The Constitutional Debate over Teaching Intelligent Design as Science in Public Schools

By Anne Marie Lofaso

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I. INTRODUCTION

Darwin's theories about the origins of species sparked a firestorm of debate that continues to rage today. Recently, proponents of intelligent design (ID) have sought to challenge the teaching of evolution in public schools across the country, and perhaps most notably in Kansas and Dover, Pennsylvania, by claiming that the theory of evolution does not adequately explain the complexities of life and that their theory—that an "intelligent agent" better explains the origins of human existence—should be taught in public schools. This idea has gained considerable traction throughout the United States; indeed, even President Bush has stated that he believes both intelligent design and evolution should be taught in schools.

While the idea of teaching ID in science class along side evolution may sound fair, it has two fundamental, interrelated flaws: *First*, it would violate the Establishment Clause. The Supreme Court has found unconstitutional both laws forbidding the teaching of evolution and so-called "balanced treatment laws" that mandate the teaching of creation science with evolution because the purpose of those laws is to advance religion. Indeed, challenges to evolution have traditionally been pushed by those Christians who take issue with the theory of evolution's challenge to a literal reading of the Book of Genesis. *Second*, teaching ID as science would undermine the definition of science that has led to medical, technological, and other scientific advances for centuries. The scientific method expressly excludes supernatural causes from the purview of science, because such causes cannot be controlled for, cannot be falsified through repeated testing, and are not tentative. Science does not pass judgment on whether those explanations are correct; they are simply outside of the domain of science and left to the realm of religious faith. An "intelligent agent," like that posited by proponents of ID, is a cause outside of nature and therefore the question of its existence is outside of science as we know it. This makes it both bad policy to teach ID in science class and is evidence that it would be unconstitutional since there seems to be no valid secular purpose for doing so.

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Perhaps recognizing these flaws, proponents of ID have attacked the scientific framework for, in their view, unnecessarily excluding supernatural explanations. But to allow supernatural explanations to qualify as scientific explanations would stifle scientific development because there is simply no way to question or test for supernatural explanations. Moreover, teaching this revised definition of science in our public schools would leave our students less prepared to understand and to improve upon the technologies that have so profoundly affected human existence over the last four centuries.

II. LEGAL AND SCIENTIFIC FRAMEWORKS FOR UNDERSTANDING THE ONGOING DEBATE BETWEEN EVOLUTION AND DESIGN

A. Legal Framework: The Establishment Clause Mandates Government Neutrality between Religion and Religion, and between Religion and Nonreligion

The questions whether and how human origins theories may be taught in public school science classes sharply implicate rights under the Establishment Clause of the First Amendment. That clause forbids the enactment of any "law respecting an establishment of religion."[1] This "fundamental concept of liberty" embodied in the First Amendment applies to the states through the Fourteenth Amendment and includes public elementary and secondary schools. In this context, the considerable discretion normally afforded to state and local school boards in operating public schools "must be exercised in a manner that comports with the transcendent imperatives of the First Amendment."[2]

The "First Amendment mandates governmental neutrality between religion and religion, and between religion and nonreligion."[3] In *Lemon v. Kurtzman* (1971), the Supreme Court developed a three-pronged test to determine whether state action runs afoul of the Establishment Clause. First, the act must have a bona-fide secular purpose. Second, the act's principal or primary effect must be one that neither advances nor inhibits religion. Third, the act must not result in an excessive entanglement of government with religion.[4] State action violates the Establishment Clause if it fails to satisfy any of these prongs.[5] For more than three decades, the *Lemon* test has been used to determine whether state action violates the Establishment Clause—most recently to strike down a display of the Ten Commandments established by the Kentucky legislature.[6] But as the Supreme Court observed in *McCreary County v. ACLU*,

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[1] U.S. Const, amend. 1.

[2] *Bd. of Educ., Island Trees Union Free School Dist. No. 26 v. Pico,* 457 U.S. 853, 864 (1982).

[3] *Epperson v. Arkansas,* 393 U.S. 97, 104 (1968); *Everson v. Board of Ed. of Ewing,* 330 U.S. 1, 15-16 (1947); *Wallace v. Jaffree*, 472 U.S. 38, 53 (1985).

[4] *Lemon v. Kurtzman,* 403 U.S. 602, 612-613 (1971).

[5] *Edwards v. Aguillard*, 482 U.S. 578, 583 (1987).

[6] *McCreary County v. ACLU*, ___ U.S. ___, 125 S. Ct. 2722 (2005).

"Establishment Clause doctrine lacks the comfort of categorical absolutes,"[7] thereby making *Lemon* a highly fact-intensive inquiry into the purpose and effects of state action.[8]

Teaching science in the science classroom presumably passes *Lemon*'s first prong, because such conduct would have a secular purpose. By contrast, teaching something other than science in the science classroom is suspect, because it begs the question why an educator would inject nonscientific analysis into a science curriculum. When the educator's reason has a religious purpose or religious effects, it violates the Establishment Clause. In this context, it is essential to understand what constitutes science and the scientific method.

B. The Scientific Framework

Sir Francis Bacon (1561-1626), a Cambridge educated lawyer, is commonly credited as the father of modern science. His NOVUM ORGANUM (1620), which, among other things, replaced the idea of final causes (e.g. supernatural causes) with the scientific method of inductive reasoning through careful observation, ushered in the era of modern science. Bacon's philosophy of science was revolutionary. Although the philosophy of science has advanced since Bacon's time, Bacon's scientific method serves as its cornerstone.

Nowhere has the definition of science been more litigated than in cases questioning the constitutionality of educational policies involving human origins. Perhaps the tidiest definition of science can be found in the federal district court decision in *McLean v. Arkansas*. In its decision permanently enjoining the Arkansas balanced treatment law, the court, based on the testimony of scientists such as Harvard Professor Stephen J. Gould, described several essential characteristics of science: "It is guided by natural law" and is "explanatory by reference to natural law;" "[i]t is testable against the empirical world" and, therefore, "falsifiable;" and "[i]ts conclusions are tentative, i.e., are not necessarily the final word."[9] This definition provides a useful guide for what modern scientists view to be science and the scientific method.

1. Science is a process for explaining natural phenomena by reference to natural phenomena—methodological naturalism

Science has been described as "a process for systematically collecting and recording data about the physical world, then categorizing and studying the collected data in an

[7] *McCreary County v. ACLU*, 125 S. Ct. at 2733 n.10 (citing *Everson v. Board of Ed. of Ewing,* 330 U.S. 1 (1947)).

[8] *Compare McCreary County v. ACLU*, 125 S. Ct. at 2727-2745 (striking down state legislature's display of Ten Commandments) *with Van Orden v. Perry*, ___ U.S. ___, 125 S.Ct. 2854, 2858-2859, 2868-2872 (2005) (upholding long-standing public display of Ten Commandments) (Breyer, J., concurring in judgment).

