

Creationism and Intelligent Design: Scientific and Theological Difficulties

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Many religious believers today are comfortable with the notion of an evolutionary process over many millions of years as God's means for achieving the creation. In other words, they believe that, while God governed the creation in some sense, it proceeded largely by natural laws and processes that can be uncovered by diligent research. An open-ended philosophy of this sort is entirely consistent with modern scientific knowledge, and for many (myself included), the "war" between science and religion ends here.

A recent report by the National Academy of Science observed, "Science and religion are based on different aspects of human experience. . . . Attempts to pit science and religion against each other create controversy where none needs to exist." The report adds, "Scientists and theologians have written eloquently about their awe and wonder at the history of the universe and of life on this planet, explaining that they see no conflict between their faith in God and the evidence for evolution."¹ Among the notable and openly religious scientists cited in this report are Francis Collins (director of the U.S. National Institutes of Health and former director of the Human Genome Project), Kenneth Miller (a well-known biologist and co-author of a widely used biology textbook), and George Coyne (former director of the Vatican Observatory).

Others in modern society (often but not always associated with conservative religious movements) insist on a more traditional view of the creation. Many of these persons further believe

that there is scientific evidence to support such a view. In a 2004 poll, 45 percent of Americans agreed that “God created human beings pretty much in their present form at one time within the last 10,000 years or so.”² In a 2005 poll, 42 percent of Americans agreed that “humans and other living things have existed in their present form since the beginning of time.”³ Such persons have been drawn to the Creationist movement and still are, although today the Intelligent Design (ID) movement has been growing in popularity.

Typical of recent Creationist literature is the declaration that “millions of years of evolution not only contradicts [sic] the clear teaching of Genesis and the rest of Scripture but also impugns [sic] the character of God.”⁴ ID literature is more accepting of modern science but still holds that Darwinian evolution is scientifically faulty, and cannot be reconciled with Judeo-Christian theism.⁵

This article examines the Creationist and Intelligent Design movements from both a scientific and a theological perspective. This discussion is framed for adherents of the Church of Jesus Christ of Latter-day Saints (LDS), although much of this analysis is independent of any particular religious denomination.

I wish to emphasize that the terms “Creationism” and “Intelligent Design” are used here only to designate the two specific movements described above. As noted above, a suitably open-ended notion of “creation” and “design” is entirely consistent with both scientific knowledge and theology, and is recommended as a basis for those seeking harmony between science and religion.

Traditional Creationism and Intelligent Design

The traditional Creationist movement, which has been termed “scientific Creationism” or “creation science” by its practitioners, originated with the publication of George McCready Price’s book *The New Geology* in 1923, and gained momentum in the 1960s, 1970s, and 1980s with works by John Whitcomb, Henry Morris, and Duane Gish.⁶ These writers have attempted, by means of both scientific and theological arguments, to defend a highly literal (albeit somewhat selective) reading of Genesis: namely, that the Earth was created a few thousand years ago and that its fossil layers were deposited during a great flood at the time of Noah. Ef-

forts to promote this form of Creationism in public schools founded in 1982, when an Arkansas court ruled that Creationism is religious dogma, and lost more ground in 1987, when the U.S. Supreme Court ruled that a Louisiana law requiring “equal time” for Creationism and evolution was unconstitutional.⁷

However, the Creationist movement continues to exert considerable influence in the United States and elsewhere. One indication of this influence is the popularity of the new Creation Museum in Petersburg, Kentucky (near Cincinnati, Ohio). This facility features a series of exhibits depicting, among other things, the creation in 4000 B.C., a global flood in 2350 B.C. that deposited all fossil layers, and humans and dinosaurs living together. Murals contrast “human reason” with “God’s Word.” In the two years since it opened in 2007, the museum has attracted over 700,000 visitors.⁸

In the early 1990s, a group of scholars formed the “Intelligent Design” (ID) movement. Unlike Creationists, these scholars, including Michael Behe, William Dembski, Phillip Johnson, and Jonathan Wells, have respectable academic credentials and generally accept the overall scientific account and timeline of the creation. However, they still insist that many features of life on earth are too complex to be explained by natural evolution. They generally acknowledge limited variations within basic “kinds” but insist that the individual kinds were separately formed or designed by an intelligent entity, utilizing means that may not be subject to human investigation.⁹

