

SCIENCE AND RELIGION TWENTY YEARS
AFTER *MCLEAN V. ARKANSAS*: EVOLUTION,
PUBLIC EDUCATION, AND THE NEW
CHALLENGE OF INTELLIGENT DESIGN

FRANCIS J. BECKWITH*

I.	INTRODUCTION	456
II.	IMPORTANT TERMS	460
A.	<i>Creationism</i>	460
B.	<i>Evolution</i>	462
C.	<i>Intelligent Design</i>	470
1.	Scholarly Support for Intelligent Design...470	
2.	Intelligent Design's Conflict with Methodological Naturalism	477
3.	Intelligent Design and Specified Complexity.....	478
4.	The Application of Specified Complexity to Intelligent Design Theory	480
a.	Irreducible Complexity of Certain Biological Systems.....	480
b.	The Fine-Tuning of The Universe For The	

* Research Fellow, James Madison Program in American Ideals & Institutions, Department of Politics, Princeton University; (starting July 2003) Associate Professor of Church-State Studies, and Associate Director of the J.M Dawson Institute for Church-State Studies, Baylor University. M.J.S. (Master of Juridical Studies), Washington University School of Law, St. Louis; Ph.D. (philosophy), M.A. (philosophy), Fordham University.

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Existence of Human Life482
 c. The Information Content of DNA.....483
 d. The Fossil Record483
 III. *McLEAN v. ARKANSAS*.....485
 IV. CONCLUSION.....498

I. INTRODUCTION

The conventional wisdom in constitutional law is that the debate that began with the famous *Scopes* trial in 1925¹ over the teaching of origins in public school science classrooms officially ended in 1987. In that year the U.S. Supreme Court, in *Edwards v. Aguillard*,² struck down a Louisiana statute, the Balanced Treatment Act, that required its public schools to teach creationism if they taught evolution and vice versa. The Court held that the statute violated the Establishment Clause of the First Amendment. A small group of academics, however, with university appointments, impressive publications, and better credentials than their creationist predecessors, have raised questions about evolution and have offered alternative arguments that have changed the texture, tenor, and quality of a debate once thought long dead.

The Intelligent Design (ID) movement,³ has presented an array of sophisticated and empirically grounded arguments supporting the notion that intelligent agency may do a better job of accounting for certain aspects of the natural world, or the natural world as a whole,

1. See generally *Epperson v. Arkansas*, 393 U.S. 97 (1968); *McLean v. Arkansas Bd. of Educ.*, 529 F. Supp. 1255 (E.D. Ark. 1982); *Scopes v. State*, 289 S.W. 363 (Tenn. 1927); RAY GINGER, *SIX DAYS OR FOREVER?: TENNESSEE V. JOHN THOMAS SCOPES* (1st ed. 1958); STEVEN GOLDBERG, *CULTURE CLASH: LAW AND SCIENCE IN AMERICA* 69-83 (1994); EDWARD J. LARSON, *SUMMER OF THE GODS: THE SCOPES TRIAL AND AMERICA'S CONTINUING DEBATE OVER SCIENCE AND RELIGION* (1997); EDWARD J. LARSON, *TRIAL AND ERROR: THE AMERICAN CONTROVERSY OVER CREATION AND EVOLUTION* (1985); RONALD L. NUMBERS, *DARWINISM COMES TO AMERICA* 76-91 (1998); JOHN THOMAS SCOPES, *THE WORLD'S MOST FAMOUS COURT TRIAL, TENNESSEE EVOLUTION CASE: A COMPLETE STENOGRAPHIC REPORT OF THE FAMOUS COURT TEST OF THE TENNESSEE ANTI-EVOLUTION ACT, AT DAYTON, JULY 10-21, 1925*, (1925); R.M. Cornelius, *Their Stage Drew All the World: A New Look at the Scopes Evolution Trial*, 15 TENN. HIST. Q. 129 (1981).

2. 482 U.S. 578 (1987).

3. For a diversity of perspectives on ID's history and publications, see John Angus Campbell, *Intelligent Design, Darwinism, and the Philosophy of Public Education*, 1 RHETORIC & PUB. AFF. 469 (1998); William A. Dembski, *The Intelligent Design Movement*, 1 COSMIC PURSUIT 22 (Spring 1998), available at http://www.baylor.edu/~William_Dembski/docs_articles/idmovmnt.htm (last visited Nov. 25, 2002); Thomas M. Lessel, *Intelligent Design: A Look at Some of the Relevant Literature*, 1 RHETORIC & PUB. AFF. 617 (1998); NUMBERS, *supra* note 1, at 15-21.

than non-agent explanations, such as natural selection or scientific laws working on the unguided interaction of matter. ID theorists argue that certain physical systems, including biological ones, exhibit what is known as specified complexity, and that specified complexity is best accounted for by intelligent agency. Moreover, ID theorists maintain that contemporary science's repudiation of intelligent agency as a legitimate category of explanation is not the result of carefully assessing ID's arguments and finding them wanting, but rather, it is the result of an a priori philosophical commitment to methodological naturalism (MN),⁴ an epistemological point of view that entails ontological materialism (OM),⁵ but which ID proponents contend is not a necessary condition for the practice of science.

Although the *Edwards* Court sounded the death-knell for creationism as part of the science curriculum in public schools, it neither prohibited public schools from teaching alternatives to

4. Methodological naturalism is, according to Dembski, "the view that science must be restricted solely to undirected natural processes" WILLIAM A. DEMBSKI, *INTELLIGENT DESIGN: THE BRIDGE BETWEEN SCIENCE AND THEOLOGY* 119 (1999). According to Phillip Johnson, "[a] methodological naturalist defines science as the search for the best naturalistic theories. A theory would not be naturalistic if it left something out (such as the existence of genetic information or consciousness) to be explained by a supernatural cause." Therefore, "all events in evolution (before the evolution of intelligence) are assumed attributable to unintelligent causes. The question is not *whether* life (genetic information) arose by some combination of chance and chemical laws, to pick one example, but merely *how* it did so." PHILLIP E. JOHNSON, *REASON IN THE BALANCE: THE CASE AGAINST NATURALISM IN SCIENCE, LAW, AND EDUCATION* 208 (1995).

5. Ontological materialism, which I will employ interchangeably with the terms "naturalism," "philosophical naturalism," "scientific materialism," and "materialism," is the view that the natural universe is all that exists and all the entities in it can be accounted for by strictly material processes without resorting to any designer, creator, or non-material entity as an explanation or cause for either any aspect of the natural universe or the universe as a whole. Thus, if science is the paradigm of knowledge (as is widely held in our culture), and it necessarily presupposes methodological naturalism, then ontological materialism is the only worldview for which one can have "knowledge."

Although for the purposes of this essay, the terms "naturalism" and "materialism" are employed interchangeably, they are not necessarily synonymous. As Moreland points out, "[O]ne could be a naturalist without being a physicalist [or materialist], say by embracing Platonic forms, possibilities or abstract objects like sets, and one can be a physicalist [or materialist] and not a naturalist (e.g., if one held that God is a physical object)." J.P. Moreland, *Theistic Science & Methodological Naturalism*, in *THE CREATION HYPOTHESIS: SCIENTIFIC EVIDENCE FOR AN INTELLIGENT DESIGNER* 50 (J.P. Moreland ed., 1994).

6. See, e.g., DEMBSKI, *supra* note 4, at 97-183; JOHNSON, *supra* note 4, at 205-18; Moreland, *supra* note 5; Alvin Plantinga, *Methodological Naturalism?*, at <http://www.arn.org/docs/odesign/od181/methnat181.htm> (last visited Jan. 27, 2003); Alvin Plantinga, *Methodological Naturalism?: Part 2*, at <http://www.arn.org/docs/odesign/od182/methnat182.htm> (last visited Jan. 27, 2003); Jonathan Wells, *Unseating Naturalism: Recent Insights from Developmental Biology*, in *MERE CREATION: SCIENCE, FAITH & INTELLIGENT DESIGN* 51 (William A. Dembski ed., 1998); Phillip E. Johnson, *Dogmatic Materialism*, *BOSTON REV.* (February/March 1997), available at <http://bostonreview.mit.edu/br22.1/johnson.html> (last visited Apr. 27, 2003).

evolution,⁷ nor prevented schools from offering to their students theories that may be consistent with, and lend support to, a religious perspective.⁸ As I have argued elsewhere,⁹ both of these qualifications, combined with other factors, suggest that ID may be offered as part of a public school science curriculum or voluntarily by a teacher without violating the Establishment Clause, for, as we shall see, ID is an alternative to evolution that is consistent with, and lends support to, a number of philosophical and religious points of view. Unlike creationism, however, ID is not derived from a particular religion's special revelation, but is the result of arguments whose premises include empirical evidence, well-founded conceptual notions outside of the natural sciences, and conclusions that are supported by these premises.

On the other hand, a future court may rely on the reasoning of a 1982 federal district court case, *McLean v. Arkansas*, to assess the constitutionality of teaching ID in public school science classes. *McLean* is the only federal court case that dealt with some of the important philosophical and scientific questions that simmer beneath the surface in this debate. For differing reasons, *Edwards*¹⁰ and

7. The Court was careful to point out that its opinion does "not imply that the legislature could never require that scientific critiques of prevailing scientific theories be taught." *Edwards*, 482 U.S. at 593. The Court maintained that "teaching a variety of scientific theories about the origins of humankind to schoolchildren might be validly done with the clear secular intent of enhancing the effectiveness of science instruction." *Id.* at 594.

