Evolution and Creationism

by Michael J. Prival

Since the publication of Charles Darwin's *On the Origin of Species* a century and a half ago, the debate over evolution has not ceased. The history of the teaching of evolution in high schools in the United States illustrates the ebbs and flows of the controversy.

Charles Darwin is generally remembered for having advanced two distinct ideas. First, that *species evolve from other species.* This concept is in direct contradiction to the biblical account, in which the deity creates each species separately. Those who have, historically, accepted the creation story in the Bible have generally rejected even the possibility that some of these divinely-created species might have evolved into other species. After all, because God's work must be perfect, the species he created also must have been perfect; evolution into other species would have been impossible as it would have been driven by a need to improve on God's handiwork.

Darwin's second major idea is that the mechanism by which evolution occurs is *natural selection*. (I put aside for this article Darwin's auxiliary theory of sexual selection.) Small changes that occur as a species reproduces confer either advantages or disadvantages upon the offspring that enable them to be more or less successful in producing further generations of offspring. The *occurrence* of these changes is random – it is not affected by the needs of the organism in which they occur. It is only the *survival* of these changes from generation to generation that depends on the extent to which they contribute to, or detract from, the organism's vitality and reproductive capacity. Eventually those progeny with the new traits that make them most

adaptable to their particular environments form a new and distinct population and, as more and more of such changes accumulate, a new species that is dramatically different from the original one appears.

Darwin's *On the Origin of Species*, published in 1859, had enormous impact in spreading and fostering acceptance of evolution and natural selection. Nevertheless, we should note that others had had similar ideas. Most notably, Alfred Russel Wallace wrote a scientific paper explaining how species arose through evolution and natural selection long after Darwin conceived of this idea but during the time when Darwin shared his heretical thoughts with only a few close friends.[1]

While Wallace and Darwin were the first to present detailed explanations of natural selection, the more basic idea that species evolve one into the other had been promoted decades earlier by Jean-Baptiste Lamarck.[2] Interestingly, even before Lamarck, Erasmus Darwin, Charles' grandfather, not only advocated evolution and the relatedness

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[1] Wallace, in far off Indonesia, sent his manuscript to Darwin to be forwarded to a journal editor for publication. Darwin, shocked that Wallace had independently had the same great thoughts, quickly prepared his own publication on the topic, which was released in simultaneously with Wallace's in 1858. Until that moment, Darwin had intended for his work on evolution and natural selection to be published after his death, when he would not have to bear the weight of the controversy that would follow.

[2] The brilliant French naturalist Jean-Baptiste Lamarck is now remembered in something of a negative way because he did not understand the mechanisms that drive the evolutionary process. However, he deserves to be recognized as a great pioneer in advancing the idea of evolution itself. It was far more courageous to advocate evolution in 1802, as Lamarck did, than it was when Darwin finally published *On the Origin of Species* in 1859.

of species but also described the general idea of natural selection.[3] Darwin himself recognized that suggestions of evolution, and even of natural selection, go back to ancient Greece.[4]

What many people may not know is that *as a young man, Charles Darwin believed in the accuracy of the Bible.* He believed that there was an intelligent designer of earth's living species. During the course of his life, he broke free of this belief, but if a great intellect like Darwin accepted it, we must recognize it as a very powerful idea.

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[3] Charles Darwin later claimed not to have been significantly influenced by the evolution-oriented writings of his grandfather Erasmus, a major humanist thinker of his time. Erasmus Darwin, in his *Zoönomia or the Laws of Organic Life*, published in the 1790s and, more ornately, in a posthumously published poem, unmistakably advances the ideas eventually championed by his grandson:

> ORGANIC LIFE beneath the shoreless waves
> Was born and nurs'd in Ocean's pearly caves;
> First forms minute, unseen by spheric glass,
> Move on the mud, or pierce the watery mass;
> These, as successive generations bloom,
> New powers acquire, and larger limbs assume;
> Whence countless groups of vegetation spring,
> And breathing realms of fin, and feet, and wing.
> ¯ From Erasmus Darwin, *The Temple of Nature, or The Origin of Society: a poem with philosophical notes* (Baltimore: John W. Butler, 1804), pp. 35-36.