ID writers and their proponents take pains to distinguish themselves from traditional Creationists, but it is clear that both the Creationist and ID movements are connected to the Evangelical world. Each of the four prominent ID scholars mentioned above (except for Michael Behe, who is Catholic) is affiliated with an Evangelical denomination, and all have acknowledged that their religious beliefs are a principal motivation for their work. The ID-authored textbook *Of Pandas and People* is a lightly edited version of an earlier Creationist textbook, in which, among other things, the word “creation” has been replaced with “intelligent design.”¹⁰ The Discovery Institute’s Center for Science and Culture, which is the umbrella organization and funding source for much of the ID work, is devoted “to defeat scientific materialism and its

destructive moral, cultural, and political legacies” and “to replace materialistic explanations with the theistic understanding that nature and human beings are created by God.” To this end, they have outlined a “wedge” strategy, which recommends that proponents proceed by degrees, first “teaching the controversy” of evolution, then promoting ID as an alternative theory to evolution, then edging out evolution in favor of biblical theism.¹¹

Capitalizing on widespread popular support, various groups have attempted to require teaching of Creationism or ID in public schools, or at least to require some form of disclaimer of evolution. A Georgia suburban school district recently required stickers to be placed in textbooks emphasizing that evolution is “a theory, not a fact.”¹² The Kansas Board of Education approved a new science curriculum that requires challenges to evolution.¹³ Both of these measures were later overturned by court rulings.

In one prominent case, the Dover Area School Board in Pennsylvania voted that “students will be made aware of gaps/problems in Darwin’s theory and of other theories of evolution including, but not limited to, intelligent design.” The school district then required that students be read a statement emphasizing that “the Theory [of evolution] is not a fact” and recommending the ID-authored text *Of Pandas and People* for student use. Several parents sued, and a widely publicized trial was held in October-November 2005.¹⁴ In December, U.S. District Judge John E. Jones ruled that the school board’s policy was unconstitutional. He further found that ID is “a religious view, a mere re-labeling of creationism, and not a scientific theory,” and “ID cannot uncouple itself from its creationist, and thus religious, antecedents.”¹⁵

An initial attempt to influence the Utah School Board in September 2005 was not fruitful, but in January 2006 State Senator Chris Buttars introduced a bill to require that “instruction to students on any theory regarding the origins of life, or the origins or present state of the human race, shall stress that not all scientists agree on which theory is correct.”¹⁶ This measure was modified several times, then defeated. However, attempts continue in other U.S. states and internationally.

Creationism, Intelligent Design, and the LDS Faith

Like the Catholic Church and most large Protestant denomi-

nations, the Church of Jesus Christ of Latter-day Saints in recent years has officially distanced itself from largely scientific issues such as evolution. Conventional scientific theories, including biology, evolution, and geology, are openly taught at Brigham Young University and BYU–Idaho, and a notable number of the scientific faculty members are well published in these fields. Students who inquire about the Church’s views on evolution are referred to “Origin of Man and Evolution,” a packet of information approved by the LDS First Presidency. The packet contains a 1909 First Presidency statement on human origins that speaks negatively of the notion that human beings developed from the lower orders of animals, but it is balanced by including the article on evolution from the 1992 *Encyclopedia of Mormonism*. This short article quotes a 1931 First Presidency letter saying, “Leave geology, biology, archaeology and anthropology, no one of which has to do with the salvation of the souls of mankind, to scientific research, while we magnify our calling in the realm of the Church.”¹⁷

Several books with a positive view of evolution have recently been published by LDS scientists.¹⁸ Also of interest is *Mormonism and Evolution: The Authoritative LDS Statements*, a collection of articles and statements made by the First Presidency on evolution.¹⁹

Nonetheless, a Creationist worldview prevails in the hearts and minds of many LDS people. For example, a 2009 poll found that only 22 percent of American Latter-day Saints believe that evolution is the best explanation for human life—a figure that is lower than all other major religious denominations except for Jehovah’s Witnesses.²⁰ Creationist material has even appeared occasionally in LDS Church publications, although it is not clear that any of this material has official endorsement. In 1998 the *Ensign* published an article asserting that Noah’s flood covered the entire earth and destroyed all living things not aboard Noah’s ark.²¹ In 2002 the *Ensign* reprinted the 1909 First Presidency statement, which has skeptical comments on humans developing from lower orders but failed to mention more recent updates that omit such language.²² The current Old Testament manual for BYU and LDS Institutes of Religion presents a very negative view of evolution, quoting Joseph Fielding Smith’s 1952 statement: “You cannot believe in this theory of the origin of man, and at the same time accept the plan of salvation.” The manual also quotes

at length from the writings of Harold Coffin, a Seventh-day Adventist Creationist, and mentions speculations by Immanuel Velikovsky that worldwide catastrophes have occurred in recent times.²³ I have heard that many instructors ignore this material, which was written many years ago, although others continue to take it quite seriously.

