture a "crisis." Moreover, it is not clear why the book is entitled *Evolution: Still a Theory in Crisis*. Denton's book is not a critique of evolution per se (descent with modification), but rather what he perceives as a widespread Darwinian absolutism (p. 111). Oddly, since he laments that this exact linguistic fuzziness appeared in his prior book, *Evolution: A Theory in Crisis* (1985), it is unclear why it persists in the current book.

Denton's book is not an easy read. I found his writing to be dense and quite technical at points. However, summaries at the end of each chapter help frame the major arguments and the book's central thesis. Still, reading it would be a substantial undertaking for the lay reader. Despite the above points and the sometimes overblown rhetoric about the "Darwin propaganda machine" (p. 88) and the "corpse of Darwinian evolution" (p. 225), Denton's book made me think hard and delve more deeply into some of the nuances of evolutionary mechanisms that might have generated such a diversity of biological structure and function. It is likely that laws of biological form, random chance, genetic

drift, punctuated equilibrium, and Darwinian adaptation may all have roles to play.

*Reviewed by Matthew Van Hook, University of Nebraska Medical Center, Omaha, NE 68198.*



## SCIENCE AND RELIGION

**DICTIONARY OF CHRISTIANITY AND SCIENCE: The Definitive Reference for the Intersection of Christian Faith and Contemporary Science** by Paul Copan, Tremper Longman III, Christopher L. Reese, and Michael G. Strauss, eds. Grand Rapids, MI: Zondervan, 2017. 691 pages. Hardcover; \$59.99. ISBN: 9780310496052.

The *Dictionary of Christianity and Science* brings together Christian scholars to help explain the significant theories, issues, and individuals essential to the discussion of science and the Christian faith. Like other scholarly dictionaries or encyclopedias, it provides brief entries that succinctly explain each concept or issue. These entries represent a wide range of topics, from the philosophical to the scientific to the biblical and theological. The purpose is to provide a resource to help readers engage the issues related to science and faith.

A strength of this volume is in the way it provides clear, concise explanations of difficult and often complex issues. Through the use of cross references and recommended reading, the authors help readers understand the main ideas being discussed. In this way, the volume is easy to use and very readable.

Another strength is the way controversial issues are presented. For example, there are two entries that deal with climate change—one that interprets the scientific data to suggest that humans are having a significant impact on changing climate, and the second arguing that humans are not. Both address the issue biblically and scientifically while coming to different conclusions. A second example is the discussion of the days in Genesis. There are two entries that present the most basic views of Genesis 1: the days as literal 24-hour periods of time, and the framework approach. Both make their case well, demonstrating the advantages and disadvantages of each perspective. A third entry focuses on a basic explanation of a variety of ways Christians have interpreted the days in Genesis 1, providing a brief overview of each approach.

A weakness of this volume is what is missing, which betrays a more conservative evangelical bias. The entry on the various interpretations of Genesis 1, for example, does not include a mythological reading that grounds the interpretation of the text in the ancient cosmology of the Israelites and in the creation stories of the ancient world. Another example is the entry on death, which does not discuss the possibility of seeing physical death

as a part of God's good creation. The author differentiates between physical and spiritual death but makes the theological assumption that physical death is always a result of sin. There are Christians who challenge this perspective, and recognizing this—even if the author disagrees—would seem to fit the purpose of this volume. Finally, there are important figures missing that would fill out the spectrum of theological perspectives. For example, there is no entry for Pierre Teilhard de Chardin, whose work has influenced scholars such as Ilia Delio to creatively explore the connections between incarnation and evolution. There is also no entry for Elizabeth Johnson, who brings a feminist hermeneutic to bear on ecological issues in her recent work *Ask the Beasts: Darwin and the Love of God*. While one might respond by pointing out the impossibility of including everything in one volume, which I recognize, there seems to be a glaring omission of Christian scholars who are pursuing what might be considered a more progressive approach to questions related to science and faith. Regardless of the target audience, any volume that uses the word “definitive” in the subtitle needs to include individuals and ideas that represent the broad spectrum of perspectives.

The authors in this volume represent a variety of conservative theological traditions and perspectives that correlate with the variety of beliefs that evangelical Christians tend to hold. Laudably, this volume represents a constructive example of dialogue that allows the reader to better understand why Christians hold particular beliefs, which makes it an important contribution to the discussion.

The *Dictionary of Christianity and Science* is an excellent resource for students, pastors, teachers, and anyone interested in learning more about issues related to Christian faith and science.

*Reviewed by Jason Lief, Professor of Religion, Northwestern College, Orange City, IA 51041.*

**RIGHTING AMERICA AT THE CREATION MUSEUM**  
by Susan L. Trollinger and William Vance Trollinger Jr.  
Baltimore, MD: Johns Hopkins University Press, 2016.  
327 pages. Hardcover; \$26.95. ISBN: 9781421419510.