8. Justice Powell writes in his concurring opinion that "a decision respecting the subject matter to be taught in public schools does not violate the Establishment Clause simply because the material to be taught 'happens to coincide or harmonize with the tenets of some or all religions.'" *Id.* at 605 (Powell, J., concurring) (quoting *Harris v. McRae*, 448 U.S. 297, 319 (1980) (quoting *McGowan v. Maryland*, 366 U.S. 420, 442 (1961))).

9. See FRANCIS J. BECKWITH, LAW, DARWINISM, AND PUBLIC EDUCATION: THE ESTABLISHMENT CLAUSE AND THE CHALLENGE OF INTELLIGENT DESIGN (2003) (at chs. 2, 4); Francis J. Beckwith, *A Liberty Not Fully Evolved?: The Case of Rodney LeVake and the Right of Public School Teachers to Criticize Darwinism*, 39 SAN DIEGO L. REV. 1311 (2002); Francis J. Beckwith, *Book Review*, 16 J.L. & RELIGION 921 (reviewing BEHE, *infra* note 89, and DEMBSKI, *infra* note 67). But see Jay D. Wexler, *Of Pandas, People, and the First Amendment: The Constitutionality of Teaching Intelligent Design in the Public Schools*, 49 STAN. L. REV. 439 (1997).

10. There are several reasons for this in *Edwards*. First, the Court struck down a Louisiana statute that was similar, though not identical, to the one struck down in *McLean*. ("Significantly, the model Act on which the [Louisiana] bill relied was also the basis for a similar statute in Arkansas." *Edwards*, 482 U.S. at 601 (Powell, J., concurring) (citation omitted)). The Louisiana statute, the Balanced Treatment for Creation-Science and Evolution-Science in Public School Instruction Act, prohibited "the teaching of the theory of evolution in public schools unless accompanied by instruction in 'creation science.'" *Id.* at 581 (citing La. Rev. Stat. Ann. § 17:286.4A). Although no school was obligated to teach creation science or evolution, if one was taught, the other had to be taught as well. The Act defined the theories of creation science and evolution as "the scientific evidences for [creation or evolution] and inferences from those scientific evidences." *Id.* at 581 (citing La. Rev. Stat. Ann. § 17:286.3(2) and (3)) (parenthetical comments inserted by Court).

Epperson v. Arkansas¹¹ never even came close to addressing these questions. *McLean* has been cited frequently as an authority in cases involving religion and public education.¹² It is sometimes referred to as "Scopes II" because of the massive media attention it received,¹³ the colorful judge, William R. Overton, who presided over the case, the parade of well-known expert witnesses from a diversity of disciplines and religious points of view,¹⁴ and the publication of a number of books about the trial,¹⁵ some of which were penned by expert witnesses who testified in the case.

In this paper I will argue that the reasoning on which *McLean* is

This is in contrast to the definitions of creation science and evolution found in the Arkansas Act struck down in *McLean*, which were far more detailed and the object of much criticism by both the district court and a number of expert witnesses. Justice Powell, in his concurring opinion in *Edwards*, points out that the elaborate definitions of creation science and evolution that were in the original Louisiana bill, and that paralleled those found in the Arkansas statute struck down in *McLean*, were removed by a Louisiana Senate committee on May 28, 1981, the day after the complaint in *McLean* was filed in federal district court. *Id.* at 601 (Powell, J., concurring). This amended bill, which emerged as the Balanced Treatment Act, then became the subject of legislative hearings.

Second, the district court in *Edwards* granted the plaintiffs' motion for summary judgment and enjoined the Act's implementation, and thus, unlike *McLean*, there were no witnesses, testimony, or exhibits with which the Supreme Court could wrestle. According to the Fifth Circuit in the *Edwards* case, "the district court reasoned that the doctrine of creation-science necessarily entailed teaching the existence of a divine creator and the concept of a creator was an inherently religious tenet. The court thus held that the purpose of the Act was to promote religion and the implementation of the Act would have the effect of establishing religion." *Aguillard v. Edwards*, 765 F.2d 1251, 1254 (5th Cir. 1985). Thus, none of the courts in *Edwards*, including the U.S. Supreme Court, addressed the substantive philosophical and scientific issues that were addressed in *McLean* and that will likely be raised in a lawsuit involving the teaching of ID in public schools.

11. The Supreme Court, in *Epperson v. Arkansas*, 393 U.S. 97 (1968), struck down, on Establishment Clause grounds, an Arkansas statute that forbade the teaching of evolution in public schools, for the prohibition was based on evolution's inconsistency with the *Genesis*-account of origins, a religious point of view. Because Arkansas did not propose arguments or submit evidence to defend the scientific validity of creationism, the *Epperson* Court did not address this issue in its opinion.

12. See, e.g., *Edwards*, 482 U.S. at 592 n.9; *id.* at 600 n.2 (Powell, J., concurring); *Grove v. Mead Sch. Dist.* No. 354, 753 F.2d 1528, 1539 n.16 (9th Cir. 1985); *Pelozo v. Capistrano Unified Sch. Dist.*, 782 F. Supp. 1412, 1416-18 (C.D. Cal. 1992); *Ark. Day Care Assoc., Inc. v. Clinton*, 577 F. Supp. 388, 397 (E.D. Ark. 1983); *Duffy v. Las Cruces Pub. Sch.*, 557 F. Supp. 1013, 1019 (D. N.M. 1983).

13. According to one account of the trial by an expert witness, "The Arkansas trial was appropriately billed by many as 'Scopes II.' Media attended from all over the world." NORMAN L. GEISLER, A.F. BROOKE III & MARK J. KEOUGH, *CREATOR IN THE COURTROOM: SCOPES II* ix (1982).

14. Among the witnesses were theologians Langdon Gilkey and Francis Bruce Vawter, philosophers Michael Ruse and Norman L. Geisler, geneticist Francisco J. Ayala, paleontologist Stephen Jay Gould, biochemist William Scot Morrow, physicist Robert V. Gentry, astronomer and mathematician N. Chandra Wickramasinghe, and historian George Marsden.

15. See, e.g., ROBERT V. GENTRY, *CREATION'S TINY MYSTERY* (2nd ed. 1988); LANGDON BROWN GILKEY, *CREATIONISM ON TRIAL: EVOLUTION AND GOD AT LITTLE ROCK* (1985).

grounded, reasoning that may have been applicable in 1982 to the question of the permissibility of teaching creationism, is not applicable today to the question of whether a public school runs afoul of the Establishment Clause if it permits or requires the teaching of Intelligent Design. However, before assessing *McLean's* contemporary applicability, it is essential that we first carefully define the terms *creationism*, *evolution*, and *intelligent design*.

II. IMPORTANT TERMS

A. *Creationism*

Creationism, understood philosophically, is minimally the belief that nature, indeed the entire universe, could not have come into existence without a Supreme Being as its ultimate cause. In other words, the creationist believes that an exhaustive materialist (or naturalist) description and explanation of the events and entities in the universe is not a real possibility, for there are causes, agents, and entities, including supernatural beings, that are non-material (or non-natural) and are thus non-detectable under the strictures of a materialist paradigm. Under this definition of creationism, young-earth creationism, old-earth creationism, and even Aristotle's cosmological views are "creationist,"¹⁶ for each posits a Supreme Being as the ultimate cause of the universe and maintains that there are non-material forces, such as agents, that can be causes for physical events and other entities. The differences between each type of creationism are often not appreciated, and so I will briefly define young-earth and old-earth creationism.

Young-earth creationism, according to Phillip E. Johnson (who himself is *not* a young-earth creationist), is associated with the "term 'creation-science,' as used in the Louisiana law [in the *Edwards* case], [and] is commonly understood to refer to a movement of Christian fundamentalists based upon an extremely literal interpretation of the Bible." Johnson writes, "Creation-scientists do not merely insist that life was *created*; they insist that the job was completed in six days no more than ten thousand years ago, and that all evolution since that time has involved trivial modifications rather than basic changes."¹⁷

16. For Aristotle, "God" was a theoretical entity, an Unmoved Mover, he posited to explain the motion of the universe. God was not an object of worship. See ARISTOTLE, *PHYSICS*, VII, 311, a, 4; ARISTOTLE, *METAPHYSICS*, XII, 6, 1071, b, 2.

17. PHILLIP E. JOHNSON, *DARWIN ON TRIAL* 4 (1991). For a defense of young earth creationism, see Paul Nelson & John Mark Reynolds, *Young Earth Creationism*, in THREE

Old-earth creationism, on the other hand, is the view “that the earth and the universe were created far more than just a few thousand years ago as has been the traditional belief among Christians.”¹⁸ Old earth creationism posits that the earth is approximately four or five billion years old and the universe approximately ten to twenty billion years old. Old earth creationists, however, maintain “that unguided evolution is not capable of producing the features we see in our universe—not the universe itself, life, its actual variety, and not humankind.”¹⁹

An old-earth creationist has written that according to his perspective:

[L]iving systems need to be robust to be able to adapt to the constantly changing environment. I believe that God incorporated this capacity for robustness in living systems to match the continuously changing environment by including genetic diversity in living systems and by allowing further modification of this diversity through mutations. Thus, I believe that *microevolution*, which I mean to include both changes in genetic population distributions within species as well as mutations that modify existing characteristics (as distinct from the more dubious claim of mutations that create entirely new characteristics), are part of God’s systemic design.²⁰

One may even include theistic evolution as a form of creationism.²¹ Theistic evolution (or “the fully gifted creation”) is the view that a complete and exhaustive description of origins and nature in wholly material terms is in principle compatible with the existence of God and other apparently non-material philosophical and theological entities (e.g., souls, minds, moral properties, etc.). Some issues raised by theistic evolution could, however, exclude it as a version of creationism.²² For example, it is not clear what theoretical role God or other non-material forces and agents play for the theistic evolutionist. In other words, if the theoretical components, empirical predictions, and materialist presuppositions of evolution are adequate to explain

VIEWS ON CREATION AND EVOLUTION 41 (J.P. Moreland & John Mark Reynolds eds., 2000).