[9] *McLean v. Ark*, 529 F. Supp. 1255, 1267 (E.D. Ark. 1982).

effort to infer the principles of nature that best explain the observed phenomena."[10] The modern scientific method is built on Bacon's insistence that science rely "entirely upon naturalistic explanations." Modern science, like Bacon, is "not concerned with supernatural or occult explanations which are, by definition, excluded from the realm of science."[11]

2. *Scientific explanations make predictions about the natural world, which are capable of being proven untrue (falsifiable) through repeated testing*

Science is "commit[ed] to the testing of proposed explanations by means of empirical observation and experimentation."[12] Science is also "devoted to formulating and testing naturalistic explanations for natural phenomena."[13] Scientific explanations "generate predictions about related phenomena, about the outcome of future activities or events, or about past occurrences. The predictive capacity of scientific explanations enables scientists to generate new applications of existing explanations. These predictions yield opportunities to test the accuracy of the scientific explanation in question and may result in the falsification of the explanation." "Because science is grounded in observable facts, empirical observations inconsistent with a scientific proposition will compel modification or abandonment of that proposition."[14]

The "hallmark" of science is that its theories are "capable of disproof, . . . subject to being falsified by empirical observation. If no test can be conceived that could prove a proposition wrong, it is not a proposition of science."[15] For example, Newton's laws are laws of science because they were formulated from empiric observation and confirmed by countless experiments. As our observational technology improved, it became clear that certain observations could not be explained by Newton's laws. And so the search was on for an explanation, finally provided in the context of Einstein's general theory of

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[10] *Edwards v. Aguillard*, No. 85-1513, amicus brief of 72 Nobel Laureates et al., 1986 WL 727658, at *23 & n.29 ("Nobel brief") (citing *IIT Research Inst. v. U.S.*, 9 Cl. Ct. 13 (1985) (defining "science" as "the process by which knowledge is systematized or classified through the use of observation, experimentation, or reasoning"). In that same case, the National Academy of Sciences' brief defined science as "a domain of human knowledge and activity within which scientists seek the systematic organization of knowledge about the composition and functioning of the universe." *Edwards v. Aguillard*, No. 85-1513, NAS amicus brief, 1986 WL 727667, at *6 ("NAS brief").

[11] NAS brief, 1986 WL 727667, at *6.

[12] *Id.*, at *6.

[13] Nobel brief, 1986 WL 727658, at *23.

[14] NAS brief, 1986 WL 727667, at *6-*7.

[15] *Id.*, 1986 WL 727667, at *6. In the twentieth century, philosopher of science, Sir Karl Popper, explored the concept of falsifiability, concluding that "the criterion of *the scientific status of a theory is its falsifiability*, *or refutability*, *or testability*." Karl Popper, CONJECTURES AND REFUTATIONS, (London: Routledge and Keagan Paul, 1963), reprinted at http://www.stephenjaygould.org/ctrl/ popper_falsification.html. For Popper, while it is easy to find verification of most theories, "[e]very genuine *test* of a theory is an attempt to falsify it, or to refute it." *Id.*

relativity. Importantly, this theory represents a complete paradigm shift in how gravity is understood.[16]

It is easy to imagine ways to refute evolution. In a detailed argument like evolution, there are numerous experimental discoveries that would be contrary to evolution and therefore difficult to reconcile with the theory. For example—the finding that acquired traits in humans can be inherited; the existence of a fossil in a time before or after its expected period, or in a place that could not be explained; the finding of a constant fossil record; the finding that DNA is perfectly copied from generation to generation and variation is not possible by errors in replication or from environmental mitogens—all tend to disprove some aspect of evolutionary theory. As easy as it is to imagine ways to disprove evolutionary theory it is difficult to imagine ways to disprove the existence of a supernatural creator of life. For example, the omnipotence of the supernatural force easily accounts for any older-than-expected fossil finding.

3. Scientific explanations are tentative and always subject to revision through the scientific method

The scientific method is structured such that no scientific explanation can ever be proven true. Scientific explanations are "necessarily tentative." The scientist's job is to modify scientific explanations through empirical observation and testing "to improve the accuracy with which those explanations account for observations." Scientists revise their explanations by testing predictions generated by the explanations themselves. Testing the predictions gives "opportunities to test the accuracy of the scientific explanation in question and may result in the falsification of the explanation."[17]

Scientists order their explanations into three levels "according to the extent to which they have withstood empirical testing"—hypotheses, theories, and laws. Hypotheses are "newly formulated . . . possible explanations of particular observed phenomena." Hypotheses cannot be supplanted by "ad hoc" hypotheses—explanations "incapable of generating new information, or of being tested empirically"—because such hypotheses "cannot stimulate research or expand scientific understanding." A theory, like the theory of evolution, is a scientific explanation that has "yielded significant advances in understanding, has enabled scientists to order and explore a range of related phenomena, has survived repeated opportunities for disproof in the course of exploring its predictions, and has been supported by the gathering of substantial observational or experimental data." A theory remains "subject to modification to improve its 'fit' to relevant empirical facts." Nevertheless, "a theory is held with a high degree of confidence and is unlikely to be abandoned unless superseded by another model with greater explanatory force, which is capable of ordering, explaining and predicting

[16] I am indebted to Dr. Seth Karp for helping me to understand the paradigm shift from Newtonian to Einsteinian physics.

[17] NAS brief, 1986 WL 727667, at *6-*7. *See also* Kenneth R. Miller, FINDING DARWIN'S GOD: A SCIENTIST'S SEARCH FOR COMMON GROUND BETWEEN GOD AND EVOLUTION. (New York: HarperCollins Publishers, 1999), pp.21, 26-27.

observed phenomena at least as well as the existing theory, but is capable of generating more fruitful research problems or approaches." Scientific laws represent the highest level of scientific generalization. "A law identifies a class of regularities in nature from which there has been no known deviation after many observations or trials. It is often expressed mathematically. Laws are generally valuable for their predictive capacity."[18]

4. Science makes no judgments about the truth or falsity of supernatural explanations for natural phenomena because such explanations are not falsifiable and never tentative

There is a bright line between scientific and religious inquiries. Scientists have "consciously limited" the scope of scientific inquiry to the search for "naturalistic principles," because "[s]cience is not equipped to evaluate the supernatural explanations for our observations." The limits of the scientific method mean that science does not "pass[] judgment on the truth or falsity of supernatural explanations," but "leaves their consideration to the domain of religious faith."[19]

C. Darwin's Theory of Evolution Is Science; Design Inference is Religion

1. Darwin's theory is a composite of several theories involving evolution, common descent, speciation, gradualism, and natural selection, each of which is falsifiable

Darwin's ON THE ORIGIN OF SPECIES sets forth five theories:

(1) *Evolution as such*. . . . [T]he world . . . is steadily changing and that organisms are transformed in time.

(2) *Common descent*. . . . [E]very group of organisms descended from a common ancestor and that all groups of organisms, including animals, plants, and microorganisms, ultimately go back to a single origin of life on earth.

(3) *Multiplication of species*. . . . [T]he origin of the enormous organic diversity. It postulates that species multiply, either by splitting into daughter species or by "budding," that is, by the establishment of geographically isolated founder populations that evolve into new species.

(4) *Gradualism*. . . . [E]volutionary change takes place through the gradual change of populations and not by the sudden (saltational) production of new individuals that represent a new type.

(5) *Natural selection*. . . . [E]volutionary change comes about through the abundant production of genetic variation in every generation. The relatively few individuals

[18] NAS brief, 1986 WL 727667, at *7-*8.

[19] Nobel brief, 1986 WL 727658, at *23.

who survive, owing to a particularly well-adapted combination of inheritable characters, give rise to the next generation.[20]

Darwin's theories meet the modern definition of science. Each relies on natural explanations for natural phenomena. Each makes predictions. For example, the theory of common descent predicts that the DNA between humans and chimps would be very similar. And in fact, 98-99 percent of human and chimp DNA is identical. Each is falsifiable as well. For example, the theory of evolution could be disproved by finding a constant fossil record. Common descent could be disproved by finding non-DNA-based life. Gradualism could be disproved by the sudden production of a new species type. Speciation could be disproved by finding that variation is not possible by errors in replication. And natural selection as the sole mechanism for change could be falsified by finding that acquired traits in any species can be inherited.