Answers in Genesis (AiG) opened its much-anticipated, 27-million-dollar Creation Museum in rural northern Kentucky at the end of May 2007, drawing more than half a million people in the first sixteen months and more than three million in the first ten years. Those are impressive numbers. By comparison, the nearby Cincinnati Museum Center, located in the heart of a major Midwestern city, covering a much larger range of subjects in three separate museums, boasting an OMNIMAX theater, and targeting a much broader demographic than just conservative Protestants, had about 1.45 million visitors in 2015. With 20% as much traffic as its much larger secular neighbor, AiG's

museum has proved to be a commercial success. Like the YEC ideas that it embodies, the Creation Museum is here to stay.

One reason for this is the high production values evident throughout. I saw this for myself, when I visited the Museum scarcely more than three months after it opened. Terry Mortenson of AiG kindly gave me a tour of the operation behind the scenes afterwards, but mostly I walked through the exhibits unaccompanied, attended a well-organized presentation by astronomer Jason Lisle in the technically impressive planetarium, and formed my own conclusions about the methods and the message of the Creation Museum. What struck me most is the way in which visitors are shown the YEC view and evolution as separate but equal sets of assumptions, with the scientific evidence impotent to determine which approach actually provides a better explanation. That is best seen in the Dinosaur Dig Site, a big sand box in which two paleontologists, one secular and one a creationist, uncover the same bones with the same techniques but draw very different conclusions about the implications.

As with many other cultural phenomena of comparable impact, the Creation Museum has attracted significant attention from scholars in a variety of disciplines, but to the best of my knowledge this is the first full-length scholarly book about it. The authors are devout Roman Catholic professors from the University of Dayton, rhetorician Susan L. Trollinger and historian William (Bill) Vance Trollinger Jr. A former colleague of mine at Messiah College, Bill Trollinger has written extensively on fundamentalism, including a book about William Bell Riley, a Baptist minister from the Twin Cities who founded the World Christian Fundamentals Association, an organization that combatted evolution after the Great War. (Riley was the person who persuaded William Jennings Bryan to assist the prosecution at the Scopes trial.) Susan Trollinger is best known for her book, *Selling the Amish*. Between them, the Trollingers bring expertise in anti-evolutionism and visual rhetoric to bear on the Creation Museum. *Righting America at the Creation Museum* combines analysis of the museum as a visual argument with analysis of the ideas on display, giving readers a broad and sometimes deep understanding of creationism as a phenomenon.

I entirely agree with their central thesis:

the museum exists and thrives ... because it represents and speaks to the religious and political commitments of a large swath of the American population, [seeking to] arm millions of American Christians as uncompromising and fearless warriors for what it understands to be the ongoing culture war in America. (p. 2)

The key words are “uncompromising” and “culture war,” core aspects of young-earth creationism that are well documented in the book.

## Book Reviews

The Trollingers describe the Creation Museum, a long-time dream of Ken Ham, as the “crown jewel of the AiG apologetics enterprise” that shows Christians how to understand our role in the highly secular modern world (p. 13). It may come as a surprise to learn that the primary message of the museum is not actually about the age of the Earth or evolution per se, but the need to preach a particular version of the gospel to unbelievers. What is that gospel? The authors answer this by examining the 16-minute film, *The Last Adam*, which visitors view right at the end of the Bible Walkthrough Experience that contains most of the exhibits. They find that “only thirty-two seconds are devoted to Jesus’s ministry and teachings,” while “three minutes and forty-five seconds are given to his flogging and execution.” The brief portion about his ministry includes the statement that Jesus “preached good news to the poor, and told the people that the Kingdom of God was at hand.” As the authors point out, the film does not spell out “what ‘good news’ was given to those in poverty,” or “what Jesus meant by the ‘Kingdom of God.’” Viewers are left to speculate, and the Trollingers suggest that, “perhaps viewers are to infer” that the poor “will suffer on Earth” but “eventually end up in Heaven,” and that the Kingdom of God refers to “the afterlife.”

In their opinion, viewers “learn that Jesus performed miracles but apparently had nothing to teach us about how we should live our lives.” They also note that a further “one minute, thirty-five seconds” is devoted to “an extrabiblical story about the youthful Mary and her family viewing the annual sacrifice of a lamb. Given the commitment to the inerrant word of God, it might seem strange to forego all the available material on the life of Jesus” in the four gospels “for a story that does not actually appear in the Bible” (p. 105).

In short, the film depicts Jesus almost solely as the Lamb of God, not the bringer of good news to the poor, and Jesus is a relatively minor player elsewhere in the museum. He is infrequently quoted, and the traditional Christian message of love and grace is not emphasized. Rather, “the essential continuity presented” at the museum is this: “God gives the Word; humans disobey it; God is obliged to punish them” (p. 49). The present world simply reiterates the sins of the past, and the whole museum presents this gospel as rooted in the true history found in the literal Bible.