18. Robert C. Newman, *Progressive Creationism (“Old Earth Creationism”)*, in THREE VIEWS, *supra* note 17, at 105.

19. *Id.*

20. Walter L. Bradley, *Response to Robert C. Newman*, in THREE VIEWS, *supra* note 17, at 135 (emphasis added).

21. For a defense of theistic evolution, see Howard J. Van Till, *The Fully Gifted Creation (“Theistic Evolution”)*, in THREE VIEWS, *supra* note 17, at 161-218.

22. See William A. Dembski, *Introduction: Mere Creation*, in MERE CREATION, *supra* note 6, at 19-23.

the order and nature of things without either a creator or other non-material entities, then per Ockham's Razor, they are superfluous.

Creationism, if defined philosophically, may include a wide range of positions on cosmological origins, such as the ones discussed above. In constitutional jurisprudence, however, it is a term of art. In that field of study, the only one that concerns us in this article, "creationism" is synonymous with creation-science, a view whose proponents embrace young-earth creationism. The statute in Arkansas, struck down as unconstitutional in *McLean*, had this type of creationism in mind. The Louisiana statute rejected in *Edwards* was thought by the Court to be in the same tradition as the one rejected in *McLean*, though the language of the Louisiana statute was more circumspect than its predecessor.²³ Thus, when I use the term "creationism" in this essay I am referring exclusively to "creation-science" or young-earth creationism, the inclusion of which in public school science curriculums was repudiated by the district court in *McLean* and by the Supreme Court in *Edwards*.

B. Evolution

Like creationism, "evolution" can mean different things. Sometimes it is used as a synonym for "Darwinism,"²⁴ referring to both the theory defended by Charles Darwin in his *The Origin of Species*²⁵ and the subsequent refinements of Darwin's theory. Arguing from what he observed occurs when domestic breeders engage in selection, Darwin offered natural selection as the engine by which species adapt, survive, acquire new characteristics, and pass them on to their offspring:²⁶

Owing to this struggle for life, any variation, however slight and

23. See BECKWITH, LAW, DARWINISM, AND PUBLIC EDUCATION, *supra* note 9, at ch. 2.

24. There are disputes among scientists and other scholars over the precise meaning of Darwinism and neo-Darwinism (or what is called the "Darwinian synthesis"). Because this is not an essay on the complexities and schools of thought on that important topic, let me suggest the following works for further study: ANTONY FLEW, DARWINIAN EVOLUTION 1-72 (2d ed. 1997); DOUGLAS J. FUTUYMA, SCIENCE ON TRIAL: THE CASE FOR EVOLUTION 23-43 (1983); MICHAEL RUSE, CAN A DARWINIAN BE A CHRISTIAN?: THE RELATIONSHIP BETWEEN SCIENCE AND RELIGION 28-32 (2001); MICHAEL RUSE, THE DARWINIAN PARADIGM: ESSAY ON ITS HISTORY, PHILOSOPHY, AND RELIGIOUS IMPLICATIONS 118-45 (1989) (examining critically Gould's theory of "punctuated equilibrium," an alternative to Darwinian gradualism); MICHAEL RUSE, THE EVOLUTION WARS: A GUIDE TO THE DEBATES 231-60 (2000).

25. CHARLES DARWIN, ON THE ORIGIN OF THE SPECIES: A FACSIMILE OF THE FIRST EDITION WITH AN INTRODUCTION BY ERNST MAYR (Atheneum 1967) (1859).

26. See *id.* at 80-130.

from whatever cause proceeding, if they be in any degree profitable to an individual of any species, in its infinitely complex relations to other organic beings and to external nature, will tend to the preservation of that individual, and will generally be inherited by the offspring. The offspring, also, will thus have a better chance of surviving, for, of the many individuals of any species which are periodically born, but a small number can survive. I have called this principle, by which each slight variation, if useful, is preserved by the term of Natural Selection, in order to mark its relation to man's power of selection. We have seen that man by selection can certainly produce great results, and can adapt organic beings to his own uses, through the accumulation of slight but useful variations, given to him by the hand of Nature. But Natural Selection, as we shall hereafter see, is a power incessantly ready for action, and is as immeasurably superior to man's feeble efforts, as the works of Nature are to those of Art.²⁷

In one sense, no one, not even hard line creationists, deny this sort of evolution, if all that is meant by evolution is that biological species adapt over time to changing environments and pass on those adaptations genetically to their offspring. This is typically called *microevolution*. This should be distinguished from *macroevolution*, the view that the complex diversity of living things in our world is the result of one bacterial cell evolving through small, incremental, and beneficial mutations over eons. That is, all living beings share a common ancestor, giving the appearance of being designed, though in reality engineered by the unintelligent forces of natural selection. In the words of Richard Dawkins:

Natural selection is the blind watchmaker, blind because it does not see ahead, does not plan consequences, has no purpose in view. Yet the living results of natural selection overwhelmingly impress us with the appearance of design as if by a master watchmaker, impress us with the illusion of design and planning.²⁸

The notion of common descent is fundamental to macroevolution even if Darwinian and neo-Darwinian accounts of this descent are replaced or supplemented by another theory (e.g., punctuated equilibrium, recombination, the founder effect, genetic drift). This is why Antony Flew correctly points out that:

It is wrong to identify either the Darwinism of *The Origin of Species* or Neo-Darwinism with biological evolution without prefix or suffix. That to which any account of the evolution of species is necessarily opposed is any doctrine of their immutability

27. *Id.* at 61.

28. RICHARD DAWKINS, *THE BLIND WATCHMAKER* 5-6 (1986).

[i.e., some form of essentialism]; combined, presumably, with the claim that they were, whether simultaneously²⁹ or successively, specially created by *ad hoc* supernatural agency.

Consequently, if evolution were only a theory of biological change, and its explanatory power merely ruled out special creation of complex biological entities, Dawkins, Flew, and their allies could reasonably entertain the idea of a watchmaker responsible for the design of the universe as a whole and the initial biological entity from which life arose. Evolution, however, is more than a theory applicable to biology and biochemistry. It also asserts that the bacterial cell from which all life arose sprung from inorganic matter. According to Douglas J. Futuyma:

The implications [in arguing that life came from inorganic matter] are so daunting that Darwin himself was reluctant to commit his beliefs to paper. In *The Origin of Species* he limited himself to saying that 'probably all organic beings which have ever lived on earth, have descended from one primordial form, into which life was first breathed'³⁰—a phrase which is certainly open to theological interpretation.

Futuyma, however, argues that, "[w]e will almost certainly never have direct fossil evidence that living molecular structures evolved from nonliving precursors. Such molecules surely could not have been preserved without degradation. *But a combination of geochemical evidence and laboratory experiment shows that such evolution is not only plausible but almost undeniable.*"³¹

Moreover, inorganic matter, indeed the matter of the entire universe, is said to have resulted from an initial explosion called the Big Bang, an event that occurred ten to twenty billion years ago.³² Thus, evolution is a grand materialist explanation for the diversity and apparent design of entities that make up what we call nature, including both organic and inorganic entities.³³ In the words of Futuyma, "order in nature is no evidence of design."³⁴ "Darwin's

29. FLEW, *supra* note 24, at 42.

30. FUTUYMA, *supra* note 24, at 95 (quoting from DARWIN, *supra* note 25, at 484).

31. *Id.* (emphasis added).

32. The "Big Bang" is the dominant theory of the origin of the universe in cosmology: "The presently accepted view . . . suggests that at a distant time in the past the whole universe was a small sphere of concentrated energy/matter. This substance then exploded in a big bang to form hydrogen first and then eventually all the galaxies and stars." MONROE W. STRICKBERGER, *EVOLUTION* 76 (3d ed., 2000).

33. *Id. passim* (In this widely-used textbook, Strickberger presents in great detail, in twenty-five chapters, this grand materialist explanation).

34. FUTUYMA, *supra* note 24, at 114.

great contribution," writes philosopher James Rachels, "was the final demolition of the idea that nature is the product of intelligent design."³⁵

Many scientists and philosophers have drawn out the implications of this view. They suggest that if the existence of the human species is truly the outcome of simply a purely physical process then there is no need to fit nonphysical substances into our worldview.³⁶

Michael Ruse, who testified as an expert witness for the plaintiffs in *McLean*,³⁷ writes that morality, in order to work, must *seem* real to members of the human race in order to promote individual reproduction.³⁸ That is, "[w]e think . . . that we have obligations to others because it is in our biological interests to have these thoughts."³⁹ Ruse writes elsewhere:

[C]onsidered as a rationally justifiable set of claims about an objective something, [morality] is illusory. I appreciate that when somebody says, 'Love thy neighbor as thyself', they think they are referring above and beyond themselves. . . . Nevertheless, to a Darwinian evolutionist it can be seen that such reference is truly without foundation. Morality is just an aid to survival and reproduction, and has no being₄₀ beyond or without this. . . . [A]ny deeper meaning is illusory . . .