Several recent books and articles by LDS writers have criticized evolution and science in general. For example, Joseph Fielding McConkie, a retired BYU religion professor, recently wrote, “We cannot overcome the irreconcilable differences between the theory of organic evolution and the doctrine of the Fall.”²⁴ Other examples include Clark A. Peterson, *Using the Book of Mormon to Combat Falsehoods in Organic Evolution* (Springville, Utah: Cedar Fort, 1992), and Webster Kehr, *Prophets or Evolution* (<http://www.prophetsorevolution.com>). The latter work argues that evolution coincides with the teachings of Korihor, a Book of Mormon anti-Christ figure, and further asserts that the scientific community is intentionally ignoring contrary evidence that nullifies the theory of evolution. While much more accepting of evolution, Richard Sherlock, professor of philosophy at Utah State University, nonetheless criticizes the 2005 Dover court decision, finds merit in some of the scientific arguments advanced by ID scholars, such as Behe’s “irreducible complexity,” and concludes that “Latter-day Saints and serious Christians generally should be sympathetic and supportive of intelligent design.”²⁵

Modern Scientific Evidence

The notions that the universe is at least 13 billion years old, that the Earth is at least 4 billion years old, and that life has developed through a branching evolutionary process over many millions of years, are all very firmly established in the scientific literature by extensive empirical data. The geological ages of various fossil layers are particularly well established, since these ages are based on multiple dating schemes that are securely grounded in fundamental laws of physics that have survived careful scrutiny for more than fifty years.²⁶

In the past few years, modern genome sequencing and computer technology have placed enormous volumes of DNA data at the fingertips of researchers worldwide. These data strongly con-

TABLE 1
PERCENTAGE OF AGREEMENT BETWEEN BETA GLOBIN
OF VARIOUS SPECIES

	<i>Human</i>	<i>Chimp</i>	<i>Gorilla</i>	<i>Red Fox</i>	<i>Dog</i>	<i>Polar Bear</i>	<i>Horse</i>	<i>Rat</i>	<i>Chicken</i>	<i>Salmon</i>
Human	100.0	100.0	99.3	91.1	89.7	89.7	83.6	81.5	69.2	49.7
Chimp	100.0	100.0	99.3	91.1	89.7	89.7	83.6	81.5	69.2	49.7
Gorilla	99.3	99.3	100.0	91.8	90.4	90.4	82.9	80.8	68.5	49.0
Red fox	91.1	91.1	91.8	100.0	98.6	95.2	80.8	80.1	72.6	49.7
Dog	89.7	89.7	90.4	98.6	100.0	94.5	80.1	79.5	71.2	49.0
Polar bear	89.7	89.7	90.4	95.2	94.5	100.0	80.8	82.9	71.9	48.3
Horse	83.6	83.6	82.9	80.8	80.1	80.8	100.0	76.0	67.8	46.3
Rat	81.5	81.5	80.8	80.1	79.5	82.9	76.0	100.0	65.8	49.7
Chicken	69.2	69.2	68.5	72.6	71.2	71.9	67.8	65.8	100.0	54.4
Salmon	49.7	49.7	49.0	49.7	49.0	48.3	46.3	49.7	54.4	100.0

firm the evolutionary paradigm, including the hierarchical organization and common ancestry of all organisms, and the evolution of these organisms via incremental mutations and natural selection.²⁷ Data of this sort have already confirmed the “family tree” of species that was previously constructed based only on comparisons of anatomy and biological function. As LDS biologist Daniel Fairbanks observes, “The results of hundreds of large-scale experiments based on DNA analysis overwhelmingly confirm the reality of evolution.”²⁸

One example of these data is Table 1, which compares the 146-unit amino acid sequences of beta globin (a component of hemoglobin) among various species of animals. Note that human beta globin is identical to that of chimpanzees, differs in only one location from that of gorillas, yet is increasingly distinct from that in red foxes, polar bears, horses, rats, chickens, and salmon.²⁹ The picture is the same if we examine any of thousands of other genes and proteins. For example, the gene that, when mutated, results in cystic fibrosis in humans is nearly identical to the corresponding gene in chimpanzees but is progressively dissimilar to

the corresponding gene in orangutans, baboons, marmosets, lemurs, mice, chickens, and puffer fish.³⁰ (See Table 1.)