What about science? The authors explain the standard creationist distinction between historical (subjective) science versus observational (objective) science. Creationists employ this to keep the conclusions of natural history from refuting their interpretation of Genesis, but the authors apply it cleverly to critique some of the pro-YEC information on display in the Museum. For example, the room devoted to Flood Geology features some facts from observational science about the deposition of detritus by river floods, using

“a small catastrophe in the present ... as a mini-analogy for a global one in the distant past.” Is that analogy valid, given that “the very first placard visitors encounter” in that room *denies* Charles Lyell’s dictum that the present is the key to the past? (pp. 90–91). It is a very good question.

The museum certainly emphasizes the primacy of the Bible, a classic Protestant theme, yet it also promotes a narrow biblicism that bears little resemblance to the Reformation idea of *sola Scriptura*. Indeed, Ham’s organization places the Bible above all other sources of knowledge, often to the point of denying their legitimacy in the name of the alleged “plain reading” of a given biblical text. According to AiG’s Statement of Faith (<https://answersingenesis.org/about/faith/>),

By definition, no apparent, perceived or claimed evidence in any field, including history and chronology, can be valid if it contradicts the scriptural record. Of primary importance is the fact that evidence is always subject to interpretation by fallible people who do not possess all information.

However, citing Alister E. McGrath’s book, *Christianity’s Dangerous Idea* (2008), the Trollingers point out that the Reformation actually “yielded an endless variety of theologies and practices,” in spite of Martin Luther’s rock bottom belief that the Bible speaks clearly to all who read it. Each group claims to have “the true word of God,” but “none has been able to control the proliferation of its meaning.” Nevertheless, “this has not stopped efforts to arrest the flow of interpretations, to freeze for all time the One True Interpretation. Enter young Earth creationism, and the Creation Museum” (p.111). Ham and his Museum “cannot acknowledge they are presenting an interpretation, nor can they consider the possibility that other interpretations—including other conservative Protestant interpretations—of Genesis might be correct” (p. 136).

I resonate with this conclusion. AiG and their museum are about providing answers for hard questions to very conservative Christians. The answers they offer can be authoritative for their audience only if *all other answers*, based on different interpretations of the Bible, are illegitimate. Otherwise, their cultural agenda collapses like a house of cards. The Trollingers fully understand this.

At the heart of the Creation Museum is a radical binary in which the visitor is confronted with two sets of tightly linked terms that are unequivocally opposed to each other, Bible-young Earth-Eden-truth-heaven versus human reason-evolution and old Earth-sin-corruption-hell. (p. 149)

They also understand the significance of this rhetorical strategy: “The binary is cosmic. The stakes could not be higher.” We find “no space for dissent, not even from fellow Christians” in this “culture war with eter-



nal implications." All dissenters are "the opponents of Truth. They are the Enemy" (p. 149).

The museum sends this message primarily through fear. Visitors pass through rooms called *Graffiti Alley*, where headlines show "how society has gone awry in our world after the Bible lost its place in the public square," and *Culture in Crisis*, about the disintegration of families and churches as a result of accepting "millions of years" of Earth history. Welcome to culture wars. We have "The Answer" for you: throw modern science in the garbage and go back to the Bible, even if it means that Cain found a wife by incestuously marrying a sister or another close relative, as the museum tells us on "a large placard entitled, 'Where Did Cain Get His Wife?'" I have to agree with the Trollingers: "Even in the context of the Creation Museum, this is one strange placard" (p. 177).

While I usually agree with the authors' analyses and conclusions, at one point their language might unintentionally mislead readers about an important aspect of the Galileo affair. Immediately after a paragraph containing a brief summary of the Galileo affair, they ask,

So what was the biblical cosmology that Copernicus and Galileo were contradicting? Put simply it was the cosmology of ancient Near Eastern cultures ... [which] consisted of a three-tiered universe with the Earth in the middle, the heavens above, and the "netherworld" below. (p. 103)

I agree that the biblical authors accepted the ANE world picture, but Catholic officials of Galileo's time did not. The three-tiered universe was irrelevant to his collision with Rome. The contested issue involved moving the spherical Earth around the Sun, not denying that the Sun passes under the flat, disc-shaped Earth every night. The authors understand this, but some readers might draw the wrong conclusion—as I did myself, before corresponding with them about it.

At the same time, the authors properly point out that the museum actually treats the solar system as if it—rather than the three-tiered universe—were the true biblical view. The visitor looks in vain for any depiction of the actual cosmology of the biblical authors. Thus, at least in this instance, modern science takes precedence over a literal Bible! When it comes to astronomy, the museum's science is not "the Bible's science" (p. 105). Here we find one of the most important conclusions in the whole book.