George Gaylord Simpson explains the "meaning of evolution":

Although many details remain to be worked out, it is already evident that all the objective phenomena of the history of life can be explained by purely naturalistic or, in a proper sense of the sometimes abused word, materialistic factors. . . . Man is the result of a purposeless and natural process that did not have him in mind.⁴¹

35. JAMES RACHELS, *CREATED FROM ANIMALS: THE MORAL IMPLICATIONS OF DARWINISM* 110 (1990).

36. See generally PAUL CHURCHLAND, *MATTER AND CONSCIOUSNESS* (1984).

37. See Michael Ruse, *Creation-Science is Not Science*, in *CREATIONISM, SCIENCE, AND THE LAW: THE ARKANSAS CASE 150*, (Marcel C. LaFollette ed., 1983).

38. See generally MICHAEL RUSE, *PHILOSOPHY OF BIOLOGY TODAY* 71-78 (1988).

39. Michael Ruse, *The New Evolutionary Ethics*, in *EVOLUTIONARY ETHICS* 133, 147 (M.H. Nitecki & D.V. Nitecki eds., 1993).

40. RUSE, *THE DARWINIAN PARADIGM*, *supra* note 24, at 268-69 (citations omitted).

41. GEORGE GAYLORD SIMPSON, *THE MEANING OF EVOLUTION* 344-45 (rev. ed. 1967). It is interesting to note that Simpson concedes that there could be a First Cause, or God, but that such a being has no explanatory value in accounting for life's origin nor intervenes in history:

There is neither need nor excuse for postulation of nonmaterial intervention in the origin of life, the rise of man, or any other part of the long history of the material cosmos. Yet the origin of that cosmos and the causal principles of its history remain unexplained and inaccessible to science. Here is hidden the First

In his widely-used textbook, *Evolution*, Monroe W. Strickberger writes that, “[t]he variability by which selection depends may be random, but adaptations are not; they arise because selection chooses and perfects only what is adaptive. In this scheme a god of design and purpose is not necessary.”⁴²

Francis Crick, discoverer, with James D. Watson, of the molecular structure of deoxyribonucleic acid (DNA), presents with exceptional clarity the materialism of the evolutionary paradigm and its implications:

In addition to our knowledge of basic chemistry and physics, the earth sciences (such as geology) and cosmic science (astronomy and cosmology) have developed pictures of our world and our universe that are quite different from those common when the traditional religions were founded. The modern picture of the universe, and how it developed in time, forms an essential background to our present knowledge of biology. That knowledge has been completely transformed in the last 150 years. Until Charles Darwin and Alfred Wallace independently hit on the basic mechanism driving biological evolution—the process of natural selection—the “Argument from Design” appeared unanswerable. . . . We now know that all living things, from bacteria to ourselves, are closely related at the biochemical level. . . . A modern neurobiologist sees no need for the religious concept of a soul to explain the behavior of humans and other animals. . . . Many educated people, especially in the Western world, . . . share the belief that the soul is a metaphor⁴³ and that there is no personal life before conception or after death.

Thus, what I mean by evolution, in this essay, is *naturalistic* evolution, the view that the entire universe and all the entities in it can be accounted for by strictly material processes without resorting to any designer, creator, or non-material entity or agent as an explanation for either any aspect of the natural universe or the universe as a whole. That is, an exhaustive materialist description of the universe is in principle possible. Therefore, to say that evolution is true, as understood by its leading proponents such as those cited above, is to say that naturalism (or materialism) as a worldview is true, for the latter is a necessary condition of the former.

Cause sought by theology and philosophy. The First Cause is not known and I suspect it never will be known to living man. We may, if we are so inclined, worship it in our own ways, but we certainly do not comprehend it.

Id. at 279.

42. STRICKBERGER, *supra* note 32, at 70.

43. FRANCIS CRICK, *THE ASTONISHING HYPOTHESIS: THE SCIENTIFIC SEARCH FOR THE SOUL* 5-7 (1994).

Consequently, to challenge that necessary condition—by appealing to something even as modest as Intelligent Design (to say nothing of full-blown creationism)—poses a threat to the materialist edifice. By attempting to rebut this threat, by taking on the arguments for ID, evolutionists implicitly accept the first and most important premise of the ID movement. That is, naturalistic evolution provides an answer to the *very same* question to which ID provides an answer: What is the origin of apparent design in biological organisms and other aspects of the natural universe or the universe as a whole? Evolution answers the question by appealing to the forces of unguided matter and energy, while ID answers the question by appealing to intelligent agency.

Because the evolutionary commitment to materialism has shaped the way in which we think of science,⁴⁴ and because science is considered to have a place of epistemological privilege in our culture, claims that challenge this paradigm either explicitly or implicitly (e.g., claims that immaterial entities such as souls, natures, substances, divine beings, etc. have or may have ontological standing⁴⁵) are dismissed as metaphorical,⁴⁵ a god-of-the-gaps strategy,⁴⁶

44. For example, Futuyma writes:

By providing materialistic, mechanistic explanations, instead of miraculous ones, for the characteristics of plants and animals, Darwin brought biology out of the realm of theology and into the realm of science. For miraculous spiritual forces fall outside the province of science; all of science is the study of material causation.

FUTUYMA, *supra* note 24, at 37. What Futuyma is suggesting is that Darwin's theory resulted in a shift in the dominant "scientific episteme." According to J.P. Moreland, "a scientific episteme is not just a view within science about the nature of living organisms and their development. It is also a second-order philosophical view about science that defines the nature, limits, metaphysics, and epistemology of 'good' science." J.P. MORELAND, *CHRISTIANITY AND THE NATURE OF SCIENCE* 215 (1989).

45. See CRICK, *supra* note 43, at 7 (arguing that "many educated people, especially in the Western world, also share the belief that the soul is a metaphor and that there is no personal life either before conception or after death."); RUSE, *CAN A DARWINIAN BE A CHRISTIAN?*, *supra* note 24, at 153, in which Ruse argues that:

If evolution be true, then in some very real sense we humans are all part of one big family, no matter what our numbers. For the Christian, is this not the fulfillment of God's promise to Abraham? 'I will make of you a great nation.' . . . Christians should not read this literally. Rather, as one could read the creation stories metaphorically—as telling us of God's relationship to humans and our obligations to nature—so one could read this promise metaphorically, as referring to the family status of humankind.

Id.

46. A "god-of-the-gaps," strategy, the philosophical equivalent of Lochnerizing in Supreme Court jurisprudence, is employed when a scientist, unable to develop a natural explanation for an observation or event, resorts to God or some other supernatural agency or power as an explanation. When the scientist or a future scientist discovers a natural explanation, God is no longer needed to fill the gap and is thus discarded as an

problems resolvable by a future naturalistic explanation,⁴⁷ or a confusing of two mutually exclusive categories,⁴⁸ one of which ("science") has the proper role of evaluating the rationality of the other ("religion").

An example is instructive in understanding how the epistemological questions over the nature of science are depicted to the general public. Consider the following comments made by The

explanation. So, according to conventional wisdom, a God-of-the-gaps strategy short circuits scientific investigation. For analyses of this problem, see John Mark Reynolds, *God of the Gaps: Intelligent Design & Bad Apologetic Advice*, in *MERE CREATION*, *supra* note 6, at 313-31, and Moreland, *supra* note 5, at 59-60.

It should be noted, however, that the reason why the god-of-the-gaps is disreputable is because it has been used to explain unknown physical mechanisms (e.g., perturbed orbits of planets), just the sorts of things for which agency seems particularly inadequate to explain. As Dembski writes:

The "gaps" in the god-of-the-gaps objection are meant to denote gaps of ignorance about underlying physical mechanisms. But there is no reason to think that all gaps give way to ordinary physical explanations once we know enough about the underlying physical mechanisms. The mechanisms may simply not exist. Some gaps might constitute ontic discontinuities in the chain of physical causes and thus remain forever beyond the capacity of physical mechanisms.

WILLIAM A. DEMBSKI, *NO FREE LUNCH: WHY SPECIFIED COMPLEXITY CANNOT BE PURCHASED WITHOUT INTELLIGENCE* 334-35 (2002). Hence, if a "gap," that is, an apparently contranomic event that cannot be accounted for by material mechanisms, exemplifies phenomena whose properties, in other contexts, we typically attribute to design, then it is unclear why attributing the "gap" to intelligent agency compromises the pursuit for truth. After all, it may be true that materialism is false.

47. An implicit example of this is John Searle's candid comments about why just about every philosopher of mind embraces some view of the mind that relies on a materialist (or physicalist) construal of the human person, even though it seems inconsistent with our well-grounded intuitions:

How is it that so many philosophers and cognitive scientists can say so many things that, to me at least, seem obviously false? . . . I believe one of the unstated assumptions behind the current batch of views is that they represent the only scientifically acceptable alternatives to the anti-scientism that went with traditional dualism, the belief in the immortality of the soul, spiritualism, and so on. Acceptance of the current views is motivated not so much by an independent conviction of their truth as by a terror of what are apparently the only alternatives. That is, the choice we are tacitly presented with is between a 'scientific' approach, as represented by one or another of the current versions of 'materialism,' and an 'anti-scientific' approach, as represented by Cartesianism or some other traditional religious conception of the mind.

JOHN SEARLE, *THE REDISCOVERY OF THE MIND* 3-4 (1992).

48. In the preface to a 1984 pamphlet published by the National Academy of Sciences, its then-president Dr. Frank Press writes:

It is false . . . to think that the theory of evolution represents an irreconcilable conflict between religion and science. A great many religious leaders and scientists accept evolution on scientific grounds without relinquishing their belief in religious principles. As stated in a resolution by the Council of the National Academy of Sciences in 1981, however, "Religion and science are separate and mutually exclusive realms of human thought whose presentation in the same context leads to misunderstanding of both scientific theory and religious belief."