DNA evidence has also dramatically confirmed some earlier conjectures. For example, scientists noted long ago that humans have only twenty-three pairs of chromosomes, whereas other great apes—chimpanzees, bonobos, gorillas, and orangutans—have twenty-four. Thus, they were led to conjecture that two of the human chromosomes have fused since the split between ancestral human and ape lineages. This hypothesis gained credence in 1982 when scientists found that chromosomes from humans, chimpanzees, gorillas, and orangutans are highly similar and can be aligned with one another, with human chromosome #2 corresponding to the slightly overlapped union of ape chromosomes 2A and 2B. The final confirmation came in 1991 from a detailed analysis of human DNA, which found two complementary telomeres (repeated sequences of a certain DNA string that appear at the end of a chromosome) spanning the exact spot of union.³¹

Technical Issues

As mentioned above, ID writers generally have respectable academic credentials (although hardly any of their peer-reviewed articles deal directly with ID³²) and, as mentioned earlier, they have approached the issue by acknowledging much of the standard scientific framework, including the “old earth” timeline. But like Creationists, ID scholars have not yet produced a solid body of quantitative, falsifiable scientific hypotheses of their own; instead they have focused their efforts on identifying weaknesses in the established evolutionary theory. Judge John E. Jones, ruling in the Dover case, noted one difficulty with this approach: “ID is at bottom premised upon a false dichotomy, namely, that to the extent evolutionary theory is discredited, ID is confirmed. . . . We do not find this false dichotomy any more availing to justify ID today than it was to justify creation science two decades ago.”³³

Nonetheless, many are convinced that the Creationist and ID writers have identified substantive technical issues that call into question certain aspects of evolutionary theory. Since these issues are invariably raised whenever this topic is discussed, a few of these claims will be briefly mentioned here, together with the

consensus response of the scientific community. For more details, I invite readers to consult several recently published references.³⁴

Gaps in the Fossil Record

Both Creationist and ID writers have argued that there are significant gaps in the fossil record and that these gaps are evidence that the evolutionary model is wrong.³⁵ Scientists readily acknowledge that gaps exist in the fossil record but point out that large numbers of these gaps (including several gaps specifically highlighted by Creationist and ID writers) have been filled by transitional fossils found in the past few decades.³⁶ Examples include fossils spanning the transition between land and marine mammals (having exactly the expected combination of terrestrial and aquatic features that had been predicted)³⁷ and a long-sought intermediate fossil linking fish and early tetrapods (four-legged animals) discovered in 2004 on an island in the Canadian Arctic.³⁸

One recent fossil discovery potentially relevant to human evolution is the “Ardi” skeleton, dating to 4.4 million years ago, not long after the split between the humans and chimpanzees.³⁹ Creationists have typically dealt with hominid fossils by assigning them to either “human” or “ape” categories, but they have failed to agree among themselves as to which hominids should be assigned to which category. Biologist Kenneth Miller observes, “Ironically, validation of our common ancestry with primates comes directly from those who are most critical of the idea.”⁴⁰

Irreducibly Complex Systems

ID scholar Michael Behe has argued that certain biological systems, such as bacterial flagella, blood-clotting processes, and the immune system, are “irreducibly complex.” They consist of multiple subsystems, the removal of any one of which would render the system nonfunctional. He argues that such systems must have been designed by an intelligent entity, because none of the components could have evolved in the absence of the others.⁴¹

Scientists counter that systems labeled as “irreducibly complex” by Behe can arise by natural evolution—that individual parts may arise separately, each useful in its own context, and then later be combined into a larger system. For example, researchers recently found that the DNA sequence of bacterial flagella is almost

identical to that of a “needle” that certain bacteria use to insert toxins.⁴² Similarly, most of the proteins involved in blood clotting are genetically similar and are most likely the result of gene duplication.⁴³ With regard to the immune system, during the Dover trial fifty-eight peer-reviewed publications, nine books, and several textbook chapters were presented to the court summarizing research on immune system evolution. Facts such as these ultimately convinced Judge Jones to write in his decision, “We therefore find that Professor Behe’s claim for irreducible complexity has been refuted in peer-reviewed research papers and has been rejected by the scientific community at large.”⁴⁴

Probability

Both traditional Creationists and ID scholars have invoked probability arguments in criticisms of evolution. One typical argument goes like this: The human alpha globin molecule, a component of hemoglobin, is a protein chain based on a sequence of 141 amino acids. There are 20 different amino acids common in living systems, so the number of potential chains of length 141 is 20^{141} , which is roughly 10^{183} (i.e., a 1 followed by 183 zeroes). Thus, the probability of the specific human alpha globin molecule forming at random is so remote that even after billions of years, it is very unlikely that it would ever appear.⁴⁵

But scientists point out that this calculation is faulty, because most of the 141 amino acids can be changed without altering the basic biological function. More importantly, this and other probability-based arguments suffer from the fatal fallacy of presuming that a structure such as alpha globin arises by a single all-at-once event (which, after all, is the Creationist theory, not the scientific theory, of their origin). Instead, available evidence suggests that alpha globin and other proteins arose as the end product of a long sequence of intermediate steps, each of which was biologically useful in an earlier context. Probability calculations such as the above, which do not take into account the process by which the structure came to be, are not meaningful and can easily mislead.