I also partly dissent from the way in which the authors narrate the rise of the Christian right in America—a theme directly related to the title of their book—particularly in relation to racism. They acknowledge that Ham and his museum unambiguously oppose racism and blame evolution for advancing it. They also see that particular stance as somewhat out of step with

the otherwise (in their view) very conservative political stance of the rest of the museum. So far, so good. However, in the context of their larger narrative, they seem to imply that Ham's opposition to racism is just trendy, part of a relatively recent change of heart among American evangelicals, who increasingly disown racial prejudice. They also endorse Randall Balmer's questionable view

that the origins of the Christian Right are not to be found in *Roe versus Wade*, but in the anger over the Internal Revenue Service's efforts to remove tax-exempt status from Christian schools that discriminated on the basis of race. (p. 187)

Yes, some segregationists used religion in their cause, but there was much more to that story than the authors indicate. Many other Christians totally opposed to segregation were concerned about the possibility of inappropriate government intrusion into other religious beliefs unrelated to racial prejudice, simply on the basis that they were inconsistent with public policy. This book gives readers the impression that the religious right is all about defending racism, as if Francis Schaeffer had never written *How Should We Then Live?* (1976), a powerful proclamation of the dangers posed to human dignity by abortion and dehumanization that galvanized evangelicals to political action.

In fact, Ham's longstanding opposition to those who use the Bible or science to support racism is a matter of public record—for which I applaud him. He deserves more credit than this book gives him. For example, in the pamphlet, "Where Did the 'Races' Come From?" (1999), Ken Ham, Carl Wieland, and Don Batten state predictably that "Darwinian evolution was (and still is) inherently a racist philosophy" (p. 2), but they also draw on science and the Bible to contest traditional creationist teachings about human "races." Quoting a paper given at the American Association for the Advancement of Science, they affirm, "Race is a social construct derived mainly from perceptions conditioned by events of recorded history, and it has no basic biological reality." Since the Bible "describe[s] all human beings as being of 'one blood'" (Acts 17:26), we are all related as "descendants of the first man Adam" (1 Cor. 15:45), so Christ died for all of us (pp. 3, 5). All three authors were born in Australia, which certainly has a sordid history of its own relative to racism, especially with regard to the indigenous population. Perhaps with some irony, they note that "a significant number" of American Christians believe that so-called "'inter-racial marriages' violate God's principles in the Bible," but they decisively reject that teaching. They also deny the related view, preached by the late Jerry Falwell (among many others) and found historically among some Jews and Muslims as well, that "the skin color of black people is a result of a curse on Ham and his descendants" (pp. 31, 40).

## Book Reviews

Nevertheless, the Trollingers quite properly point out that AiG and the museum do not really come clean on the Bible and slavery. The room devoted to racism quotes Acts 17:26, but only the first part about how God “hath made of one blood all nations of men,” leaving out the part where God determined “the bounds of their habitation.” The authors emphasize that those words at the end of the verse were quoted by segregationists more often than any other biblical text, yet they are not on display in the museum, and visitors will have no idea that the Bible was widely used to defend slavery, or that the Bible does not directly condemn it. Indeed (as the authors state), AiG tries hard to distinguish between “slavery under the Mosaic covenant” from the “harsh slavery” imposed on blacks in America, in order not to raise unanswerable questions about their approach to the Bible. It would be far better, if they were more forthright about such things, like the newly opened Museum of the Bible, which I have also seen. There we find, side by side, historically important writings advocating for and against black slavery in the United States, both citing the Bible profusely. That is quite a contrast with the Creation Museum, whose motto is “Prepare to Believe,” not “What Actually Happened.”

*Reviewed by Edward B. Davis, Professor of the History of Science, Messiah College, Mechanicsburg, PA 17019.*



## SOCIAL SCIENCE

**RELIGION: What It Is, How It Works, and Why It Matters** by Christian Smith. Princeton, NJ: Princeton University Press, 2017. 296 pages, including notes, references and index. Hardcover; \$35.00. ISBN: 9780691175416.

The sociology of religion is conventionally characterized as composed primarily of two competing schools of thought, the old, cultural perspective advanced by Max Weber, and the new, rational choice perspective advanced by Rodney Stark. In this scholarly work, Christian Smith rejects the positivist assumptions underlying both schools, but nevertheless offers a theory of religion that “can embrace and capitalize upon the contributions of both” (p. 254) in a “more complicated and realistic theory” (p. 255) that “takes very seriously causal multiplicity, complexity, interactions, and contingency” (p. 259).

Smith is Professor of Sociology and Director of the Center for the Study of Religion and Society at the University of Notre Dame, and is arguably the leading Christian sociologist of religion today. He is perhaps best known beyond sociological circles as director of the massive National Study of Youth and Religion (2001–2015).

A trilogy of Smith’s previous works serves as prologue to *Religion*, whose intended readership “includes

not only academic scholars of religion, but also ... the educated reading public” (p. ix). First, *Moral, Believing Animals: Human Personhood and Culture* (2003) introduced his theory of personhood and applied it to religion. *What Is a Person? Rethinking Humanity, Social Life, and the Moral Good from the Person Up* (2011) furthered his personalism and introduced his commitment to critical realism. Finally, *To Flourish or Destruct: A Personalist Theory of Human Goods, Motivations, Failure, and Evil* (2015) examined the motivations intrinsic to subjective experience and to realizing natural human goods. Smith’s forthcoming work on *Atheist Overreach* (2018) may well serve as epilogue to *Religion*.