NATIONAL ACADEMY OF SCIENCES, *SCIENCE AND CREATIONISM: A VIEW FROM THE NATIONAL ACADEMY OF SCIENCES* 5-6 (1984).

National Association of Biology Teachers (NABT) as part of an official statement published on its web site:

This same examination, pondering and possible revision have firmly established evolution as an important natural process explained by valid scientific principles, and clearly differentiate and separate science from various kinds of nonscientific ways of knowing, including those with a supernatural basis such as creationism. Whether called "creation science," "scientific creationism," "intelligent-design theory," "young-earth theory" or some other synonym, creation beliefs have no place in the science classroom. Explanations employing nonnaturalistic or supernatural events, whether or not explicit reference is made to a supernatural being, are outside the realm of science and not part of a valid science curriculum. Evolutionary theory, indeed all of science, is necessarily silent on religion⁴⁹ and neither refutes nor supports the existence of a deity or deities.

This statement begs an important question: If there are other "ways of knowing" besides materialist science, what happens when they conflict? For example, many neuropsychologists tell us that human beings are merely physical systems, property-things, and that "thought" is entirely the result of the firing of neurons in the brain. The mind may be an "epiphenomenon," but it is not a non-material thing that really exists. That is, there are no non-material substances, like souls or minds, from which thought arises. Suppose, however, a philosophical theologian, armed with arguments defending the existence of the soul, arguments she believes are persuasive and rationally defensible apart from appeals to special revelation, rejects the neuropsychologist's materialist description of human nature? Who wins? I suspect that the NABT would say the neuropsychologist wins, for he is proposing a scientific theory (i.e., a materialist explanation) while the philosophical theologian is appealing to non-natural entities (i.e., immaterial substances) and thus is suggesting "another way of knowing." This is just a kind, though condescending, way of saying that the philosophical theologian is giving us her "beliefs" (or "religious opinion") and not providing us with any real knowledge. And thus, contrary to what the NABT is saying, evolutionary theory's presuppositional commitment (methodological naturalism) and metaphysical entailment (ontological materialism) has a lot to say about the plausibility and rationality of "religious beliefs."

49. NATIONAL ASSOCIATION OF BIOLOGY TEACHERS, STATEMENT ON TEACHING EVOLUTION, at http://www.nabt.org/sub/position_statements/evolution.asp (last visited Jan. 25, 2003).

C. Intelligent Design

Intelligent Design, as I noted above, is a research program embraced by a small, though growing, platoon of academics who maintain 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 the existence of the universe as a whole, than the blind forces of unguided matter.

1. Scholarly Support for Intelligent Design

Many prominent scholars associate themselves with the ID movement including Michael Behe,⁵⁰ Dean Kenyon,⁵¹ Phillip E. Johnson,⁵² Alvin Plantinga,⁵³ J.P. Moreland,⁵⁴ William Dembski,⁵⁵ Dallas Willard,⁵⁶ Stephen C. Meyer,⁵⁷ Walter Bradley,⁵⁸ Paul Nelson,⁵⁹ Henry F. Schaefer III,⁶⁰ Hugh Ross,⁶¹ David Berklinski,⁶² Jonathan Wells,⁶³ Robert Kaita,⁶⁴ and William Lane Craig.⁶⁵ The

50. Professor of Biological Sciences, Lehigh University; Ph.D. in biochemistry, University of Pennsylvania.

51. Professor *Emeritus* of Biology, San Francisco State University; Ph.D. in biophysics, Stanford University. He has been a National Science Foundation Postdoctoral Fellow at the University of California (Berkeley), a visiting scholar to Trinity College, Oxford University and a postdoctoral fellow at NASA-Ames Research Center.

52. Professor Emeritus of Law, Boalt Hall School of Law, University of California (Berkeley); J.D., University of Chicago.

53. John A. O'Brien Professor of Philosophy, University of Notre Dame; Ph.D. in philosophy, Yale University.

54. Distinguished Professor of Philosophy, Biola University; Ph.D. in philosophy, University of Southern California.

55. Associate Research Professor in the Conceptual Foundations of Science, Baylor University; Ph.D. in mathematics, University of Chicago; Ph.D. in philosophy, University of Illinois, Chicago. He has also done postdoctoral work in mathematics at Cornell University and the Massachusetts Institute of Technology, in physics at the University of Chicago, and in computer science at Princeton University.

56. Professor of Philosophy, University of Southern California; Ph.D. in philosophy, University of Wisconsin.

57. Ph.D. in history and philosophy of science, Cambridge University.

58. Professor of Mechanical Engineering, Texas A & M University; Ph.D. in materials science, University of Texas at Austin.

59. Ph.D. in philosophy of biology, University of Chicago.

60. Graham Perdue Professor of Chemistry and Director of the Center for Computational Quantum Chemistry, University of Georgia; Ph.D. in chemical physics, Stanford University. He has been nominated several times for the Nobel Prize.

61. Ph.D. in astronomy, University of Toronto. He was a post-doctoral fellow at the California Institute of Technology for five years.

62. Ph.D. in mathematics, Princeton University. He has been a postdoctoral fellow in mathematics and molecular biology at Columbia University.

63. Ph.D. in molecular and cell biology, University of California at Berkeley; Ph.D. in religious studies, Yale University. He has done postdoctoral research at the University of

intellectual epicenter of ID is the Center for Science and Culture (the Center), housed in the Seattle-based think-tank, the Discovery Institute. According to its web site, the Center seeks “to challenge materialism on specifically scientific grounds. Yet Center Fellows do more than critique theories that have materialistic implications. They have also pioneered alternative scientific theories and research methods that recognize the reality of design and the need for intelligent agency to explain it.”⁶⁶ The works of these and other ID scholars have been published by prestigious academic presses and respected academic journals. These works have also received attention by the wider academic and research community. The following is a brief sample of this activity.

William Dembski’s monograph on ID, *The Design Inference: Eliminating Chance Through Small Probabilities*, was published in 1998 by Cambridge University Press in its prestigious monograph series “Probability, Induction, and Decision Theory.”⁶⁷ It was assessed in a number of important journals, including *Philosophy of Science*,⁶⁸ in which it was reviewed by the renowned philosopher of science Elliot Sober and two of his colleagues at the University of Wisconsin. In 2002, a sequel, *The Design Inference, No Free Lunch: Why Specified Complexity Cannot Be Purchased Without Intelligence*, was published by Rowman & Littlefield, a widely respected academic press.⁶⁹ Among the scholars who have endorsed this book is Darwinian Michael Ruse who commented “I strongly disagree with

California at Berkeley, and has taught biology at California State University at Hayward.

64. Principal Research Physicist, Plasma Physics Laboratory, Princeton University; Ph.D. in nuclear physics, Rutgers University. He teaches in Princeton University’s department of astrophysical sciences.

65. Research Professor of Philosophy, Biola University; Ph.D. in philosophy, University of Birmingham (U.K.); D. Theol., University of Munich.

66. THE DISCOVERY INSTITUTE, DESIGN THEORY: A NEW SCIENCE FOR A NEW CENTURY, at <http://www.discovery.org/crsc/> (last visited Jan. 25, 2003). The web site further notes:

This new research program—called ‘design theory’—is based upon recent developments in the information sciences and many new evidences of design. Design theory promises to revitalize many long-stagnant disciplines by recognizing mind, as well as matter, as a causal influence in the world. It also promises, by implication, to promote a more holistic view of reality and humanity, thus helping to reverse some of materialism’s destructive cultural consequences.

Id.

67. WILLIAM A. DEMBSKI, *THE DESIGN INFERENCE: ELIMINATING CHANCE THROUGH SMALL PROBABILITIES* (1998).

68. Brandon Fitelson et al., *How Not to Detect Design*, 66 PHIL. SCI. 472 (1999) (book review).

69. DEMBSKI, *supra* note 46.

the position taken by . . . Dembski. But I do think that he argues strongly and those of us who do not accept his conclusions should read his book and form our own opinions and counterarguments. He should not be ignored.”⁷⁰ Dembski’s work has appeared in many journals across different disciplines.⁷¹

Paul Nelson’s book, *On Common Descent*,⁷² a critique of neo-Darwinism and based on his University of Chicago doctoral dissertation (in philosophy of biology), will be published by the University of Chicago Press in its prestigious “Evolutionary Monographs” series. In 2001, State University of New York (SUNY) Press published a monograph by Del Ratzsch, a philosopher of science at Calvin College, *Nature, Design, and Science: The Status of Design in Natural Science*.⁷³ A volume in SUNY Press’s “Philosophy and Biology” series, it is, according to its author, “not a piece of advocacy” against or for design, but rather, “a philosophical attempt to clarify some of the conceptual landscape which productive pursuit of broader design debates must negotiate.”⁷⁴ Ratzsch concludes that though design theorists still have much more work to do, “there is little to be said for a prohibitionism that forbids even the attempt to pursue whatever potential [for design theory] there might be.”⁷⁵

J.P. Moreland and William Lane Craig are editors of the book, *Naturalism: A Critical Analysis*, published by Routledge in 2000.⁷⁶ Craig, an accomplished scholar in the philosophy of science and the philosophy of religion,⁷⁷ has published books with Oxford University Press⁷⁸ and MacMillan as well as numerous articles in such journals

70. Rowman & Littlefield, REVIEWS FOR NO FREE LUNCH: WHY SPECIFIED COMPLEXITY CANNOT BE PURCHASED WITHOUT INTELLIGENCE, at <http://www.rowmanlittlefield.com/Catalog/Reviews.shtml?command=Search&db=^DB/CATALOG.db&eqSKUdata=0742512975> (last visited Jan. 25, 2003).