Darwin devised his theories through careful observation over a number of decades. And, in fact, many of Darwin's theories arise from his rejection of other working theories, and, importantly, his rejection of the design inference. Of equal importance, Darwin and others further tested Darwin's theories even after he settled on them for purposes of publication in 1859. Even after Darwin's death in 1882, each of these theories continued to undergo extensive scientific testing and, in many cases, revision based on new evidence.

2. *Although Darwin's theories challenge long-held ideological beliefs, including design and creationism, the scientific community eventually comes to accept those theories on the strength of their explanatory power*

    a. *Darwin's theory challenges traditional Christian ideology and nineteenth century philosophy; in particular, it is a response to Paley's design inference*

As Ernst Mayr, Harvard Professor of Zoology, once explained, each theory challenged long-held religious ideologies. The Darwinian paradigm—which views the world in constant flux and posits that all living creatures have a common ancestor—challenges the belief in a constant world created by a wise and benign Creator, who made humans in His image and with a soul, something animals do not possess. If animals and humans have a common ancestor, why don't animals have a soul? If, according to *Genesis*, God separately created all the living plants on day 3, fish and birds on day 5, terrestrial animals and humans on day 6, then how can all living creatures gradually have evolved from a common ancestor? These and other questions pose problems for the creationist who believes in God the Creator. The Darwinian paradigm also challenges the

[20] Ernst Mayr, ONE LONG ARGUMENT: CHARLES DARWIN AND THE GENESIS OF MODERN EVOLUTIONARY THOUGHT. (Cambridge: Harvard University Press, 1991), pp.36-37; *see also* Ernst Mayr, WHAT MAKES BIOLOGY UNIQUE? (Cambridge: Cambridge University Press, 2004), pp.100-112; Ernst Mayr, TOWARD A NEW PHILOSOPHY OF BIOLOGY (Cambridge: Harvard University Press, 1988), pp.198-211.

nature of that Creator, by replacing God as the final cause with natural selection—a non-teleological mechanism for change.[21]

The Darwinian paradigm also challenged a wide array of entrenched nineteenth century philosophical ideology. But perhaps the most drastic paradigm shift for nineteenth century thinkers was the shift from a teleological to a nonteleological world view. Nineteenth century western thinkers believed in a final cause. For Christians, that final cause was God, who designed the world and all living things for humanity's purpose. Darwin described the world without the need to resort to a final cause. For Darwin, natural selection acted on random variation to transform species, one branch of which evolved into modern-day humans.

The design argument, in its simplest form, goes something like this: Design is observable in nature. Design implies a designer. That designer must be God. Bishop William Paley (1743-1805), the Cambridge educated Anglican priest and one of the best known proponents of design, famously articulated a teleological version of the argument—that naturally observable design implies an intelligent designer with purpose:

> There cannot be design without a designer; contrivance without a contriver; order without choice; arrangement without anything capable of arranging; * * * * Arrangement, disposition of parts, subservience of means to an end, relation of instruments to a use imply the presence of intelligence and mind.[22]

Bishop Paley's design argument, like all design arguments, patently depends on the truth of the initial postulate—that design exists. If this observation is untrue, then Paley's argument fails. While most biologists, including Darwin, agree that order in the natural world exists, is measurable, and subject to scientific inquiry, that does not directly speak to whether design exists as Paley uses the term.

More importantly, design theory also hinges on the argument that design implies a designer. But that argument fails if the inference itself is untrue or even unknowable. Accordingly, the interesting question for those interested in the origins of life is not whether order exists, but whether such order implies a designer and whether that inference is observable, testable, and falsifiable through the scientific method.

Darwin's doubts about design lie in the inference of design, not in the observable fact of natural order. Darwin was trained at Cambridge in natural theology, a school of thought committed to design theory. Darwin was also a keen observer of nature. During his famous voyage, Darwin observed anomalies in "God's design," which led him to abandon teleological thinking by the 1850s in favor of non-purpose driven natural selection. Darwin's meticulous observations led him to discover increasingly more evidence that cast doubt on design theory, thereby emancipating him from the design

[21] Mayr, (1991), pp.38-39.

[22] William Paley, NATURAL THEOLOGY, chapter 2, p.11 (1802).

ideology. For example, all the evidence Darwin found in favor of common descent cast doubt on design. Darwin also considered the existence of vestigial organs and extinction—both anomalies in a designed universe.

Darwin's theory of natural selection, coupled with his consideration of the many anomalous data that cast doubt on the design inference, enabled him to abandon design—not because he falsified it, but because he no longer had faith in the inference.[23] Darwin, by his theory of natural selection, essentially rejects (as having no explanatory power) supernatural causes for life's origins, thereby bringing the study of life's origins within the domain of modern science.

b. The Modern Synthesis: the scientific community comes to accept Darwin's theories by the 1940s

Darwin's theories—evolution, common descent, gradualism, multiplication of species, and natural selection—are now commonly accepted by the scientific community because they have withstood almost 150 years of challenges.[24] Evolution and common descent were quickly accepted. As Professor Mayr points out, "[w]ithin fifteen years of the publication of the Origins hardly a qualified biologist was left who had not become an evolutionist."[25] By contrast, "other theories, such as gradualism, took longer to be accepted as they depended on concepts foreign to nineteenth century scientist, but are widely accepted today.[26]

III. THE INITIAL CONFLICT BETWEEN EVOLUTION AND RELIGION: DEVELOPMENT OF ESTABLISHMENT CLAUSE JURISPRUDENCE CONCERNING THE QUESTION WHETHER AND HOW HUMAN EVOLUTION MAY BE TAUGHT IN PUBLIC SCHOOLS

A. Overview: Young Earth Creationists Are the First To Launch Legal Challenges to Teaching Darwin's Theories in Public Schools

The more the scientific method separated itself from final causes or supernatural explanations for phenomena, the more likely it became that religious leaders and scientists would clash in a debate over the origins of life. Yet, because the scientific method eliminates from consideration supernatural explanations for observable phenomena, there logically should be no inherent conflict between the two disciplines. Science explains natural phenomena in accordance with the scientific method, leaving

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[23] For a modern account of the evidence against design, *see* Miller (1999), pp.57-128; *see generally* Richard Dawkins, THE BLIND WATCHMAKER: WHY THE EVIDENCE OF EVOLUTION REVEALS A UNIVERSE WITHOUT DESIGN. (New York: W.W. Norton & Co. 1996).

[24] General acceptance of Darwin's theories, known as the Modern Synthesis, came in two phases. First is the synthesis of Darwin's theories with Mendelian genetics to a core discipline of population genetics. Second is the linking of several traditional subdisciplines in biology. *See generally* Stephen Jay Gould, THE STRUCTURE OF EVOLUTIONARY THEORY (Cambridge: The Belknap Press of Harvard University Press, 2002), pp.503-591.

[25] Mayr (1988), p.21; Mayr (2004), p.112.