Smith’s self-identified theoretical influences are (a) substantive definitions of religion that identify what religion is, in contrast to functional definitions that identify what it does; (b) the critical realist philosophy of science that combines ontological realism, epistemic perspectivalism, and judgmental rationality; and (c) the social theory of personalism, which argues that “humans have a particular nature that is defined by our biologically grounded yet emergently real personal being and its features” (p. 12). In keeping with the “methodological agnosticism” of science (not “methodological atheism”), he states flatly that

nothing in this book either directly endorses or invalidates the truth claims of any religious tradition ... The social sciences are constitutionally incompetent to make judgments about religion’s metaphysical claims about superhuman powers. (pp. 17–18)

Cue Smith’s definition of religion: “a complex of culturally prescribed practices, based on premises about the existence and nature of superhuman powers, whether personal or impersonal, which seek to help practitioners gain access to and communicate or align themselves with these powers, in hopes of realizing human goods and avoiding things bad” (p. 22). Most notable “is the dual emphasis on prescribed practices and superhuman powers” (p. 3). Contra Weber, “religion is not most fundamentally a cognitive or existential meaning system. Rather it is essentially a set of practices ... ‘making meaning’ is not the heart of religion” (p. 41).

Smith anticipates and refutes the charge that his account of religion is reductionistic. Regarding explanatory reductionism, he notes that such an account of religion “would especially surprise readers who know that I have spent my career criticizing utilitarian-based rational choice theory ... and exchange-based views of social relationships” (p. 62). Yet he has self-descriptively moved from the definition of religion he gave in *Moral, Believing Animals*. His definition now “prioritizes practices over beliefs and symbols, it centers on the superhuman instead of the superempirical, it replaces ‘orders’ with ‘powers,’ and it shifts the purpose of religion away from moral order toward deliverance and blessings” (p. 75).

According to Smith, the answer to why religion matters lies not in what it is, but rather in what it can do, that is, in its causal capacities to influence how individuals live and how the world operates. He lists eighteen powers that religion can generate under the categories of identity, community, meaning, expression and experience, social control, and legitimacy. None of them are unique to religion, and all of them are secondary, derivative, and dependent, like the branches and leaves of a tree relative to its roots and trunk. In another, fully elaborated list, Smith then outlines the ways religion impacts the social world beyond the individual. To illustrate these points, Smith provides a fascinating extended example of Engaged Buddhism.

As to how religion works, Smith proposes a simple mental process: "the human making of causal attributions to superhuman powers" (p. 136). Case studies of miracles, ordinary "religious experiences," and the fundamentalist attribution of the terrorist attacks of September 11, 2001, to "the retributive anger of God for America's contemporary apostasy and sins" (p. 156) beg the question of how religious practitioners interpret and evaluate superhuman causal influence. Distinct perceived outcomes that religious practices were meant to activate include the superhuman powers delivering what was sought, the powers providing a superior alternative to what was sought, the powers remaining nonresponsive and silent, the powers failing to produce what was sought, or the powers rejecting the practitioners who sought them. The social psychological literature on attribution theory and cognitive biases is vast, and Smith defines 23 of the latter and their possible religious applications, including psychological placebo effects and their sociological analogue: If people define situations as real, they are real in their consequences.

Beyond the questions in the subtitle, Smith also asks why humans presumably are the only species on earth to be religious in the first place. His answer "lies in humans' unique possession of a complicated combination of natural capacities and limitations" (p. 5). More boldly, Smith references "a large body of recent research in the cognitive science of religion" about biologically grounded genetic and neurological traits which show that religion is "a natural and fairly effortless way for people to think about and live in the world" (p. 5). People are motivated by their "objective interest in realizing six natural, 'basic goods' of human personhood [which realize] their proper natural end (telos) of *eudaimonia* (happy flourishing)" (p. 205), goods he elaborated in *To Flourish or Destruct*.

"Doing religion" depends on exercising at least ten specific human capacities that he elaborated in *What Is a Person?* "Eliminate any one of them and the practice of religion would not be possible" (p. 209). Thus, contrary to much Western social thought in recent centuries, Smith maintains that religion is not unnatural, irra-

tional, and abnormal. We are *Moral, Believing Animals* whose self-consciousness and self-transcendence drive us beyond ourselves. Indeed, "it may actually be religious unbelievers and secularists who need more sociological explaining than religious practitioners" (p. 233).