71. See e.g., William A. Dembski, *Randomness by Design*, 25 NOÛS 75 (1991); William A. Dembski, *Reverse Diffusion-Limited Aggregation*, 37 J. STAT. COMPUTATION AND SIMULATION 231 (1990); William A. Dembski, *Uniform Probability*, 3 J. THEORETICAL PROBABILITY 611 (1990); William A. Dembski & Stephen C. Meyer, *Fruitful Interchange or Polite Chitchat?: The Dialogue Between Science and Theology*, 33 ZYGMON 415 (1998).

72. PAUL A. NELSON, *ON COMMON DESCENT* (forthcoming 2003).

73. DEL RATZSCH, *NATURE, SCIENCE, AND DESIGN: THE STATUS OF DESIGN IN NATURAL SCIENCE* (2001).

74. *Id.* at vii.

75. *Id.* at 151.

76. *NATURALISM: A CRITICAL ANALYSIS* (William Lane Craig & J.P. Moreland eds., 2000).

77. WILLIAM LANE CRAIG & QUENTIN SMITH, *THEISM, ATHEISM, AND BIG BANG COSMOLOGY* (1993).

78. WILLIAM LANE CRAIG, *THE COSMOLOGICAL ARGUMENT FROM PLATO TO*

as *British Journal for the Philosophy of Science*⁷⁹ and *The Journal of Philosophy*.⁸⁰

In addition to his published work critical of philosophical naturalism,⁸¹ Alvin Plantinga presented a provocative paper at the 1998 Eastern Division Meeting of the American Philosophical Association⁸² in which he suggested, among other things, that naturalistic evolution should be taught in public schools *only if* students are informed that the theory's truth is contingent upon its controversial and disputed epistemological and metaphysical presuppositions.⁸³

Phillip E. Johnson's 1991 book, *Darwin on Trial*,⁸⁴ which provoked an acerbic review by Harvard paleontologist Stephen Jay Gould in *Scientific American*,⁸⁵ "has inspired academic symposia at Universities such as Stanford, Harvard, Chicago, Cornell, SMU [Southern Methodist University] and the University of Texas. In these settings, [Johnson] has exchanged views with such scientific and philosophic luminaries as Michael Ruse, Stephen Jay Gould, William Provine and Steven Weinberg."⁸⁶ Ruse has said of Johnson and his books, "Johnson is a brilliant man and these are clever and skillfully

LEIBNIZ (1980); WILLIAM LANE CRAIG, *THE KALĀM COSMOLOGICAL ARGUMENT* (1979).

79. William Lane Craig, *God, Creation and Mr. Davies*, 37 BRIT. J. FOR PHIL. SCI. 163 (1986); William Lane Craig, *Barrow and Tipler on the Anthropic Principle vs. Divine Design*, 39 BRIT. J. FOR PHIL. SCI. 389 (1988).

80. William Lane Craig, *Tachyons, Time Travel, and Divine Omniscience*, 85 J. PHIL. 135 (1988).

81. See, e.g., ALVIN PLANTINGA, *WARRANT AND PROPER FUNCTION* 216-37 (1993); Alvin Plantinga, *An Evolutionary Argument Against Naturalism*, in *FAITH IN THEORY AND PRACTICE: ESSAYS ON JUSTIFYING RELIGIOUS BELIEF* 35 (Elizabeth S. Radcliffe & Carol J. White eds., 1993); Plantinga, *Methodological Naturalism?*, *supra* note 6; Plantinga, *Methodological Naturalism?: Part 2*, *supra* note 6.

82. Alvin Plantinga, *Creation and Evolution: A Modest Proposal*, Paper Delivered at the Eastern Division Meeting of the American Philosophical Association in Washington, D.C. (Dec. 27-30, 1998) in *INTELLIGENT DESIGN CREATIONISM AND ITS CRITICS: PHILOSOPHICAL, THEOLOGICAL AND SCIENTIFIC PERSPECTIVES* 779 (Robert T. Pennock ed., 2001). Plantinga opens his paper with the following comments:

The topic of our meeting is the question: should Creationism be taught in the (public) schools? That is an excellent question, and Professor Pennock has interesting things to say about it. I want to begin however, by asking a complementary question, after which I shall return to this one: should evolution be taught in the public schools?

Id. at 779.

83. For a discussion of Plantinga's case, see BECKWITH, *LAW, DARWINISM, AND PUBLIC EDUCATION*, *supra* note 9, at ch. 3, pt. C.

84. JOHNSON, *supra* note 17.

85. Stephen Jay Gould, *Impeaching a Self-Appointed Judge*, SCI. AM., July 1992, at 118.

86. DISCOVERY INSTITUTE, *Profile of Advisor Phillip E. Johnson*, at <http://www.discovery.org/crsc/fellows/PhilJohnson/index.html> (last visited Jan. 22, 2003).

written books. I hope you are not convinced by them but do not underestimate them."⁸⁷

In 1996, Behe, a biochemist who has published in peer-reviewed journals,⁸⁸ released his groundbreaking and best-selling book, *Darwin's Black Box: The Biochemical Challenge to Evolution*.⁸⁹ It was reviewed in many major periodicals including *Quarterly Review of Biology*,⁹⁰ *Nature*,⁹¹ *American Scientist*,⁹² and *The Boston Review*.⁹³ Soon after that, in December 1997, William F. Buckley's *Firing Line* program (PBS) hosted a special debate on the issue, "Resolved: Evolution Should Acknowledge Creation."⁹⁴ Participants included Buckley, Johnson, Behe, Berlinski, Ruse, Barry W. Lynn (Executive Director, Americans United for Separation of Church and State), Eugenie C. Scott, and Kenneth R. Miller. The participation of Scott and Miller in the debate is significant, for their presence shows the

87. RUSE, THE EVOLUTION WARS, *supra* note 24, at 285. The two books to which Ruse is referring are JOHNSON, DARWIN ON TRIAL, *supra* note 17, and JOHNSON, REASON IN THE BALANCE, *supra* note 4.

88. See, e.g., M.J. Behe, *An Overabundance of Long Oligopurine Tracts Occurs in the Genome of Simple and Complex Eukaryotes*, 23 NUCLEIC ACIDS RES. 689 (1995); Michael J. Behe, *Tracts of Separated, Alternating, and Mixed Adenosine and Cytidine Residues in the Genomes of Prokaryotes and Eukaryotes*, 8 DNA SEQUENCE 375 (1988); Michael J. Behe et al., *The Protein-Folding Problem: The Native Fold Determines Packing, But Does Packing Determine the Native Fold?*, 88 PROC. NAT'L ACAD. SCI. 4195 (1991); R.C. Getts & M.J. Behe, *Eukaryotic DNA Does Not Form Nucleosomes As Readily As Some Prokaryotic DNA*, 19 NUCLEIC ACIDS RES. 5923 (1991); K. Luthman & M.J. Behe, *Sequence Dependence of DNA Structure: The B, Z, and A Conformations of Polydeoxynucleotides Containing Repeating Units of 6 to 16 Base Pairs*, J. BIOLOGICAL CHEMISTRY 15535 (1988); Henry L. Puhl & Michael J. Behe, *Poly(dA)·Poly(dT) Forms Very Stable Nucleosomes at Higher Temperatures*, 245 J. MOLECULAR BIOLOGY 559 (1995).

89. MICHAEL BEHE, DARWIN'S BLACK BOX: THE BIOCHEMICAL CHALLENGE TO EVOLUTION (1996).

90. Neil W. Blackstone, *Argumentum Ad Ignorantiam* 72 Q. REV. BIOLOGY 445 (1997) (book review).

91. Jerry A. Coyne, *God in the Details*, 383 NATURE 227 (1996) (book review).

92. Robert Dorit, 85 AM. SCI. 474 (1997) (book review).

93. H. Allen Orr, *Darwin v. Intelligent Design (Again)*, BOSTON REV., Dec./Jan. 1996-97, at 28 (book review). This review, along with another one (Robert C. Berwick, *Feeling for the Organism*, BOSTON REV., Dec./Jan. 1996-97, at 23 (reviewing RICHARD DAWKINS, CLIMBING MOUNT IMPROBABLE (1996))) provoked a number of replies. These were published in *Is Darwin in the Details?*, BOSTON REV., Feb./Mar. 1997, at 24. The respondents were Michael Behe, Phillip E. Johnson, David Berlinski, Jerry A. Coyne, Russell F. Doolittle, Douglas J. Futuyma, Robert DiSilvestro, Michael Ruse, James A. Shapiro, Richard Dawkins, and Daniel Dennett.

94. *Firing Line Debate: "Resolved: The Evolutionists Should Acknowledge Creation"* (PBS television broadcast, Dec. 19, 1997); see also Walter Goodman, *Once Again, of God, Man And Everything in Between*, N.Y. TIMES, Dec. 19, 1997, at E34 (reviewing and describing the positions of both sides of the PBS debate); Laurie Goodstein, *Christians and Scientists: New Light for Creationism*, N.Y. TIMES, Dec. 21, 1997, at Sec. 4, p. 1 (describing the resurgence of creationist thought through intelligent design, highlighted by the PBS debate).

seriousness with which ID is taken by the scientific establishment. Scott, a Darwinian opponent of ID, is a biological anthropologist and former university professor who since 1987 has been executive director of the National Center for Science Education. Miller, another opponent of ID, is a Brown University biology professor and author of a book strongly critical of ID, which he published two years after the Firing Line debate, *Finding Darwin's God: A Scientist's Search for Common Ground Between God and Evolution*.⁹⁵

In 2000 both Baylor University⁹⁶ and Yale University⁹⁷ hosted major conferences on ID. The American Museum of Natural History (New York City) in April 2002, presented as part of its lecture series a public discussion entitled, "Evolution or Intelligent Design?: Examining the Intelligent Design Issue."⁹⁸ *Natural History* described the discussion in its April 2002 issue.⁹⁹ Participating in the program were Behe, Dembski, Scott, Miller, and Robert T. Pennock, a philosophy of science professor at Michigan State University who, in 1999, published with M.I.T. Press an important monograph critical of ID which was nominated for a Pulitzer Prize, the National Book Award and the PEN Award:¹⁰⁰ *Tower of Babel: The Evidence Against the New Creationism*.¹⁰¹

In 2001, the *New York Times*,¹⁰² the *Los Angeles Times*,¹⁰³ and the

95. KENNETH R. MILLER, *FINDING DARWIN'S GOD: A SCIENTIST'S SEARCH FOR COMMON GROUND BETWEEN GOD AND EVOLUTION* (1999) (arguing that intelligent design advocates do not adequately address the complexities of evolution and support a proposition that cannot be proved scientifically).