[4] Darwin refers to "allusions to the subject in the classical writers." He specifically quotes Aristotle discussing of parts of the body: ". . . Aristotle, in his 'Physicae Auscultationes' (lib. 2, cap. 8, s. 2), [says] 'Wheresoever, therefore, all things together (that is all the parts of one whole) happened like as if they were made for the sake of something, these were preserved, having been appropriately constituted by an internal spontaneity; and whatsoever things were not thus constituted, perished, and still perish.' We here see the principle of natural selection shadowed forth, . . ."– Charles Darwin, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*, Fourth Edition (London: John Murray, 1866), p. xiii.

Darwin and the Argument for Intelligent Design

In his autobiography, Darwin says that during his three years of study at Cambridge the only worthwhile ideas he encountered were those contained in the books of William Paley: *Evidences of Christianity*, *Moral Philosophy*, and *Natural Theology*. The latter presents a classic argument for intelligent design. If one stumbles upon a watch and examines it, it is clear that its many parts are assembled for a purpose – to produce motion of the hands that tell a person what time it is. It is obvious upon inspection, even if we never saw a watch before, that it was designed and assembled by a purposeful, intelligent being. If a watch requires an intelligent designer, how much more so does a living being, much less a human, with so many intricately assembled and interacting parts? Paley writes: "The marks of design are too strong to be got over. Design must have had a designer. That designer must have been a person. That person is GOD."[5]

The assertion that the organizational complexity of living things requires an intelligent designer has been used for two distinct, but related, purposes. First, the so-called *argument from design* has been, for many centuries, one of the classic ways of "proving" the existence of an intelligent creator god or gods. More recently, the notion of *intelligent design* of living things has been put forward to demonstrate that Darwin's theory of natural selection is not a sufficient explanation for the evolution of species from other species. It is this intelligent design argument that was promoted by opponents of evolution as recently as 2005, when its application to public education was found by a federal

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[5] Paley, William, *Natural Theology: or, Evidences of the Existence and Attributes of the Deity, Collected from the Appearances of Nature*, Second Edition (London: Taylor and Wilks, 1802), p. 473.

judge in Pennsylvania to be an unconstitutional violation of the principle of separation of church and state.[6]

The argument from design was analyzed, prior to Paley's *Natural Theology*, by a person to whom we often look for clarification of difficult issues: the Scottish Enlightenment philosopher David Hume. In his *Dialogues Concerning Natural Religion*, published after his death in 1776, Hume refutes the idea that the structure of the universe or of living things leads to a conclusion that there is an intelligent, all-powerful designer.

If a watch or a house requires a designer, he says, it is not valid to conclude by analogy that the far more vast and incomprehensible structures of the universe or even human bodies have a similar intelligence behind them. We cannot know that these great designs did not result from self-assembly of the materials. Remember, Hume put forth this argument long before Darwin and even longer before the modern cosmological "big bang" theory.

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[6] The phrase "separation of church and state" is commonly used to denote an expansive interpretation of the clause in the First Amendment to the United States Constitution that says: "Congress shall make no law respecting an establishment of religion." In many decisions since 1947, the Supreme Court has held that the Establishment Clause means much more than merely preventing the government from favoring one religion over other religions. For example, in the 1968 case *Lemon v. Kurtzman*, the court said that the Establishment Clause means that any law must have a secular purpose, must not primarily advance or inhibit religion, and must not excessively entangle government and religion. In his important swing opinion in the 2005 Texas Ten Commandments case *Van Orden v. Perry*, Justice Stephen Breyer invoked this doctrine, but also recognized its limitations: "If the relation between government and religion is one of separation, but not of mutual hostility and suspicion, one will inevitably find difficult borderline cases."

Furthermore, if we cannot imagine the universe to be self-creating and we thus require that it have a creator, doesn't that just push the problem back one step? How, asks Hume, was this creator created? It is no more difficult to imagine our world having been self-assembled than it is to imagine a creator originating without a preceding intelligent creator, and so on *ad infinitum*.

Even if we were to accept the idea that there is some unknown founding principle of the universe, Hume says that we still could not ascribe any particular attributes to that founder, such as human-like intelligence or infinite power. Given the amount of pain and misery in our world, Hume is clear that we can rule out benevolence as one of the putative creator's traits.