Smith therefore concludes, in concert with twenty-first century consensus, that twentieth-century secularization theories are incorrect, though not completely wrong or useless. "Properly appropriated, they offer valuable insights into social causal mechanisms that decrease religious belief and practices" (p. 5). Critical realism apprehends the nuance and complexity of how mechanisms such as modernity's religious pluralism can either weaken or strengthen religion depending on social conditions. "Exactly which causal mechanisms operate under what social conditions to produce differing religious outcomes we cannot predict according to some general law of social life" (p. 260).

Like the examination of the human side of religion in the sociology of religion generally, the net effect on readers is likely to question their (ir)religious practices. They have surely been unmasked, though not debunked. As Smith asserts, social science can only expose religion for what it is, how it works, and why it matters. It cannot verify or falsify religious truth claims. To whatever superhuman powers we give our allegiance, we still need an explanation for all the other religions. When those religions have been carefully explained (away?), perhaps we will then be willing to turn the analytic lens back on our own religious practices. The payoff is to separate out the human from the superhuman, the bio-psycho-social-cultural from the truly spiritual, a reward of great personal value. Christian Smith is a superb guide to the human side.

*Reviewed by Dennis Hiebert, Professor of Sociology, Providence University College, Otterburne, MB R0A 1G0.*



## TECHNOLOGY

**THE HEART OF THE MACHINE: Our Future in a World of Artificial Intelligence** by Richard Yonck. New York: Arcade, 2017. 328 pages, references, index. Hardcover; \$25.99. ISBN: 9781628727333.

Calling a customer service line where an automated program happily routes us to the appropriate human agent is becoming commonplace. What we may not understand, however, is how these systems are becoming better able to identify and respond not just to the words we say, but to the emotions behind those words. As computers become more and more advanced, it is no surprise that they are becoming more "emotionally intelligent." What is less understood is how these innovations will change us and, ultimately, how they will change humanity.



## Book Reviews

Richard Yonck, in his book entitled *The Heart of the Machine*, lays out a fascinating examination of the world of emotionally intelligent machines. He combines a thorough history of the innovative pathways that brought us to where we are now, a captivating tour through current and future applications of the technology, and a fairly disturbing look into the future of where intelligent machines may take us.

Yonck begins with an evolutionary description of emotions. He makes the case that cave men who had the ability to read the emotion of fellow cavemen would be better able to survive. He does a good job of explaining what emotions are, the role they play in a civil society, and the many ways they influence how we think and the decisions we make. He then proceeds to discuss how emotions can be “read.” Whether it be through micro facial expressions, small vocal variations, or changes in stride or posture, he lays an excellent foundation for helping the reader better understand the many different ways artificial intelligence programs work by gathering data that allows them to quantify and interpret the emotional state of the humans they are interacting with.

Yonck’s second section answers the “so what?” question by laying out the many ways artificial emotional intelligence is affecting us now and in the future. He provides one fascinating example after another, each one accompanied by enough history and science to give it context. He also avoids the pitfalls of Postman’s one-eyed prophet by discussing both the benefits and drawbacks of each innovation. Here are a few examples: computer programs that can sense how hard we hit the keypad—and then provide helpful advice based on our level of frustration; wristbands that can help autistic children interpret the emotions of people they are talking with; marketing programs that can adapt to consumers’ emotional state and provide ads that are more helpful, effective, or even manipulative; education programs that can sense the frustration or enthusiasm levels of a student and create appropriate individualized learning activities; programs that add an emotional component to the stark texts or Skype calls we make, helping friends in cyberspace understand how we are feeling or even helping them *feel* the same emotions; robots that provide customer service, elder care, and child care; brain chips that act as emotional prosthetics; operating systems that communicate what would appear to be warmth, humor, caring, anger, fear, and even love. For better or worse, each of these AI applications reads, interprets, and responds to human emotions. Each moves us closer to being unable to differentiate between person and machine, and maybe not really caring that much about the difference.

And that leads into the final section of *The Heart of the Machine*. Are machines that think *and* feel somehow more human? What makes something “human”? What

happens when machines become smarter and more powerful than all of humanity put together? Yonck begins this section by looking at how smart machines have been portrayed in movies and books. This chapter provides an insightful look at the various artistic portrayals of artificial intelligence and serves as an innocuous segue into the question of what makes something human. This, however, is where the book takes an unexpected and frustrating turn. Yonck spends a muddled chapter establishing a definition for “consciousness,” to help ascertain when a machine is no longer *just* a machine. He draws from philosophers to answer the question of consciousness but rejects the relevance of a discussion of the soul.

It is his last argument that becomes the most untenable. He presents three possible alternatives to a humanity that is forced to live with machines that are exponentially smarter and more powerful. They are the Terminator, the Matrix, and the cyborg outcomes. In the Terminator view, the machines wipe us out. In the Matrix view, the machines either use us or find a way to co-exist (unlikely from his point of view). He promotes the final possibility, the one in which humans and machines merge. Drawing on his evolutionary point of view, Yonck suggests the best way to survive in the future is to add machine elements to human bodies.