96. *The Nature of Nature: An Interdisciplinary Conference on the Role of Naturalism in Science at Baylor University* (Apr. 12-15, 2000).

97. *Science and Evidence For Design in the Universe at Yale University* (Nov. 2-4, 2000); see *Yale Symposium Will Explore New Evidence Supporting the Theory of Intelligent Design*, M2 PRESSWIRE, Nov. 1, 2000, available at 2000 WL 28278632 (describing the event).

98. See generally *American Museum of Natural History Homepage*, at <http://www.amnh.org> (last visited Jan. 23, 2002).

99. *Intelligent Design?*, NAT. HIST., Apr. 2002, at 73.

100. *Research and Scholarship*, LBS News, at http://www.msu.edu/unit/lbs/news/research_pub.html (last visited Nov. 25, 2002).

101. ROBERT T. PENNOCK, *TOWER OF BABEL: THE EVIDENCE AGAINST NEW CREATIONISM* (1999) (rebutting intelligent design arguments which the author claims are becoming increasingly popular among students).

102. James Glanz, *Darwin vs. Design: Evolutionists' New Battle*, N.Y. TIMES, Apr. 8, 2001, at A1 (describing the growth and viewpoints of the intelligent design movement and its opponents).

103. Teresa Watanabe, *Enlisting Science to Find the Fingerprints of a Creator*, L.A. TIMES, Mar. 25, 2001, at A1 (describing the leaders of the intelligent design movement, their funding sources, and the debate over whether their viewpoint should be taught in public schools).

Chronicle of Higher Education,¹⁰⁴ published major pieces on the ID movement. In 1998, the journal *Rhetoric & Public Affairs*, published by Michigan State University Press and sponsored by two academic units of Texas A&M University,¹⁰⁵ dedicated an entire issue to a symposium on “the Intelligent Design Argument.”¹⁰⁶ Contributors included supporters and critics of ID, though the former outnumbered the latter. A book based on that issue is set for release by Michigan State University Press in 2003.¹⁰⁷ Cambridge University Press is set to release, in 2004, a collection of essays edited by Dembski and Ruse, *Debating Design: From Darwin to DNA*, which will include articles by both opponents and proponents of ID.¹⁰⁸ An 805-page anthology, *Intelligent Design Creationism and Its Critics: Philosophical, Theological, and Scientific Perspectives* was released by M.I.T. Press in late 2001,¹⁰⁹ which, according to journalist Richard N. Ostling, “signaled ID’s growing importance.”¹¹⁰ This edited volume includes essays by leading ID supporters including Behe, Dembski, Johnson, and Plantinga as well as foes Ruse, Pennock, Richard Dawkins, and Philip Kitcher.

Unlike their creationist predecessors, ID proponents have developed highly sophisticated arguments, have had their works published by prestigious presses and in academic journals,¹¹¹ have

104. Beth McMurtrie, *Darwinism Under Attack*, CHRON. HIGHER EDUC., Dec. 21, 2001, at A8 (describing the intelligent design movement and its scientific critics).

105. Department of Speech Communication and the Center for Presidential Studies of the George Bush School of Government.

106. Symposium, *Special Issue on the Intelligent Design Argument*, 14 RHETORIC & PUB. AFF. 469 (1998).

107. DARWINISM, DESIGN, AND PUBLIC EDUCATION (John A. Campbell & Stephen C. Meyer eds., forthcoming 2003).

108. DEBATING DESIGN: FROM DARWIN TO DNA (William A. Dembski & Michael Ruse eds., forthcoming 2004).

109. INTELLIGENT DESIGN CREATIONISM AND ITS CRITICS, *supra* note 82.

110. Richard N. Ostling, “*Intelligent Design*” Gains Attention in Ohio Debate, But Many Science Educators Are Skeptical, ASSOCIATED PRESS ONLINE, Mar. 14, 2002, available at 2002 WL 16390222 (discussing the growing political debates about teaching intelligent design in public schools).

111. Because ID’s project strikes at the philosophical core of evolutionary theory, its unchallenged epistemological and metaphysical presuppositions, ID proponents have published most of their pro-ID essays in peer-reviewed periodicals that specialize in the *philosophy* of science or in anthologies produced by respected university presses. In addition, as noted in the text, ID proponents have made significant inroads in publishing monographs with prestigious presses. The ID movement has found more success in these venues than in traditional scientific journals, for the latter typically do not have reviewers and editors adequately trained to assess the soundness of arguments, both empirical and philosophical, that challenge the core presuppositions of an entrenched paradigm.

However, design theorists’ publication in biology peer-reviewed journals *is* thin, and cannot be entirely attributed to hostile editorial boards who want to suppress ID (though

aired their views among critics in the corridors of major universities and institutions, and have been recognized by leading periodicals, both academic and non-academic. This is no small accomplishment. Given the negative image of "creationists,"¹¹² what the ID movement has accomplished in fewer than two decades is nothing short of astounding.

Because the literature supporting ID is sophisticated, vast, and growing, my presentation of its case will be cursory. I will first address its critique of methodological naturalism, followed by a discussion of specified complexity and its application to ID.

2. Intelligent Design's Conflict with Methodological Naturalism

Methodological naturalism (MN) restricts science to "undirected natural processes."¹¹³ As such, a prior commitment to MN makes evolution appear to be the only reasonable explanation accounting for the origin of the universe and, thus, organic life. More specifically, if science is defined as a discipline that only permits naturalistic explanations, and if science is the only field of study that in principle provides knowledge on the question of origins, then evolution (but not necessarily Darwinism) *must be true* even if the evolutionary paradigm cannot adequately address many questions about, or

that is sometimes the case). According to a personal e-mail from Dembski:

I would say there are two things going on: (1) Much of biological research is frankly engineering (genetic engineering, molecular machines, etc.) and thus already frameable in ID terms; the problem is that Darwinists are framing this work in Darwinian terms, seeing the Darwinian mechanism as the great engineer of biology. Thus work that should be considered design-theoretic research has been co-opted for a materialist agenda. (2) We are just getting off the ground with a biological research program that is uniquely design-theoretic (i.e., which cannot be co-opted by Darwinians). The number of researchers who presently see how to employ design-theoretic concepts to inspire fruitful biological research is merely a handful.

E-mail from William A. Dembski to Francis J. Beckwith (July 10, 2002) (on file with author). Nevertheless, it should be stressed that ID opponents are *mistaken* when they claim that design theorists have not published peer-reviewed works. In addition, as I will point out below in the text, as a matter of constitutional law, peer-review publication, though relevant, is not necessary in order for a viewpoint to be considered "scientific" by a court of law.

112. For example, in a footnote in his majority opinion in *Epperson*, Justice Abe Fortas writes:

Clarence Darrow, who was counsel for the defense in the Scopes trial, in his biography published in 1932, somewhat sardonically pointed out that States with anti-evolution laws did not insist upon the fundamentalist theory in all respects. He said: "I understand that the States of Tennessee and Mississippi both continue to teach that the earth is round and that the revolution on its axis brings the day and night, in spite of all the opposition."

Epperson v. Arkansas, 393 U.S. 97, 102 n.9 (1968).

113. DEMBSKI, *supra* note 4, at 119.

account for some phenomena in, the natural world.

ID theorists contend that this unquestioning loyalty to MN is inappropriate; the literature is replete with critiques of MN.¹¹⁴ The central premise common to these critiques is the accurate identification of MN not as a claim *of* science, such as Einstein's Theory of Relativity, but as a claim *about* natural science. Moreland describes the assumption that natural science must adopt MN as a "second-order philosophical claim *about* science."¹¹⁵ In other words, the question of whether natural science requires MN as a necessary condition for its practice is a philosophical one that necessitates a philosophical justification. If MN is supposed to be a *precondition* for the practice of natural science, it cannot be justified *by* natural science. It is clear that natural science presupposes certain conditions, some of which seem to be indispensable to its practice. But they are not derived *from* science, but rather, they are philosophical presuppositions that make science possible. A responsible, rational, scientific community should therefore assess ID arguments on the merits instead of dismissing them a priori merely because their conclusions are inconsistent with MN. Ultimately, if the arguments for ID are reasonable and the resulting conclusions sound (even if they conflict with MN), we may conclude that MN is not a necessary precondition of natural science.