[26] Mayr (1988), pp.211-12; Mayr, (2004), pp.112-113.

supernatural explanations to the realm of religion. Science expressly declares that its conclusions are tentative; religion expressly declares that its conclusions are final. Science concerns itself solely with natural explanations for the observable world; religion concerns itself with "all things seen and unseen."[27]

Accordingly, the Judeo-Christian explanation for human origins is not a scientific hypothesis, theory or law. Rather, it is a supernatural explanation for the observable phenomena that the earth exists and that diverse life on earth exists. No scientific law, theory or hypothesis—not even Darwin's theory of evolution by natural selection—contradicts that explanation. Nor does any scientific law, theory, or hypothesis, support that explanation. At most, we can say that a scientific law, theory or hypothesis is consistent with any given religious tradition.

Although there is no necessary conflict between God the Creator and Mother Nature, the intellectual history of the debate over human origins is fraught with controversy. Perhaps this conflict is foreshadowed by the rise of the science of geology in the eighteenth century, when geologists found evidence that contradicted strict creationists, who believed that God created the earth about 6000 years ago. Darwin, based on the thinking of geologists such as Charles Lyell, posited that life on earth was several billion years old, a theory consistent with the scientifically tested age of the earth.

Nor is there any necessary conflict between the theory that nonhuman species evolved by natural selection and the religious explanation that God created diverse life on earth. The theory of evolution by natural selection is simply silent on matters dealing with God. And indeed, many creationists willingly concede that some evolution of life occurs and that the scientific explanation for, say, antibiotic-resistant bacteria, casts no doubt on their belief in God the Creator.

Similarly, there is no necessary conflict between common descent and creationism or the Christian tradition, more broadly. Although common descent appears to refute the idea that humans are unique because they were separately created by God, common descent says nothing, for example, about ensoulment— the entry of the soul into the body. And if evolutionary theory is silent on ensoulment, then it cannot speak authoritatively on human uniqueness, at least in that regard.

Accordingly, the conflict between evolution and creationism was not inevitable, even if it was foreseeable. As shown below, the theory of evolution spawned one famous trial and two cases ultimately decided by the Supreme Court.

[27] *See* Nicene-Constantinopolitan Creed.

B. Anti-Evolution Laws, which Forbid Teaching Any Theory Antithetical to the Biblical Creation Story, Are Eventually Declared Unconstitutional

1. Scopes*: Tennessee Supreme Court Declares Anti-Evolution Act Constitutional under the Establishment Clause Because, in its View, the Act Is Religiously Neutral and Has No Religious Purpose*

Fundamentalism, a nineteenth-century religious movement that grew out of evangelical Protestantism, viewed Darwin's theory of evolution as responsible for a perceived decline in traditional moral values following World War I. The central common premise of Fundamentalism has been a belief in the literal interpretation of the Bible and the infallibility of biblical scriptures. Fundamentalist efforts, particularly in the South, focused on promoting statutes prohibiting the teaching of evolution in public schools. During the 1920s, twenty state legislatures introduced anti-evolution bills.

In 1925, John Scopes, a biology teacher working in the Tennessee public school system, was tried and convicted of violating the Tennessee Anti-evolution Act. The anti-evolution act made it a crime for Tennessee public schools teachers "to teach any theory that denies the story of the Divine Creation of man as taught in the Bible, and to teach instead that man has descended from a lower order of animals." Any teacher convicted of violating the act's terms was guilty of a misdemeanor and would be fined between $100 and $500.[28]

Scopes appealed his conviction, raising several questions concerning the anti-evolution act's constitutionality. On appeal, the Tennessee Supreme Court upheld the act, and found that the jury properly found Scopes guilty, rejecting Scopes' contention that the act violated the Establishment Clause on grounds that the act did not give a preference to any particular religious establishment. The Court added that, if a public school felt so "hampered" by the act in "teaching the science of biology . . . as to render such an effort no longer desirable, this course of study may be entirely omitted from the curriculum of our schools." Finally, the Court rejected arguments concerning the motives of the legislators who enacted the act, explaining that "the validity of a statute must be determined by its natural and legal effect, rather than proclaimed motives."[29] Notwithstanding its analysis upholding the anti-evolution act, the Court overturned Scopes' conviction on a technicality.

2. *Forty-three years later, the Supreme Court in* Epperson *Strikes Down Anti-Evolution Law Because It Has a Religious Purpose*

By the mid-1960s, only three states, Tennessee, Arkansas, and Mississippi, still maintained anti-evolution statutes.[30] A constitutional challenge to one of those statutes—

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[28] Ch. 27, TENN.ACTS. 1925, §§ 1, 2.

[29] 289 S.W. at 367 (citing, inter alia, *Lochner v. N.Y.*, 198 U.S. 45 (1905).

[30] Tennessee's antievolution statute was not repealed until 1967. *See* Tenn Act of 1967, chapter 237. *See also* Miss.Code Ann. ss 6798, 6799 (1942). Act No. 1, Ark.Acts 1929; Ark.Stat.Ann. ss 80-1627, 80-1628.

the Arkansas anti-evolution law—only reached the United States Supreme Court in 1968 in *Epperson v. Arkansas*. The trial court in *Epperson* rejected the view, adopted by the Tennessee Supreme Court in *Scopes*, that the law was merely an employment directive by the state to its employees. Instead it found the Arkansas law unconstitutional on free speech grounds. The Arkansas Supreme Court reversed, noting primarily that the Arkansas law "is a valid exercise of the state's power to specify the curriculum in its public schools."[31]

The Supreme Court unanimously reversed the state's highest court and found Arkansas' anti-evolution statute unconstitutional, because it had a religious purpose. The Court explained that the Arkansas law violates the Establishment Clause, because it "selects from the body of knowledge a particular segment which it proscribes for the sole reason that it is deemed to conflict with a particular religious doctrine; that is, with a particular interpretation of the Book of Genesis by a particular religious group." The Court rested its conclusion on the principle that the government "must be neutral in matters of religious theory, doctrine, and practice." [32]

The Court recognized that not all religious instruction in public school violates the Establishment Clause. The Court explained that "[w]hile study of religions and of the Bible from a literary and historic viewpoint, presented objectively as part of a secular program of education, need not collide with the First Amendment's prohibition, the State may not adopt programs or practices in its public schools or colleges which 'aid or oppose' any religion."[33] But if the "purpose" or the "primary effect" of the enactment is to advance or inhibit religion then "the enactment exceeds the scope of legislative power as circumscribed by the Constitution."[34] Relying in part on public appeals favoring the passage of the anti-evolution act, which depicted those favoring the act as theists and those favoring teaching evolution as atheists, the Court found that Arkansas public officials sought to prevent their "teachers from discussing the theory of evolution because it is contrary to the belief of [fundamentalist sectarian Christians]." The Court found irrelevant that the religious purpose of the Arkansas statute, unlike that of Tennessee, was not explicit.[35]

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[31] *Epperson v. Arkansas*, 393 U.S. 98-101 & nn.3-7 (1968).

[32] 393 U.S. at 103.

[33] 393 U.S. at 106. In this context, the Court explained that the First Amendment's "prohibition is absolute. It forbids alike the preference of a religious doctrine or the prohibition of theory which is deemed antagonistic to a particular dogma." *Id*. at 106-07. The Court further explained that "'the state has no legitimate interest in protecting any or all religions from views distasteful to them." *Id*. at 107 (quoting *Joseph Burnstyn, Inc. v. Wilson*, 343 U.S. 495, 505 (1952))

[34] 393 U.S. at 107 (quoting *Abingdon Sch. Dist.. v. Schempp*, 374 U.S. 203, 222 (1963)).

[35] 393 U.S. at 107-09 & nn.15-18.