Despite Hume's illuminating reasoning, it is understandable that people as intelligent as Paley and the young Darwin accepted the argument from design. On the surface, the validity of this argument is, it seems to me, intuitively obvious. How can one look upon the structures and functioning of living species and conclude that this all happened by natural forces? Of course, in science, things that are intuitively obvious do not always turn out to be true, and this is one of those cases in which reality is not in harmony with intuition. We honor Charles Darwin for presenting an alternative explanation for the origin of species – one that does not include a guiding intelligent force.

Evolution and Creationism in the Schools

Following Darwin's publication of *On the Origin of Species* in 1859, his ideas were slowly adopted into the educational system in the United States. High school science texts gradually eliminated their declarations that the order of living species reflected God's design. By about 1900, Darwin's ideas had totally supplanted such theological explanations in American high school science texts.

At the end of the nineteenth century, German scholars, the best known of whom is Julius Wellhausen, concluded that the books of the Bible, specifically the first five of these books (the *Torah* or the Books of Moses), were written not by a single supernatural deity but rather by four different authors. These authors, who lived in different historical periods, and the final editor or editors used the biblical texts to promote their political and religious agendas. This "documentary hypothesis" began to be accepted in Protestant churches (and also by non-Orthodox rabbis) in the United States. Largely in reaction against the documentary hypothesis (and similar scholarly criticism of the New Testament, questioning, for example, the miracle of the virgin birth of Jesus), the movement we now call Protestant Fundamentalism arose.

By 1920 the Fundamentalist movement had adopted an additional mission: to prevent public schools from teaching Darwin's ideas about evolution as facts. This was not an effort to ban the teaching of evolution. The Fundamentalists at that time wanted only to prevent teachers and textbooks from saying that evolution and natural selection are true. They also had no desire for teachers promote the biblical story of creation. The Protestant Fundamentalists of the early twentieth century understood that any discussion of religion, outside of rote daily readings from the Bible and recitation of the Lord's Prayer, would be an impermissible breach of the separation of church and state. The Fundamentalists saw that no matter how such religious ideas were expressed they would undoubtedly offend some Protestant sect. Separation of church and state was widely seen as necessary to prevent the elevation of one Protestant denomination over another, not as a way of protecting the rights of non-Protestants.

After Tennessee banned the teaching of evolution in 1925, Fundamentalists won a legal victory in the famous Scopes trial. John Scopes was convicted of teaching evolution, and the anti-evolution law

was subsequently upheld by the Tennessee Supreme Court.[7] Liberals, both religious and nonreligious, considered the legal defeat in the Scopes trial to be a moral victory because of the verbal shellacking that Clarence Darrow inflicted on one of the prosecuting attorneys, William Jennings Bryan, a leader of the Fundamentalist movement.[8]

But, despite the deep public humiliation that Bryan suffered when questioned by Darrow, the Scopes trial was actually a great loss for science. In the wake of the decision, American high school textbooks immediately reduced or completely eliminated their discussion of Darwin and evolution. Very little about evolution, and nothing at all about human evolution, was taught in American public high schools for three decades following the Scopes trial, at least as evidenced by the published textbooks of that period.

The battle over teaching evolution wasn't reignited until the United States was shocked into greatly expanding its commitment to science and science education following the launching of the earth-orbiting satellite, Sputnik, by the Soviet Union in 1957. The National Science Foundation (NSF) sponsored the development of a new biology curriculum whose central conceptual focus was evolution through natural selection. In 1963, schools around the country, even in areas where the teaching of evolution had been banned, began adopting textbooks based on the new NSF curriculum. By 1970 the three existing state laws banning the teaching of evolution (in Tennessee,

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[7] Scopes was not a victim here; he volunteered to be prosecuted in response to a search by the American Civil Liberties Union for a teacher willing to test the Tennessee law.

[8] While Bryan was for decades portrayed by secular historians as an ignorant populist, he was, in fact, probably the greatest force in his day for political progressivism, as documented, for example, in Michael Kazin's 2006 book, *A Godly Hero: The Life of William Jennings Bryan*. Bryan offered, before the famous trial began, to personally pay any fine that the court might levy on Scopes.