Along this line, scientists note that if one (erroneously) presumes that a snowflake arises by an all-at-once random assemblage of water molecules, instead of by known natural processes, then by analyzing symmetry one would calculate exceedingly

small probabilities for their formation, even more remote than the figures mentioned above for alpha globin. Yet no one insists that supernatural action is required to produce snowflakes.⁴⁶

Information Theory

ID writer William Dembski has invoked probability and information theory (the mathematical theory of information content) in arguments against Darwinism. But knowledgeable researchers who have examined Dembski's works in detail are sharply critical. Mathematician Jeffrey Shallit and biologist Wesley Elsberry conclude that Dembski's notion of "complex specified information" is incoherent and unworkable.⁴⁷ Richard Wein, in a review of Dembski's *No Free Lunch*, characterizes it as "pseudoscientific rhetoric."⁴⁸

Biological Novelty

Creationists and ID scholars have insisted that, whereas minor changes may occur within an established "kind," "random" evolution can never produce anything fundamentally new.⁴⁹ Biologists counter with examples such as a 1974 experiment, in which a gene in the bacterium *E. coli* that is responsible for metabolizing lactose was removed. Within twenty-four hours, the bacterium had re-evolved a capability to utilize lactose by means of a similar but distinct three-part biochemical pathway.⁵⁰

Another example is a bacterial species discovered in Japan that has adapted to digest nylon waste (which did not exist until the twentieth century) as the result of a "frame shift" mutation.⁵¹ As a third example, certain Italians, all descended from a single individual several generations back, possess a genetic mutation that results in measurably improved cardiovascular health.⁵²

Perhaps the best-known examples, however, are the recent evolution of new strains of tuberculosis that are resistant to all known anti-TB drugs and drug-resistant strains of HIV that, in many cases, evolve within the body of a single patient.⁵³

Along these lines, scientists note that computer programs mimicking the process of evolution have been utilized to construct computer algorithms and engineering designs that are superior, in many cases, to the best-known human efforts. Applications have been found in aerospace, chemistry, electrical engi-

neering, financial analysis, materials engineering, robotics, and others.⁵⁴

Speciation

Creationists and ID scholars often assert that the splitting of a species into two species has never been actually observed. Although speciation typically requires many thousands of years, biologists cite examples of present-day species that appear to be in the process of splitting.⁵⁵ One example is a certain salamander species in California, which is visibly different between one end of its habitat and the other. These differences are so extensive that, by established standards (such as failure to interbreed), specimens from the two ends would be classified as two distinct species.⁵⁶

Origin of Life

Scientists readily acknowledge that many questions regarding the evolution of life on earth remain to be resolved. The origin of life, for instance, is still not understood, although intriguing advances have been made recently.⁵⁷ In any event, it is not clear what is to be gained for the Creationist/ID cause by highlighting the remaining unknowns in the origin of life arena, since the evolution of living organisms after biogenesis is very well grounded experimentally, independent of how the first biomolecules formed.

In summary, the consensus of the vast majority of scientists who have examined these issues is that the arguments raised so far by the Creationist and ID communities are not genuinely substantive. For the most part, these questions were settled long ago in the scientific literature. They certainly do not threaten the foundations of the evolutionary paradigm. For additional discussion on the technical issues of creationism and intelligent design, see the papers I have prepared and posted at <http://www.sciencemeetsreligion.org/evolution>.

Scriptural Interpretations

Passages in Genesis, as well as similar passages in other LDS scriptures such as the book of Moses and the book of Abraham, describe the process of the creation and Earth's early history. One key issue is how literally one should interpret these passages—for

example, what period of time was required for the creation, or whether Noah's flood was a local event or a global immersion. Along this line, it is worth noting that the book of Abraham account of the creation uses "time" instead of "day" to denote each creative period (e.g., Abr. 4:8).