C. Balanced-Treatment Laws, which Forbid the Teaching of the Evolution in Public Schools unless Accompanied by Instruction in "Creation Science," Are Unconstitutional

While constitutional challenges to anti-evolution statutes were percolating, groups of fundamentalist organizations attempted to give scientific legitimacy to the biblical story of human origins. These fundamentalist groups adopted the term "creation science" to describe their study of creation and human origins.

Creation scientists generally pitted themselves directly against proponents of evolution, by adopting the view that "there are only two positions with respect to the origins of the earth and life: belief in the inerrancy of the Genesis story of creation and of a worldwide flood as fact, or belief in what they call evolution."[36] Creationists viewed teaching creation science in public schools as part of their mission and published pamphlets suggesting methods for persuading school officials to add creation science to their curriculum.

The constitutionality of teaching creation science in public schools was first tested in 1982 in *McLean v. Arkansas*, where a federal district court judge issued a permanent injunction against enforcing Arkansas' Balanced Treatment for Creation-Science and Evolution-Science Act, on grounds that the statute violated the Establishment Clause. The Arkansas law required public schools to give balanced treatment to Creation-Science and Evolution-Science.[37]

By that time, the Supreme Court in *Lemon v. Kurtzman*,[38] had formulated its three-pronged test for determining whether a state actor, such as a public high school, violated the Establishment Clause. Applying the Lemon test—whereby a challenged statute must have a bona-fide secular legislative purpose; its principal effect must not advance or inhibit religion; and it must not foster excessive governmental entanglement with religion—the court decided that the Act failed on each prong. The court concluded that the act was passed with the specific purpose of advancing religion by introducing the Biblical version of creation into the public school curriculum, citing both Arkansas' historical role in this debate and statements by the law's supporters. The court next concluded that a major effect of the Act was to advance particular religious beliefs rather than advancing legitimate educational or scientific goals. The court first pointed to the statutory definition of creation science as inspired by a literal interpretation of *Genesis.* The court further noted that the act's dual model approach was the approach espoused by fundamentalist organizations and lacked educational value because creation science was not science. The court added: "creationists' methods do not take data, weigh it against the opposing scientific data, and thereafter reach the[ir] conclusions . . . . Instead, they take the literal wording of the Book of Genesis and attempt to find scientific support for it."

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[36] *McLean v. Ark*, 529 F. Supp. 1255, 1260 (E.D. Ark. 1982).

[37] 529 F. Supp. 1255 (E.D. Ark. 1982). For definitions of the terms "Creation-Science and Evolution-Science, *see* 529 F. Supp. at 1264 (quoting Ark. Act 590, §§ 4(a), 4(b)).

[38] 403 U.S. 602, 612-13 (1971).

The Court acknowledged evidence that most Americans favored balanced treatment, but observed that such evidence was irrelevant to the question whether balanced treatment violates the First Amendment.

The question whether balanced treatment acts violate the Establishment Clause ultimately reached the Supreme Court in 1987. In *Edwards v. Aguillard*, the Supreme Court held unconstitutional Louisiana's balanced treatment act because it served no identified secular purpose and had as its primary purpose the promotion of a particular religious belief. Acknowledging that the act's stated purpose was to protect academic freedom, the Court concluded that the Act was not designed to further that purpose, but in fact restricts academic freedom by putting conditions on the teaching of evolution. The Court observed: "Even if 'academic freedom' is read to mean 'teaching all of the evidence' with respect to the origin of human beings, the Act does not further this purpose. The goal of providing a more comprehensive science curriculum is not furthered either by outlawing the teaching of evolution or by requiring the teaching of creation science."[39] Rather, the act "has the distinctly different purpose of discrediting 'evolution by counterbalancing its teaching at every turn with the teaching of creationism.'"[40]

The Court also concluded that the act was unconstitutional because it had a religious purpose—"to advance the religious viewpoint that a supernatural being created humankind."[41] The Court found that the statute's historical context and its legislative history, including statements by the law's proponents, supported its conclusion.[42] In that way, the Court likened the balanced treatment act—designed either to promote creationism or inhibit the teaching of a theory hostile to young earth creationists—to the anti-evolution act struck down in *Epperson*—designed to proscribe the teaching of a theory hostile to a particular religious viewpoint. Summarizing its views, the Court explained that the Establishment Clause "'forbids *alike* the preference of a religious doctrine *or* the prohibition of theory which is deemed antagonistic to a particular dogma.'"[43]

D. Devising a Framework for Analyzing the Constitutionality of Legislative Attempts To Regulate How Evolution Should Be Taught in Public Schools

The Court's detailed discussion of the Arkansas anti-evolution act in *Epperson* and Louisiana's balanced treatment act in *Edwards* gives many clues for how it might analyze future disputes over the teaching of evolution in public school. In evaluating a particular

[39] *Id*. at 586-88 & n.6.

[40] *Id*. at 588.

[41] *Id*. at 591.

[42] The Court referred to the "historic and contemporaneous link between the teachings of certain religious denominations and the teaching of evolution," noting that it was this link that concerned the Court in *Epperson*. *See Id*. at 590-91 & nn.9-13.

[43] 482 U.S. at 593 (quoting *Epperson*, 393 U.S. at 106-07).

statute, the Court has announced that it will examine the plain meaning of the statutory language, the legislative history, the statute's interpretation by the responsible administrative agency, and the statute's historical context.[44] In the public school setting, this means that the Court would continue to scrutinize not only the statutory language regulating how the origin of life is to be taught, but also the statements of school board members and legislative sponsors, the debates over the law's enactment, and the historical context of the debate, among other things.

The Court's search for a valid, bona fide secular purpose, also suggests the conclusion that the concurrence in *Edwards* in fact draws: "If no valid secular purpose can be identified, then the statute violates the Establishment Clause."[45] In this context, the search for the bone fide secular purpose would entail a close examination of alternatives to evolution, including the question whether the alternative constitutes a valid scientific theory. Valid scientific critiques of any scientific doctrine would likely pass *Lemon*'s purpose prong. But nonscientific critiques, especially those that imply a supernatural explanation, lend themselves to question the validity of the regulation's secular purpose and are likely to be viewed as transgressing the Establishment Clause.

IV. THE MODERN CONFLICT BETWEEN EVOLUTION AND RELIGION: "TEACH THE CONTROVERSY"

A. Overview: So What's All the Fuss about?

> Both sides [evolution and design] ought to be properly taught . . . so people can understand what the debate is about. . . . Part of education is to expose people to different schools of thought. . . . You're asking me whether or not people ought to be exposed to different ideas, and the answer is yes. – remarks of President George W. Bush, spoken on August 1, 2005.[46]

It is by now generally well-accepted that creationism is not science, and therefore that teaching creationism in science classrooms would be unconstitutional. Creation-science has been discredited as a scientific theory. So why, twenty years after *Edwards v. Aguillard*, are we having this déjà vu experience? The answer lies in the strength of the ID movement.

The modern ID movement began about the same time that *Edwards v. Aguillard* was decided. ID, as defined in more detail below, is the response of a group of intellectuals, including lawyers, theologians, philosophers, and scientists, who draw on the design inference to discredit evolutionary theory. In their view, evolutionary theory inadequately explains certain natural complexities; it is therefore necessary to resort to an intelligent agent (a final cause) more fully and adequately to explain life's origins. Since *Edwards*, ID proponents have prolifically published books and articles in part to show

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[44] *Id*. at 594-95.

[45] *Id*. at 597 (Powell, J., concurring).