By integrating with us, artificial intelligence could actually gain advantage in a challenging environment, balancing out those processes by which machines excel with our own unique style of cognition. Each of us would coevolve in a manner that would become increasingly symbiotic. (p. 266)

Yonck’s conclusions are not surprising, considering his strict adherence to a biological and evolutionary point of view. It is unfortunate that he does not examine the interplay between emotions and the soul. When he defines human beings as little more than a concoction of cells, neurons, and chemicals, he misses an important discussion about how artificial emotional intelligence may actually be attacking our identities, our social interconnectedness, and ultimately our humanity. While he clearly cannot address all of the history, science, innovation, possible futures, and social, philosophical, and religious implications of artificial intelligence in one book, he left a clear hole when it comes to issues important to individuals who see humans as being created in the image of God and emotions as flowing from the deepest part of the soul.

That being said, this book is one that will be viewed as foundational to an emerging discipline. Yonck’s writing style is easy to read, his stories and examples are compelling, his science explanations are easy to understand, and he has introduced us to a technology that will undoubtedly be impacting us far into the future. I highly recommend this book to help us better under-

stand where our technology is taking us and how we might ultimately *feel* about it when we get there.

*Reviewed by Peggy Kendall, Professor of Communication Studies, Bethel University, St. Paul, MN 55112.*

## THEOLOGY

**HUMAN ORIGINS AND THE IMAGE OF GOD: Essays in Honor of J. Wentzel van Huyssteen** by Christopher Lilley and Daniel J. Pedersen, eds. Grand Rapids, MI: Eerdmans, 2017. 322 pages. Hardcover; \$60.00. ISBN: 9780802875143.

If you are looking for proof that you are not alone, here it is. Transdisciplinary work in theology and anthropology has been on the rise over the last few decades and Wentzel van Huyssteen has been at the forefront of bridge building. Humans may be the only species with religion, and Earth may be the only planet with intelligence, but our humanity is defined—in large part—by the interactions we have with the rest of creation.

In 2004, van Huyssteen delivered the Gifford Lectures at the University of Edinburgh. The series was entitled “Alone in the World? Human Uniqueness in Science and Theology” and resulted in a book by the same title (Eerdmans, 2006). Those lectures and a broader body of work by van Huyssteen have inspired a generation of scholars to engage more deeply in questions about what makes us human and how that differentiation came about historically. In the present volume, Lilley and Pederson present a collection of essays in honor of van Huyssteen, featuring prominent scholars working at the intersection of science and Christianity. For scholars, the book provides an excellent avenue into the literature. The general public will find it provocative, but occasionally difficult to read. Individual articles vary greatly in readability and level of jargon. If you can get past those challenges, the range and depth of thinking is impressive.

The book is organized into an opening section and three disciplinary heads: natural scientists, philosophers and historians, and theologians. The opening has a foreword by M. Craig Barnes and a preface by the editors, setting forth the intentions and import of the book. An introduction by Niels Henrik Gregersen provides a thorough, if rather technical, summary of van Huyssteen’s work. It emphasizes his commitment to relational epistemology and critical realism. By attending to how we come to conclusions in anthropology and theology, and by creating better communication between the disciplines, he opens a space for serious scholars to approach the material together, even when their standards and goals differ. All the works in the book demonstrate this level of care, not only for disciplinary standards, but for the significance of working beyond any one field. Van Huyssteen calls his methodology transversal postfoundationalism:

transversal because it respects boundaries but communicates across them, postfoundational because it denies the divide between modern foundationalism and post-modern coherentism.

Part one deals with anthropology and psychology, featuring chapters by Ian Tattersol, Ian Hodder, Justin Barrett and Tyler Greenway, Agustín Fuentes, and Richard Potts. Each one brings a scientific perspective to the question of what makes humans unique and how such traits arose. In addition to providing highlights of the historical record, they all emphasize the importance of relationships. Humans live and move and have our being in community. What makes us unique might not be inherent in individuals, so much as it is something attained interactively.

As an evolutionary biologist, I have some concern that claims of uniqueness—particularly with regard to agriculture—may be overstated. Ants, for example, breed fungi and aphids. No doubt such objections could be addressed if the essays were longer, but the limitations of format restrict the scope. Overall, I found the material fascinating and informative.

Part two deals with philosophy and history, primarily focusing on questions of ethics and aesthetics in human origins. Keith Ward usefully distinguishes between (biological) humans and (ethical) persons. Clearly the categories overlap, but they are constructed in different ways and it matters how we line the two up. Michael Ruse provides a provocative set of questions that highlight the ways evolution can challenge Christian thinking. Wesley Wildman and John Hedley Brooke also contribute.