As mentioned earlier, both the Creationist and ID movements are closely allied with Evangelical Christianity. Many (albeit not all) Evangelicals subscribe to the Chicago Statement on Biblical Inerrancy, which declares: "Being wholly and verbally God-given, Scripture is without error or fault in all its teaching . . . in what it states about God's acts in creation, about the events of world history, and about its own literary origins under God."⁵⁸ Partly because of such beliefs, many in the Evangelical world (including the Discovery Institute that backs the ID movement) agree that Darwinian evolution is fundamentally incompatible with scripture and the Christian faith.⁵⁹ Ironically, this view is shared by some prominent modern-day atheists on the other end of the intellectual spectrum, who hold that modern science proves religion to be utterly false.⁶⁰

In any event, most modern Bible scholars agree that an inerrant reading of the Bible is no longer defensible, in light of both textual and archaeological research.⁶¹ This conclusion should not come as a surprise to LDS readers, since Mormonism was founded on a rejection of biblical inerrancy and completeness. Bible scholars also point out that an approach that fails to acknowledge the human element in the Bible makes it difficult to deal with passages that appear to endorse holy war, slavery, and the subjugation of women.⁶² With respect to the creation scriptures, scholars have long concluded that these passages were written to reaffirm God's love for his people, not as a scientific discourse in the modern sense. Karen Armstrong, for instance, writes that the Genesis text "was emphatically not intended as a literal account of the physical origins of life."⁶³ LDS Apostle James E. Talmage made essentially the same point in 1931: "The opening chapters of Genesis, and scriptures related thereto, were never intended as a textbook of geology, archaeology, earth-science, or man-science. Holy Scripture will endure, while the conceptions of men change with new discoveries. We do not show reverence for the scriptures when we misapply them through faulty

interpretation.”⁶⁴ In this context, it is reasonable to ask why the creation scriptures should be read very literally, when no one insists that, for example, the passages below should be read literally:

1 Sam. 2:8. . . . for the pillars of the earth [are] the LORD’S, and he hath set the world upon them.

Psa. 93:1. . . . the world also is stablished, that it cannot be moved.

Psa. 104:5. [Who] laid the foundations of the earth, [that] it should not be removed for ever[?]

Eccl. 1:5. The sun also ariseth, and the sun goeth down, and hasteth to his place where he arose.

These passages, among many others that could be listed, affirm the geocentric cosmology of antiquity: The Earth is flat with four corners, is set on a foundation of pillars, and remains stationary while the sun and other heavenly bodies move on transparent spheres above it. Such passages are not interpreted literally today, but they were the foundation of the persecution of Galileo and others over Copernican astronomy during the sixteenth and seventeenth centuries.⁶⁵

Theological Difficulties

ID scholar Phillip Johnson criticizes the assumption of “methodological naturalism” underlying the scientific enterprise, namely the notion that the universe is governed by natural and comprehensible laws. Johnson argues that this assumption unfairly rules out the hypothesis of a supernatural designer.⁶⁶ He also suggests that some questions regarding the creation of our world are “mysteries” beyond the realm of human investigation or understanding.⁶⁷ ID scholars Dembski and Behe have also criticized the naturalistic worldview. Behe has said that “design,” from his point of view, means beyond the laws of nature.⁶⁸

Scientists acknowledge that methodological naturalism underlies their research but argue that they have no choice. As scientific philosopher Robert Pennock observes: “Once such supernatural explanations are permitted they could be used in chemistry and physics as easily as Creationists have used them in biology and geology. Indeed, all empirical investigation beyond the

purely descriptive could cease. . . . Methodological Naturalism is not a dogmatic ideology that simply is tacked on to the principles of the scientific method; it is essential for the basic standards of empirical evidence.”⁶⁹

Theologians point out that Creationist and ID attempts to identify phenomena that cannot be explained by natural law lead directly to a “God of the gaps” theology—meaning that God’s influence is to be found in the gaps of what currently remains unexplained in science. This approach has been characterized as theological suicide, since many of those who have adopted it over the centuries have been disappointed as scientific knowledge has expanded.⁷⁰ This worldview also contrasts with LDS theology, which has traditionally viewed God as acting within the realm of eternal natural laws, thus effectively eliminating the need for warfare between science and religion. Here are some authoritative comments by Latter-day Saint leaders: President Brigham Young and Apostles John A. Widtsoe and Parley P. Pratt on this topic. Widtsoe was a scientist (a chemist), but the other two were not:

Brigham Young: Yet I will say with regard to miracles, there is no such thing save to the ignorant—that is, there never was a result wrought out by God or by any of His creatures without there being a cause for it. There may be results, the causes of which we do not see or understand, and what we call miracles are no more than this—they are the results or effects of causes hidden from our understandings.⁷¹

John A. Widtsoe: Just what forces were brought into operation, or what process was used, to organize the “elements” into an earth is not known. Latter-day Saints are inclined to hold that forces about us, known in part through common human experience, especially in the field of physical science, were employed in the formation of the earth. The progress of science may yet shed much light on the origin of the earth.⁷²