[46] Remarks reprinted in Peter Baker and Peter Slevin, "Bush Remarks on 'Intelligent Design' Theory Fuel Debate," Washington Post, available at http://www.washingtonpost.com/wp-dyn/content/article/2005/08/02/AR2005080201686.html.

that evolutionary theory does not withstand scientific scrutiny and in part to show that design should be reinstated as science.[47]

ID proponents, like its creation-science predecessors, have made teaching evolution in public schools their legal battleground. ID is thought to have inspired at least 19 states to consider challenging teaching evolution in its secondary schools.[48] The first of these, the Kansas Board of Education, eliminated macroevolution or speciation, along with the Big Bang theory, from the State's science education standards in August 1999. The Board of Education reversed itself in 2001, without legal challenge. Most recently, the Kansas Board of Education approved new science standards, which cast doubt on Darwin's theory of evolution and redefined science to include exploration of supernatural causes.

The movement grew in controversy and political strength when, in 2001, Senator Rick Santorum (R-Pa) introduced a nonbinding amendment to the No Child Left Behind Bill, stating that "where biological evolution is taught, the curriculum should help students to understand why the subject generates so much continuing controversy."[49] Although Congress ultimately rejected the idea of encouraging teaching ID,[50] the movement nevertheless grew in strength in many states. In 2002, the Cobb County school board in Georgia approved a policy asserting that "discussion of disputed views of academic subjects is a necessary element of providing a balanced education, including the study of the origin of the species."[51] Later that year, parents sued Cobb County to remove disclaimer stickers (undermining evolution as a scientific theory) from biology textbooks, alleging, among other things, that the sticker violated the Establishment Clause. The court found the sticker unconstitutional, ordered removal, and permanently enjoined the School Board from disseminating the stickers.[52] That ruling is currently under review in the United States Court of Appeals for the Eleventh Circuit. In December 2003, the Missouri state legislature introduced a bill requiring that equal time be given to teaching evolution and ID in science classes.[53] That same month, Montana

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[47] *See, e.g.,* Phillip E. Johnson, DARWIN ON TRIAL (InterVarsity Press, 1993); Michael J. Behe, DARWIN'S BLACK BOX: THE BIOCHEMICAL CHALLENGE TO EVOLUTION (New York: The Free Press 1996); William A. Dembski, INTELLIGENT DESIGN: THE BRIDGE BETWEEN SCIENCE AND THEOLOGY (Downers Grove: InterVarsity Press, 1999); Francis J. Beckwith, LAW, DARWINISM, & PUBLIC EDUCATION: THE ESTABLISHMENT CLAUSE AND THE CHALLENGE OF INTELLIGENT DESIGN (Lanham, Maryland: Rowman & Littlefield Publishers, Inc. 2003).

[48] *See* Michael Powell, "Doubting Rationalist: 'Intelligent Design' Proponent Phillip Johnson, and How He Came To Be," Washington Post (May 15, 2005) available at http://www.washingtonpost.com/wp-dyn/content/article/2005/05/14/AR2005051401222.html.

[49] 147 Cong. Rec. S6147-6148, 6153 (June 13, 2001) (statement of Sen. Santorum). Although dubbed the "Santorum Amendment," Phillip Johnson, father of the modern Intelligent Design movement, has taken credit for authoring it.

[50] PL 107-110, January 8, 2002, 115 Stat 1425.

[51] *See* AAAS, Dialogue on Science, Ethics, and Religion, State Educational Standards, available at http://www.aaas.org/spp/dser/evolution/issues.shtml#georgia.

[52] *Selman v. Cobb County Sch. Dist.*, January 13, 2005 Order, pp.43-44.

[53] Missouri Standard Science Act, Missouri General Assembly House Bill 911, § 170.018.3.(4)(b), available at http://www.house.state.mo.us/bills041/biltxt/intro/HB0911I.htm.

Baptist Minister Curtis Brickley handbilled residents of Darby, Montana, asking them to attend a town meeting to discuss teaching ID. Following that meeting, in February 2004, the Darby School Board approved (3-2) a policy encouraging teachers to teach criticisms of evolutionary theory. The School Board reversed itself later that year. Also in February 2004, the Ohio School Board voted 13-5, to adopt high school science class lesson plans that encourage teaching ID. This year, school boards in Indiana have various plans to teach ID in its public schools.

Most famously, in June 2004, the Pennsylvania School Board rejected a biology textbook that taught Darwinian evolution. The School Board subsequently agreed to the textbook on the condition that it also approve OF PANDAS AND PEOPLE: THE CENTRAL QUESTION OF BIOLOGICAL ORIGINS as a supplemental textbook. OF PANDAS advocates ID as a viable scientific alternative to the modern theory of evolution. Shortly thereafter, the School Board adopted a resolution requiring that ID be taught. Parents have sued the school board, asking for a declaratory judgment that the ID policy violates the Establishment Clause, and injunctive relief, prohibiting the school board from implementing the policy.[54] In November, 2005, all 8 School Board members who supported ID were voted out of office. Soon thereafter, Senator Santorum shifted his position and said that he did not believe that ID should be taught in science classes.

But what is the fuss about? The fuss, according to the scientific community, is that ID is not science, and therefore should not be taught as science. Political proponents of ID, like President Bush, have couched the debate in terms of academic freedom. However, it is never an aspect of academic freedom to teach bad science. It is simply not enough to state that one has a critique of a scientific theory and, therefore, that principles of academic freedom should entitle teachers to teach the controversy that one's critique has generated. To advance scientific knowledge, there must be a legitimate scientific controversy to teach. Otherwise, teaching the controversy leads to confusion about the principles of science and the scientific method.

For these reasons, it is imperative to determine whether ID is science. If it is not, there is no good reason for teaching it in science class. If ID is not science and has a religious purpose or religious effects, then not only is it bad policy to teach it in science class, but it is unconstitutional to do so. Perhaps recognizing this, proponents of ID have sought to alter the scientific method and treat supernatural explanations for natural phenomena as science—a move that would turn back the scholarly clock by centuries. In essence, the modern debate over whether or not to teach the controversy is really a debate about the nature of science.

[54] *Kitzmiller v. Dover Sch. Dist.*, Docket No. 04-CV-2688 (W.D. Pa.).

B. The Inference of Intelligent Design

1. Intelligent Design, as defined by its proponents, is not science

ID proponents have defined it as a movement, whose "main thrust . . . is that intelligent agency, as an aspect of scientific theory-making, has more explanatory power in accounting for the specified, and sometimes irreducible, complexity of some physical systems, including biological entities, and/or the existence of the universe as a whole, than the blind forces of unguided and everlasting matter."[55] Professor Michael Behe, one of ID's stalwarts, defines design "simply as the purposeful arrangement of parts."[56] And by "irreducibly complex," Professor Behe means "a single system composed of several well-matched, interacting parts that contribute to the basic function, where in the removal of any one of the parts causes the system to effectively cease functioning."[57] For Behe, an "irreducibly complex system cannot be produced directly by numerous, successive, slight modifications of a precursor system, because any precursor to an irreducibly complex system that is missing a party is by definition nonfunctional." According to the view, finding an irreducibly complex biological system would present a "powerful challenge to Darwinian evolution. Since natural selection can only choose systems that are already working, then if a biological system cannot be produced gradually it would have to arise as an integrated unit, in one fell swoop, for natural selection to have anything to act on."[58] The existence of an irreducibly complex system is "better" explained by the act of some "unnamed intelligent agent," one who purposefully arranged parts together into the irreducibly complex system.[59] Simply put, "life is too complex to have developed through evolution, implying a higher power must have had a hand."[60]

As with Paley's argument from design, ID hinges primarily on the veracity of an inference: that the complex order observed in nature powerfully suggests that such complex order must have been designed by an intelligent agent. ID also postulates that

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[55] Francis J. Beckwith, "Public Education, Religious Establishment, and the Challenge of Intelligent Design," 17 NOTRE DAME J. L.ETHICS & PUB. POL. 461, 462 (2003).