Part three includes theological reflections. Each author comments on van Huyssteen’s methodology, how it does and does not work in practical settings. Celia Deane-Drummond provides a critique, asking whether it is clearly enough defined. David Ferguson defends it as an important way forward in theological anthropology. D. Etienne de Villiers compares it to Max Weber’s “ethic of responsibility.” Each in their own way, these authors deepen the discussion that van Huyssteen started. Michael Welker’s chapter, on the other hand, seems unconnected and out of place. The section and the book wrap up with a wonderful reflection by Dirk J. Smit on the concrete context of van Huyssteen’s thought in South African Christianity at the end of Apartheid. He draws the connection between our ideas of “self” and “alone” and how they interact with our ideas of “stranger,” reminding us that the discussions of humanity invariably have life or death consequences in how we treat our neighbor.

The book is well edited and thoughtfully organized, with useful contents, index, and short author biographies. Copy-editing is solid throughout, but flow and

## Letter

reference formats vary from chapter to chapter. Overall, this detracts little from a broad and insightful volume.

I disagree with the authors on several points; sometimes I disagree strongly with their conclusions. That is, perhaps, what the authors intended. In line with van Huyssteen's career, they are willing to engage in meaningful conversation, to bring the best of their fields to a common dialogue and to reveal their own presumptions in a way that allows all of us to come away with a deeper understanding. We do not all agree on what it means to be human, but anthropology and theology have important, even indispensable, things to offer in the conversation. We cannot know how they will interact until we bring the best of our reason and knowledge to the table. Van Huyssteen models this, and Lilley and Pedersen give us ample proof that it works. When we are willing to listen and to engage with others in careful, thoughtful, and compassionate dialogue, we are never alone.

*Reviewed by Lucas John Mix, Associate, Organismic and Evolutionary Biology, Harvard University, Cambridge, MA 02138.* \*

## Letter

### Mind and Heart

I wish to comment on Luke Janssen's article "'Fallen' and 'Broken' Reinterpreted in the Light of Evolution Theory" (*PSCF* 70, no. 1 [2018]: 36–47). I write from the vantage of two overlapping worlds, one as an active member of a conservative evangelical (largely "creationist") Christian faith community, and the other as a university professor and scientist who has concluded beyond reasonable doubt that the evolutionary model (descent with modification) best explains the many evidential trains that inform questions of biological origin. I also seek to build upon a 2017 essay in *God and Nature* titled "With All Your Mind," which I wrote during a sabbatical leave that included an objective to "construct a bridge over the perceived gulf that forces so many conservative Christians into having to choose between either their faith or the overwhelming picture of our origins that science is painting."

Generalizations are always treacherous, but I think it is safe to say that we scientists enjoy loving God with all of our minds. We are evidence based by training and often by personality archetype. Good scientists thrive on questioning orthodoxies and rethinking models when confronted with clear and compelling data that point in a different direction. Thus, it is probably no surprise to find large communities of committed Christian men and women in organizations such as the ASA and BioLogos who do not feel threatened by evolution theory. We appreciate the overwhelming scientific evidence supporting evolution and are willing

to seek common ground with our Christian faith. But as Janssen's article lays out, simmering beneath any effort to reconcile evolution and conservative Christian faith lie profound questions of theology, not the least of which concerns the "Fall" and the Christian understanding of why nature and humanity are the way that they are.

As Janssen points out, the embrace of evolution theory necessitates a shift in the conservative Christian understanding of "The Fall" from one in which nature and humanity were originally "good" (essentially perfect), but subsequently cursed by God because of the sin of Adam and Eve, to one in which neither nature nor man were ever "good" (in the sense of being essentially perfect) to begin with. That is, when God declared that his various creative acts were good, and humankind very good, he was speaking of the same cosmos and humanity that we experience today. The problem is that this view presents an enormous stumbling block for many conservative Christians who are desperately trying to make sense of this world.

After all, we are not called to love God with just all of our mind, but also with all of our heart and being. How can I love a God who created a natural system capable of inflicting unspeakable pain and misery upon human beings (think cancer, debilitating birth defects, natural disasters here), and who populated it with humans who are capable of inflicting unspeakable pain and misery upon each other? Many conservative Christians conclude that it is logically and morally impossible for a good God to create this world and this human species in its current form—humankind and nature must have fallen!

We scientists need to take ownership of this problem of pain and deeply empathize with our creationist brothers and sisters if we are to ever have a substantive conversation with them. Dealing with the theological implications of evolution, as Janssen has done in his article (and others before him), is a necessary first step, but it cannot end there or the conversation will go nowhere. I struggled with this issue for years, and it was only through the insightful musings of C.S. Lewis in *The Problem of Pain* and some of his other writings that I began to find a way to reconcile my science and faith. This is not the venue to recount that journey and share my own musings, but please let me plead to my brothers and sisters in Christ who are scientists and comfortable with evolution theory that we have to deal with the heart as well as the mind, and do so very gently when it comes to reaching out to our creationist brothers and sisters. Many thanks to Luke Janssen for starting that process in my own mind and heart.

Paul S. Kindstedt  
ASA Member  
Professor, University of Vermont

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