Parley P. Pratt: Among the popular errors of modern times, an opinion prevails that miracles are events which transpire contrary to the laws of nature, that they are effects without a cause. If such is the fact, then, there never has been a miracle, and there never will be one. The laws of nature are the laws of truth. Truth is unchangeable, and independent in its own sphere. A law of nature never has been broken. And it is an absolute impossibility that such law ever should be broken.⁷³

Some Creationist writers have acknowledged the evidence for an extremely old Earth, for instance, but offer the explanation that God created the world with an “appearance of age,” perhaps as a test of our faith.⁷⁴ ID scholars are more reserved in this regard, but Johnson’s notion that certain aspects of the creation are “mysteries” beyond the reach of human investigation and understanding is in this same general vein.⁷⁵ Needless to say, such precepts are at odds with the LDS notion of a rational, comprehensible God epitomized by the credo “The glory of God is intelligence, or, in other words, light and truth” (D&C 93:36). Writers from other religious traditions have also been sharply critical of the notion of a God who deliberately distorts evidence or withholds truth from humans. Catholic biologist Kenneth Miller writes, “In order to defend God against the challenge [Creationists] see from evolution, they have to make him into a schemer, a trickster, even a charlatan. Their version of God is one who intentionally plants misleading clues beneath our feet and in the heavens themselves. . . . To embrace that God, we must reject science and worship deception itself.”⁷⁶ The ID community’s notion that each individual species or “kind” has been meticulously designed presents severe theological problems in light of the many troublesome features of nature, such as pain, disease, violence, and the millions of species that have become extinct. For example, scientists have found twenty-two distinct species of elephants that arose and became extinct during the past six million years. Why did it take so many tries to design modern elephants?⁷⁷

For that matter, certain features of the human body are highly troublesome from a “design” hypothesis in the above sense. Many persons suffer from back ailments, due to a skeletal design adapted from four-footed ancestors.⁷⁸ Most mammals generate their own vitamin C; but while we have the same biochemical machinery, it doesn’t work because mutations have inactivated a key final step. Evidently these mutations occurred after our ancestors adopted a diet rich in fruit, when it was no longer essential to generate vitamin C.⁷⁹ Thirty percent of the roughly one thousand human genes associated with the sense of smell are inoperable due to accumulated mutations.⁸⁰ In human eyes, the optic nerves emerge from the front of the retina, and then travel to the back, resulting in a blind spot. By contrast, mollusk eyes are designed

more logically with nerve connections on the back of the retina.⁸¹ Each of these examples makes perfect sense from evolutionary history, but they are inexplicable as the product of meticulous design by a transcendent Being. Even worse, as noted tongue-in-cheek by Kenneth Miller, one could argue that the ID movement's designer is a plagiarist, because the DNA errors that have inactivated our ability to produce vitamin C have been copied into the genomes of three other primates.⁸²

The “War” between Science and Religion

Creationist and ID scholars have adopted a combative stance against the findings and theories of modern science, particularly evolution—indeed, they see science and religion pitched in mortal combat. But many other scientists and theologians fail to see the need for this “war.” As Kenneth Miller explained recently on PBS:

I think that faith and reason are both gifts from God. And if God is real, then faith and reason should complement each other rather than be in conflict. Science is the child of reason. Reason has given us the ability to establish the scientific method to investigate the world around us, and to show that the world and the universe in which we live are far vaster and far more complex, and I think far more wonderful, than anyone could have imagined 1,000 or 2,000 years ago.

Does that mean that scientific reason, by taking some of the mystery out of nature, has taken away faith? I don't think so. I think by revealing a world that is infinitely more complex and infinitely more varied and creative than we had ever believed before, in a way it deepens our faith and our appreciation for the author of that nature, the author of that physical universe. And to people of faith, that author is God.⁸³

LDS biologist Daniel J. Fairbanks offered this advice:

Those who sincerely seek both scientific and spiritual understanding would do well to abandon the dichotomy [that one must choose between science and religion]. Denying the evidence of evolution, including human evolution, is honest only in ignorance. The incredible diversity of life on Earth, the many fossils unearthed, the varied yet similar anatomical features among species, the obvious hierarchical arrangement of life, and the literally millions of ancestral relics in our DNA—all undeniably attest to our common evolutionary origin with the rest of life. If someone can believe that all living organisms share the same creator, why not consider that all living or-

ganisms share a common genetic heritage? Indeed, we can find wonder, even comfort, in embracing our biological relationship with all living things. As Darwin understood, “[T]here is grandeur in this view of life.”⁸⁴