[56] Behe (1996), p.193. Most recently, Professor Behe defined *intelligent* design as "a scientific theory that proposes that some aspects of life are best explained as the result of design, and that the strong appearance of design in life is real and not just apparent." *Kitzmiller v. Dover Area Sch. Dist.*, No. 04-CV-2688 (M.D. Pa.), Transcript., p.89 (October 17, 2005).

[57] Behe (1996), p.39.

[58] Michael J. Behe, "Evidence for Intelligent Design from Biochemistry from a Speech Delivered at Discovery Institute's God & Culture Conference," (Discovery Institute, August 10, 1996), available at www.arn.org/docs/behe/mb_idfrombiochemistry.htm.

[59] Lisa Anderson, "Evolution of Intelligent Design," Chicago Tribune, October 30, 2005, available at http://www.discovery.org/scripts/viewDB/index.php?command=view&id=2986&program=News&callingPage=discoMainPage.

[60] Ondrej Hejma, "'Intelligent Design' Supporters Gather," Associated Press, October 24, 2005, available at http://www.discovery.org/scripts/viewDB/index.php?command=view&id=2974&program=News&callingPage=discoMainPage.

observable complex systems are so complex—irreducibly complex—that they could not have been brought into existence by natural selection.

As the argument itself reveals, ID is simply not a scientific theory, because it fails to meet the definition of science. In other words, it relies on supernatural rather than natural explanations for the natural world; it is not subject to revision by testing and it is not falsifiable. To begin, ID is, by definition, an inference—not a theory—for the existence of a supernatural power. That supernatural power, whether it is the Judeo-Christian God, the gods of the Ancient world, or some other supernatural force, is simply not the domain of science. Nor is that aspect of ID that criticizes Darwinian evolution a scientific theory. Simply stating that a theory is wrong is not a theory in itself. And simply stating that the inference "has more explanatory power" than the scientific theory of evolution does not transform the inference into a theory. Moreover, the inference from design is also tautological, because it assumes what it tries to prove—observable design must have a designer. Simply put, to the extent the argument is based on any theory, the theory is not that order exists (after all, evolution depends on the same premise), but that an intelligent designer exists—an argument that, by definition, has no place in science, but whose true home is religion.

To be sure, complexity and order are observable and measurable. But it is doubtful whether the concept of "irreducible complexity" is measurable precisely because it begs the question asked: A system is irreducibly complex only if natural selection cannot account for it. Whether the existence of a system is so complex that natural selection cannot account for it, at most, casts doubt on the theory of natural selection as the mechanism for evolutionary change. In other words, it potentially falsifies natural selection.

By contrast, ID is not falsifiable.[61] In fact, ID's poster child for irreducibly complex systems, the bacterial flagellum, does not show that ID is falsifiable and therefore cannot transform ID into a scientific theory. Professor Behe states that the bacterial flagellum is an irreducibly complex system—natural selection cannot create it. Behe further argues that the flagellum proves that ID is falsifiable. If a flagellum were produced by placing a bacterial species lacking a flagellum under some selective pressure and then growing the bacteria for thousands of generations, ID would be disproven:

> In fact, *intelligent design is open to direct experimental rebuttal*. Here is a thought experiment that makes the point clear. In *Darwin's Black Box* (Behe 1996) I claimed that the bacterial flagellum was irreducibly complex and so required deliberate intelligent design. The flip side of this claim is that the flagellum can't be produced by natural selection acting on random mutation, or any other unintelligent process. To falsify such a claim, a scientist could go into the laboratory, place a bacterial species lacking a flagellum under some selective pressure (for mobility, say), grow it for ten thousand generations,

[61] Dembski also takes issue with the significance of showing that ID is not falsifiable. Dembski (1999), pp.253-54 & nn.29, 39. Other proponents, such as Behe, have tried unsuccessfully to show that intelligent design is falsifiable.

> and see if a flagellum—or *any* equally complex system—was produced. If that happened, my claims would be neatly disproven.[62]

Behe is wrong. Even if his experiment did produce the flagellum, ID's proponents could argue that the intelligent agent was merely acting in the test tube. There is no way to tell, from this experiment, whether the intelligent agent was actually working inside the laboratory; therefore, the test does not falsify the theory. Behe's claim is also wrong as a matter of scientific methodology. Generally one single finding casts doubt on a particular theory, but does not invalidate it. A theory is generally not disproven until a new scientific theory supercedes it.

If ID is not falsifiable and is otherwise not scientific because it invokes a supernatural force as its causal agent, then what scientific controversy is there to teach in the science classroom? Simply put, ID is, by its own terms, a nonscientific inference that arrogates itself to science. And, in its haste to cast doubt on evolutionary theory, it ironically shows why one of its main targets, the theory of evolution by natural selection, is itself scientific.

2. Intelligent Design is a religious inference for the existence of God

> Christ is indispensable to any scientific theory, even if its practitioners don't have a clue about him. The pragmatics of a scientific theory can, to be sure, be pursued without recourse to Christ. But the conceptual soundness of the theory can in the end only be located in Christ. —William A. Dembski.[63]

As shown above, ID is a religious inference for the existence of God. In essence, ID is an argument for the existence of God. That argument is similar in most respects to the fifth of St. Thomas Aquinas's (1225-1274) five proofs for the existence of God. The core of this argument is that natural bodies cannot order themselves, because they themselves lack knowledge and intelligence. Accordingly, something with knowledge and intelligence must be acting on them.

It stands to reason that ID would be appealing to Christian theologians, who would view Behe's and Dembski's version of the design argument as giving scientific rigor to the design inference. After all, Behe attempts to explain, in biochemical terms, the enormous complexity hidden from the naked eye—complexity, he claims, cannot be produced by natural forces. But, as explained above, the extent to which complexity is observable and measurable is not unique to ID. Darwin's theory of evolution also depends on observable order in the universe, even at the biochemical level.

ID's proponents dispute that their argument is necessarily religious, by disputing that the intelligent agent is necessarily God or the gods. When asked then what the intelligent agent is, if not God, the answer ID most frequently sets forth is the panspermia

[62] Michael Behe, "Philosophical Objections to Intelligent Design: Response to Critics," originally published at Discovery Institute website), available at http://www.trueorigin.org/behe06.asp#b1.

[63] Dembski (1999), p.210.

argument—"the theory that organisms were deliberately transmitted to the earth by intelligent beings on another planet."[64] But as is patently obvious from the definition of panspermia, that answer only begs the question: What intelligent agent created the intelligent beings that spread intelligent life to earth?

3. Bringing intelligent design ideology into science class promotes the bad public policy of encouraging bad science, and is, moreover, unconstitutional

Teaching ID in science class is bad public policy. As explained above, the controversy surrounding evolution is not a scientific controversy, but a political and religious debate, which should be confined to classes where such controversies are the subject matter. To be sure, were there a competing scientific model to evolution, it would be good public policy to teach that theory. Along those lines, if ID's proponents want ID to be taught as science, they must obtain scientific acceptance of the design inference.[65] So far, they have been unable to do so, because their argument is not science and is contrary to the scientific method. Thus, teaching ID as an alternative to evolution actually confuses students about how science is actually practiced. The original objective of the Santorum amendment, to provide models for how students should explore differences in opinion through reasoned discussions, can be obtained by making debates on important political issues a part of the social studies curriculum. For all these reasons, teaching ID as science is bad public policy.