Arkansas, and Mississippi) had been either repealed or struck down by the courts. It was the landmark 1968 Supreme Court case *Epperson v. Arkansas* which found such laws to violate separation of church and state.

Recognizing that they couldn't stop the teaching of evolution in the public schools, the anti-evolution forces adopted a new strategy. When the Fundamentalists, prior to the Scopes trial, opposed the teaching of evolution as a fact, they did so in the name of religious neutrality. If some religious people believed in evolution and others believed in the Bible's creation story, then teaching that only one of these two theories is correct was, they felt, religiously biased. However, after the Epperson case, they came to realize that they could not stop the teaching of evolution and natural selection, so they overcame their earlier aversion to teaching religious ideas in public schools. In 1973, Tennessee passed a law requiring equal treatment in the classrooms of various theories concerning the origin of species, specifically including the biblical creation story. The statute was overturned by a Federal court in 1975.

The Kentucky legislature in 1976 took a different approach. Rather than requiring the teaching of alternatives to evolution, the Kentucky law simply permits teachers, of their own volition, to teach the biblical story of creation along with evolution. If such instruction is given and a student is a believer in the biblical story, then full credit must be given if the student responds to an examination question by correctly recounting that story. Shockingly, that law has never been challenged and remains on the books to this day.[9] There is no information available

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[9] Other religion-oriented statutes still on the books in Kentucky include a 1942 law requiring Bible readings in public school classes, a law permitting the recitation of the Lord's Prayer in classrooms, and a 1978 law requiring that the Ten Commandments be posted in every classroom with a notice saying that "the secular application of the Ten Commandments" is the basis for Western and United States law.

concerning how many, if any, public high school teachers in Kentucky are aware of or utilize the existing law permitting them to teach creationism. Once the courts had eliminated the possibility of balancing the teaching of evolution with the required teaching of biblical creation, a different anti-evolution strategy emerged: to unlink the creation idea from religion. If creationism could be taught as science rather than as religion, it would not run afoul of the legal constraints on teaching religion in public schools. Thus was born the campaign for teaching "creation science."

The central idea of creation science was to use scientific-sounding arguments to show that evolution of species from common ancestors through natural selection throughout millions of years cannot be true; that humans and apes, specifically, do not have a shared ancestry; that the age of the earth is thousands, not many millions, much less billions, of years; and that an ancient, catastrophic worldwide flood explains the geological structures modern geologists attribute to processes that occurred gradually over vast time periods. Equal treatment laws for teaching evolution and creation science were passed in Arkansas and Louisiana in 1981. In 1983 federal judge William Overton ruled that the Arkansas law "was simply and purely an effort to introduce the Biblical version of creation into the public school curricula" and was, therefore, unconstitutional *(McLean v. Arkansas).* The Louisiana law was taken all the way to the U.S. Supreme Court, which in 1987 held it unconstitutional because it promoted an idea, creationism, that was motivated by religion *(Aguillard v. Edwards).*

So, once again, the creationists were thwarted by the courts and needed yet another fallback strategy that would meet the standard of separation of church and state. Creation science had been tainted by embracing such Bible-based ideas as a worldwide flood and a relatively young Earth. The new formula abandoned these points. Instead, it hearkened back to an idea that had impressed the young Charles Darwin – that the complexity and interrelatedness of living things could not have occurred without the guiding hand of an intelligent designer. Yes, species may

have evolved from one another during a period of many millions of years, but not by random, natural processes alone. By advocating this moderated viewpoint, the anti-evolution forces hoped to ally themselves with liberal religious thinkers who embraced Darwinism but who, in addition, wanted to believe in some divine purpose to it all.

In order to avoid accusations of promoting religion, the most careful proponents of intelligent design did not claim that the intelligent designer was God or any other supernatural force. It might, for example, be aliens from another planet. Of course, this begs the question of how these intelligent aliens came to be. Who created them and who created their creator? We're back to Hume's irrefutable refutation.