In contrast to the highly negative view of evolution that one reads in the Creationist and ID literature, Catholic biologist Francisco Ayala argues that evolution can be seen in a positive light, as the solution to the “last prong” of the problem of suffering and evil: “As floods and drought were a necessary consequence of the fabric of the physical world, predators and parasites, dysfunctions and diseases were a consequence of the evolution of life. They were not a result of deficient or malevolent design.”⁸⁵ This statement is reminiscent of a comment made by LDS President David O. McKay in 1952, who argued that evolution could be seen as evidence that humankind is destined for eternal life:

For example, evolution’s beautiful theory of the creation of the world offers many perplexing problems to the inquiring mind. Inevitably, a teacher who denies divine agency in creation, who insists there is no intelligent purpose in it, will infest the student with the thought that all may be chance. I say, that no youth should be so led without a counterbalancing thought. Even the skeptic teacher should be fair enough to see that even Charles Darwin, when he faced this great question of annihilation, that the creation is dominated only by chance wrote: “It is an intolerable thought that man and all other sentient beings are doomed to complete annihilation after such long, continued slow progress.” And another good authority, Raymond West, said, “Why this vast [expenditure] of time and pain and blood?” Why should man come so far if he’s destined to go no farther? A creature that travels such distances and fought such battles and won such victories deserves what we are compelled to say, “To conquer death and rob the grave of its victory.”⁸⁶

Catholic theologian John Haught adds the following:

If God were a magician or a dictator, then we might expect the universe to be finished all at once and remain eternally unchanged. If God insisted on being in total control of things, we might not expect the weird organisms of the Cambrian explosion, the later dinosaurs and reptiles, or the many other wild creatures that seem so exotic to us. We would want our divine magician to build the world along the lines of a narrowly human sense of clean perfection.

But what a pallid and impoverished world that would be. It would lack all the drama, diversity, adventure, and intense beauty

that evolution has in fact produced. A world of human design might have a listless harmony to it, and it might be a world devoid of pain and struggle, but it would have none of the novelty, contrast, danger, upheaval and grandeur that evolution has brought about over billions of years.

Fortunately, the God of our religion is not a magician but a creator. And we think this God is much more interested in promoting freedom and the adventure of evolution than in preserving the status quo.⁸⁷

Conclusion

There is nothing in the overall scientific picture of the creation that is fundamentally anti-religious. To the contrary, many stand in awe at the grandeur of life on earth and the universe's elegant, lawful construction. Further, as some authors cited above have argued, evolution can be seen as a solution to the problem of why suffering and evil exist in the world, and as evidence that humankind is destined for eternal life (as in the LDS doctrine of "eternal progression").

With regard to the scientific evidence, Carl Sagan observed that "extraordinary claims require extraordinary evidence."⁸⁸ Most scientists (even those professing religious faith) who have examined the claims of the Creationist and ID movements agree that what these communities have produced so far is either negated by available scientific evidence or, at the very least, falls far short of the level required to challenge existing theories. These movements have also failed to formulate a body of quantitative, falsifiable hypotheses of their own that can withstand empirical testing and peer review.

With regard to theology, the Creationist and ID communities seek to identify phenomena that cannot be explained by natural laws, in an attempt to "prove" the hand of God, thus making faith unnecessary. Ironically, this approach implicitly affirms the materialist worldview of prominent atheists, who say that religion is false because of modern science. More importantly, this approach leads directly to a "God of the gaps" theology, which has left a legacy of disappointment through the years as science has filled many of the remaining gaps. Furthermore, as noted above, certain Creationist and ID writings have overtones of "God the Great Deceiver" theology—the notion that God has deliberately altered

physical evidence to give it the “appearance of age” or has withheld truth regarding the creation from humans. Such notions are inimical to the LDS tradition of a rational, comprehensible God who works within the realm of natural law.

Some have suggested that Creationist or ID scholarship might be useful to bolster the religious conviction of those who waver. But it seems highly unwise to base one’s personal faith on precepts that are questioned by many God-believing scientists. As Paul warned the Corinthians, “For if the trumpet give an uncertain sound, who shall prepare himself to the battle?” (1 Cor. 14:8).

In summary, it is not only futile to battle modern science, as the Creationist and ID communities have done, but it is also unnecessary. Most major religious denominations, including the LDS Church, have made peace with the scientific world, recognizing that science addresses very different questions and employs very different methods. Many leading scientists affirm a religious faith. And both scientists and nonscientists can stand in awe at the majesty of the universe, which is now known to be much vaster, more intricate, and more magnificent than ever before realized in human history.

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