Teaching ID as science also violates the Establishment Clause, because such teaching lacks a secular purpose and is in fact religiously motivated. To be sure, analyzing any issue under the Establishment Clause is a highly fact-intensive inquiry into the purpose and effects of the state action.[66] But applying the principles set forth in *Lemon* and its progeny, in particular, as Establishment Clause jurisprudence development in the context of the debate over teaching creation-science in public schools, it is fair to say that ID has at least two hurdles to overcome. First, it must establish itself as science. Second, it must disentangle itself from religion. Considering ID's overtly theistic agenda, a finding of religious purpose, effects or entanglement is very likely. Similarly considering that ID overtly relies on God to explain natural phenomena, it is unlikely that its proponents will convince a court of law that ID is science, short of convincing the scientific community to change its definition of science.

4. The intelligent design movement's attack on the scientific method's methodological naturalism

Intelligent design's proponents claim that science, in general, and evolutionary theory, in particular, has a philosophical bias in favor of methodological naturalism—the exclusion of supernatural explanations from the realm of science. By excluding

[64] F.H.C. Crick and L.E. Orgel, "Directed Panspermia," 19 ICARUS 341-346 (1973), available at http://profiles.nlm.nih.gov/SC/B/C/C/P/_/scbccp.pdf.

[65] NAS brief, 1986 WL 727667, at *15 (discussing importance of peer review characterizing scientific community).

[66] *McCreary County v. ACLU*, ___ U.S. ___, 125 S. Ct. 2722, 2733 n.10 (2005).

supernatural causes from science's domain, scientists a priori exclude ID from scientific consideration. Accordingly, any argument that posits a final or teleological cause as the explanation of the natural phenomenon will have a problem both meeting the definition of science and showing that it does not violate the Establishment Clause.

To get around the Establishment Clause obstacle, proponents of ID have advocated a mission of redefining science so that ID comes within that definition. In particular, ID's proponents have advanced replacing methodological naturalism with theistic naturalism or theistic science. Theistic naturalism fundamentally alters the scientific method by allowing scientists to seek supernatural explanations for natural phenomena. This is precisely what the Kansas School Board recently did.

Not surprisingly, the scientific community has been hostile to fundamentally altering a methodology that has advanced knowledge of the natural world. Thus, while proponents of ID view methodological naturalism as confining, science's restriction of explanations to material causes in fact augments knowledge. Dr. Eugenie C. Scott explained: "By continuing to seek natural explanations for how the world works, we have been able to find them. If supernatural explanations are allowed, they will discourage—or at least delay—the discovery of natural explanations, and we will understand less about the universe." Dr. Scott also pointed out that supernatural explanations do not allow for controlled experiments and therefore do not allow for proper testing against the natural world: "[W]ithout making a judgment on the existence or nonexistence of God, modern scientists carry out their tests of hypotheses as if only natural causes were operating. It's a scientific analogue of Pascal's wager: if an omnipotent power such as God exists, then we can't control for its actions, so we're stuck with methodological materialism. If God doesn't exist, then of course methodological materialism is the best way to understand the natural world."[67]

V. FINAL THOUGHTS: THE DESTRUCTION OF SCIENCE AS WE KNOW IT?

As this paper shows, ID's criticism of the scientific method—that it a priori excludes supernatural explanations—is true, but so what? Why is it is so important for proponents to teach ID as science? The answer to that question lies in the belief of many that science, in general, and evolutionary theory, in particular, is built on a philosophy of materialism that is destroying the core fundamental values upon which our country was founded. As Richard Dawkins explained: "Darwin made it possible to be an intellectually fulfilled atheist."[68] But again, so what? So what if Darwin's evolutionary theories are compatible with an atheistic universe? All scientific theories, by definition,

[67] Eugenie C. Scott, "'Science and Religion,' 'Christian Scholarship,' and 'Theistic Science': Some Comparisons," available at http://www.ncseweb.org/resources/articles/6149_science_and_religion_chris_3_1_1998.asp.

[68] Dawkins (1996), p.6.

are compatible with a universe without God. More importantly, as even the Vatican has repeatedly observed, Darwin's evolution is compatible with a theistic universe as well.[69]

So then why not allow ID, or any theory that relies on supernatural causes, to be taught alongside evolution? The answer is simple. Reliance on supernatural causes, far from promoting academic freedom, stifles the pursuit of knowledge. Dr. Eugenie Scott put it well in describing the so-called scientific analogue of Pascal's wager: The best way to understand the natural world is to assume methodological naturalism because if God exists, we can't experimentally control for God anyway.

The argument from design, in whatever form, historically has been a powerfully persuasive argument for the existence of God, but it is not a scientific theory. To be sure, modern ID proponents have added scientific rigor to their analysis by pointing to the great complexity of natural order at the biochemical level. But the answer—God did it—is both epistemologically unfulfilling and intellectually stifling. And indeed, their own examples show just that. Behe has given several examples of what he considers are irreducibly complex systems, including the mechanisms for blood clotting and the structure of the bacterial flagellum. Yet, scientists have explained how both systems, although complex in the way Behe describes, can be brought about by evolutionary forces.[70] If left to Behe, the inquiry would have ended with his statement that these systems were too complex to come about by the mechanism of natural selection.

Science is the quest for knowledge about the natural world. For the atheist-scientist, that's all it may be. For the theist-scientist, perhaps science is the quest for understanding God's mind. For a strict Christian creationist, knowledge gained from such a quest may be forbidden fruit from the tree of the knowledge of good and evil. By refusing those fruits, we avoid the consequences arising from the misuse or abuse of such knowledge. But, by invoking God as the final cause, and ending our quest for knowledge, we also blind ourselves to God's mind; we end progress; we strangle academic freedom. By contrast, opposing such a stranglehold says nothing about the role religion and morality should play in scientific debates. After all, God did "put [Adam] in the garden of Eden to till it and keep it."[71] To paraphrase a recent statement by the Vatican: "We know where scientific reason can end up by itself: the atomic bomb and [other similar accomplishments] are fruit of a reason that wants to free itself of every ethical or religious link."[72] That is the debate we should be having—what are the

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[69] Address of Pope John Paul II to the Pontifical Academy of Sciences (Oct. 22, 1996); statement Cardinal Paul Poupard, head of the Pontifical Council for Culture, that the *Genesis* description of how God created the universe and Darwin's theory of evolution were "perfectly compatible" if the Bible were read correctly (Nov. 7, 2005); statement of Rev. George Coyne, Vatican Chief Astronomer, that ID should not be taught alongside evolution, and if it is taught in school, it should be taught with "religion or cultural history" (Nov. 18, 2005).

[70] *See* Miller (1999), pp.129-164.

[71] *Genesis* 2:15 (Revised Standard Version, Catholic edition).

[72] Nicole Winfield, "Vatican: Faithful Should Listen to Science," Nov. 4, 2005, available at http://news.yahoo.com/s/ap/20051104/ap_on_sc/vatican_science;_ylt=AmddOpaPmxvLcl3sFIC309ys0NUE;_ylu=X3oDMTA3MzV0MTdmBHNlYwM3NTM.

appropriate uses of knowledge gained through science, and not whether we should end scientific inquiry.