The doctrine of intelligent design was fleshed out, most particularly, by Michael Behe, a biochemist who promotes the concept of *irreducible complexity*. Because Darwinian theory holds that evolution occurs in small steps, accumulating over time, it is necessary that there be a selective advantage to each step before the next can take hold. Behe maintains that there are biological structures, such as the flagella of bacteria (little hairs that propel them), whose parts are so interdependent that all of them must have developed at the same time. If any one had arisen before the others, it would confer no selective advantage and would not have spread through the species so that the next part could then arise and spread. The complex structure works, says Behe, only when all the pieces are in place, and, because this cannot happen in a single evolutionary step, the structure cannot have developed through successive changes and natural selection. Instead, there must have been an intelligent force that enabled all the necessary components of this "irreducibly complex" structure to develop all at once.

Behe uses the analogy of a mousetrap, which consists of five major parts: (1) a platform; (2) a hammer that crushes the mouse; (3) a spring; (4) a sensitive catch that releases the hammer when touched; and (5) a metal bar that holds the hammer back until it is sprung. Behe says that you can't catch a few mice with one of these pieces, say, the platform,

and then catch them more efficiently with two, three, or four pieces. You need all five parts for the mousetrap to work. That's what he means by *irreducible complexity*.

Given the advances in science since Paley's time, it is not surprising that Behe's arguments are far more sophisticated and detailed than those of centuries past. But they are, in reality, just an updated version of the age-old argument from design that David Hume demolished in the 1770s. These updated arguments require an updated refutation, which U.S. District Court Judge John E. Jones III provided with great lucidity in his 2005 decision overturning the inclusion of intelligent design in the Dover Area, Pennsylvania, high school science curriculum.

It turns out that some of the component parts of the bacterial flagellum do have a function, even in the absence of the other parts. But even if this information were not known, the case for intelligent design would rest on the incompleteness of our knowledge rather than on any positive argument. Through the ages, supernatural deities have been presented as forces that perform functions which could not be otherwise understood – carrying the sun across the sky each day, whipping up storms, creating species. As science has advanced, the realm of the "God of the gaps" has shriveled. So, calling upon a powerful, superhuman or supernatural being to explain remaining unexplained phenomena is really no argument at all.

Most importantly, Judge Jones explained that there may well be an intelligent designer pressing the evolution of species in a particular direction. We have no way of demonstrating or refuting that possibility. And that's the point. In science any hypothesis has to be testable. Because we cannot test intelligent design, it is not science. And that, said the judge, means it can't be part of a required science curriculum. Judge Jones recognized intelligent design as simply the latest mask donned to shield the face of biblical creationism. His opinion is a brilliant treatise in plain language on the nature of science.

So, since the early 1960s, the anti-evolutionists have been beaten back time and time again. Their most recent salvo is a 2008 Louisiana law promoted by Governor Bobby Jindal that gives teachers the right to introduce into their classrooms alternative ideas concerning such topics as evolution, the origin of life, global warming, and human cloning. Like the 1976 Kentucky law, this Louisiana law is cleverly written as if its goal were to protect the academic freedom of teachers. It has sparked considerable controversy and there is great concern as to whether parents will have an opportunity to effectively appeal if they believe their children are being indoctrinated with religion by their teachers.

However, this Louisiana statute is a pale shadow of earlier assaults on the teaching of evolution. The anti-evolution forces are beleaguered and in retreat. Although we secularists and humanists often feel that it is we who are on the defensive, recent American history has very much been on our side.

Protestant Fundamentalists celebrated their victory in the 1925 Scopes trial by withdrawing from public and political life for several decades. They became active again when they saw their values being undermined by the political and legal system through the banning of teacher-led prayer in schools, legalization of abortion, and now the expansion of gay rights. Our victories have energized our opponents. We need to stay vigilant to protect and expand the implementation of our values. At the same time, we must recognize that the occasional setbacks we have suffered in recent decades are relatively minor, and the overall tide has been in our direction. The legal and political history of the teaching of evolution is but one example of the increasing acceptance of a progressive outlook on important social issues.

Suggested Readings:

Scott, Eugenie C., *Evolution vs. Creationism: An Introduction* (Berkeley: University of California Press, 2005).

Larson, Edward J., *Trial and Error: The American Controversy Over Creation and Evolution,* Third Edition (Oxford: Oxford University Press, 2003).

Larson, Edward J., *Summer for the Gods: The Scopes Trial and America's Continuing Debate Over Science and Religion* (New York: Basic Books, 2006).

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