3. Intelligent Design and Specified Complexity

At the core of ID research is the set of criteria by which its proponents claim they can detect or falsify design. One primary criterion is specified complexity, a concept already accepted as evidence of intelligent agency in other fields, including "forensic science, intellectual property law, insurance claims investigation, cryptography, and random number generation."¹¹⁶ Thus, Dembski, in proposing that we extend the principles previously proven effective in other fields to the world of the natural sciences, is not suggesting something entirely new. He defines specified complexity as a combination of contingency, complexity, and specification; all three

114. See, e.g., DEMBSKI, *supra* note 4, at 97-183; JOHNSON, *supra* note 4, at 205-18; Moreland, *supra* note 5; NATURALISM, *supra* note 74; Plantinga, *Methodological Naturalism? Part 1*, *supra* note 6; Plantinga, *Methodological Naturalism? Part 2*, *supra* note 6; Wells, *supra* note 6; Johnson, *Dogmatic Materialism*, *supra* note 6.

115. Moreland, *supra* note 5, at 43.

116. William A. Dembski, *Reinstating Design Within Science*, 1.4 RHETORIC & PUB. AFF. 503, 506 (1998).

of which are required to support an inference of design.¹¹⁷

According to Dembski, "Contingency, by which we mean that an event was one of several possibilities, ensures that the object is not the result of an automatic and hence unintelligent process."¹¹⁸ In other words, an event that is not contingent is one that can be completely accounted for by natural law. To use Dembski's example, a salt crystal "results from forces of chemical necessity that can be described by the laws of chemistry . . . [A] setting of silverware is not. No physical or chemical laws dictate that the fork must be on the left and the knife and spoon on the right."¹¹⁹

Complexity reduces the likelihood that an event can be attributed exclusively to chance. For Dembski, "complexity . . . is a form of probability."¹²⁰ For example, the probability of opening a combination lock by chance depends on the complexity of the mechanism. As a mechanism becomes more complex, the probability that it can be opened by chance is reduced. Therefore, "to determine whether something is sufficiently complex to warrant a design inference is to determine whether it has sufficiently small probability."¹²¹ For example, a random selection of 1000 symbols (rtvwix%*<3q498d. . .) and the result of 1000 coin flips are complex and improbable, but can be explained by chance. This is why the third element, specification, is also essential.

"Specification ensures that [the] object exhibits the type of pattern that is the trademark of intelligence."¹²² Yet specificity by itself may not be design, since redundant order, such as the earth's orbit around the sun every 365 days, can be explained by natural law. When combined with the other two elements, however, a design inference may be warranted. Dembski illustrates this point with the Search for Extra-Terrestrial Intelligence (SETI), which imposes filters on radio waves to discard those without the requisite level of specified complexity. In Carl Sagan's novel *Contact* (and the subsequent movie), SETI researchers determine that a sequence of beats and pauses corresponding to the prime numbers from 2 to 101 is a

117. William A. Dembski, *The Third Mode of Explanation: Detecting Evidence of Intelligent Design in the Sciences*, in *SCIENCE AND EVIDENCE FOR DESIGN IN THE UNIVERSE* 17, 25 (Michael J. Behe et al. eds., 2000). Dembski's earlier work identified only two factors—complexity and specification. See Dembski, *supra* note 116, at 506-07.

118. Dembski, *supra* note 117, at 25.

119. *Id.* at 26.

120. *Id.* at 27.

121. *Id.*

122. Dembski, *supra* note 116, at 508.

definitive sign of extra-terrestrial intelligence.¹²³

Dembski distinguishes specification from fabrication, which occurs when a pattern is inferred ad hoc even though chance may account for the pattern. For example, suppose that a hurricane destroys four of the seven homes in a given block; all three of the homes not destroyed are owned by members of the Welty family. Further, the Weltys own the second, fourth, and sixth homes on the block, so the hurricane destroyed only the odd-numbered homes. It could be inferred either that the hurricane intentionally spared all Welty-owned property or that it only affects odd-numbered houses. Yet, this inference is not warranted since the apparent "pattern" may be attributed to chance. On the other hand, the pattern detected by the SETI researchers in *Contact* demonstrates specified complexity because it demonstrates sufficient complexity and a pattern independent of the event it explains. That is, the pattern is not derived exclusively from the event, as are the patterns suggested in the hurricane example, but is one that is detached from the actual outcome. The pattern of the message from space in *Contact* can be constructed from background knowledge (or side information, as Dembski calls it) about binary arithmetic independently from any determination about the existence of extra-terrestrial life.¹²⁴ As a researcher in the movie version of *Contact* exclaimed, "This isn't noise; this has structure."¹²⁵ Dembski goes one step further insisting that "[t]his distinction between specifications and fabrications can be made with full statistical rigor."¹²⁶

4. The Application of Specified Complexity to Intelligent Design Theory

ID theorists now employ Dembski's conception of specified complexity in various settings. We will consider two of these in detail, namely (1) the irreducible complexity of certain biological systems, and (2) the fine-tuning of the universe for the existence of life, and briefly mention two other examples.

a. Irreducible Complexity of Certain Biological Systems

Michael Behe takes seriously Darwin's claim that "[i]f it could be demonstrated that any complex organ existed which could not

123. *Id.* at 507-09.

124. See Dembski, *supra* note 117, at 47-51.

125. Dembski, *supra* note 116, at 509.

126. *Id.* at 510.

possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down."¹²⁷ Thus, irreducibly complex systems directly challenge the legitimacy of Darwin's theory of natural selection. Behe defines an irreducibly complex system as "a single system composed of several well-matched, interacting parts that contribute to the basic function, wherein the removal of any one of the parts causes the system to effectively cease functioning."¹²⁸ Behe uses a mechanical mousetrap with five component parts to illustrate an irreducibly complex system, since it cannot function at all if any component is missing.¹²⁹ As a result, such systems cannot be created by gradual changes over time through natural selection, since a biological entity must have some function in order to exist, change and pass on change to its progeny. Irreducibly complex systems can have no functioning intermediate forms that have yet to acquire the requisite parts, for they are, by definition, *irreducible* and cannot be the legacy of intermediate forms. Thus, as Behe notes, "If there is no function, selection has nothing to work on, and Darwinian evolution is thwarted."¹³⁰ Behe lists several irreducibly complex biological systems, including the cilium within a cell.¹³¹ He writes:

Ciliary motion certainly requires microtubules; otherwise, there would be no strands to slide. Additionally it requires a motor, or else the microtubules of the cilium would lie stiff and motionless. Furthermore, it requires linkers to tug on neighboring strands, converting the sliding motion into a bending motion, and preventing the structure from falling apart. All of these parts are required to perform one function: ciliary motion. Just as a mousetrap does not work unless all of its constituent parts are present, ciliary motion simply does not exist in the absence of microtubules, connectors, and motors. Therefore we can conclude that the cilium is irreducibly complex—an enormous monkey wrench thrown into its presumed gradual, Darwinian evolution.¹³²

According to Behe, reviewers of his book *Darwin's Black Box*

127. CHARLES DARWIN, *THE ORIGIN OF SPECIES* 154 (6th ed., 1872 (1859)), quoted in Michael Behe, *Intelligent Design as an Alternative Explanation for the Existence of Biomolecular Machines*, 1.4 RHETORIC & PUB. AFF. 565, 566 (1998).

128. BEHE, *supra* note 89, at 39.

129. *Id.* at 42.

130. Behe, *supra* note 127, at 567. Some controversy surrounds Behe's mousetrap example. For a response to these critiques, see DEMBSKI, *supra* note 46, at 256-67, 279-89.

131. Behe also describes bacterial flagellum, the mechanism of blood clotting, vesicular transport, and immune systems.

132. BEHE, *supra* note 89, at 64-65.

“admit[ted] the current lack of Darwinian explanations,” even though most “expressed confidence that in the future such explanations will be found.”¹³³ Behe does not share their optimism. Rather, he argues that the data are more consistent with an ID explanation. He maintains that we have legitimate criteria (such as specified complexity) by which to detect design, and that an irreducibly complex system exhibits all of the characteristics these criteria are meant to detect. Because it is one of multiple possibilities, Darwinian algorithms cannot account for it. Furthermore, it involves numerous systems and sub-systems, and it contains patterns that a capable intelligence would have constructed if it intended to bring about certain functions in an organism. In short, it is contingent, complex, and specified.

b. The Fine-Tuning of The Universe For The
Existence of Human Life

As early as the 1960s, physicists announced that our universe appears to have been fine-tuned to support the possibility of human life. Since that time, this “anthropic coincidence” has been explained in multiple ways.¹³⁴ According to Stephen C. Meyer, these scientists “discovered that the existence of life in the universe depends upon a highly improbable but precise balance of physical factors. The constants of physics, the initial conditions of the universe, and many other of its features appear delicately balanced to allow for the possibility of life.”¹³⁵ Even minor changes to known constants such as the strength of gravitational attraction would have rendered human life impossible. Astrophysicist Hugh Ross estimated in 1998 that there are “twenty-nine characteristics of the universe that must be fine-tuned for any kind of physical life to be possible” and that our solar system possesses forty-five characteristics essential to maintain human life.¹³⁶ Given the individual and collective probabilities for these factors to arise by chance with precisely the correct values to enable human life, Ross theorized that there is “[m]uch less than 1 chance in one hundred billion trillion trillion trillion [that there] exists

133. Behe, *supra* note 127, at 569.

134. See, e.g., Stephen C. Meyer, *Evidence for Design in Physics and Biology*, in SCIENCE AND EVIDENCE FOR DESIGN IN THE UNIVERSE, *supra* note 117, at 53, 56-57; see also JOHN BARROW AND FRANK TIPLER, THE ANTHROPIC COSMOLOGICAL PRINCIPLE (1988); PAUL DAVIES, THE ACCIDENTAL UNIVERSE (1982); JOHN LESLIE, UNIVERSES (1989); K. Giberson, *The Anthropic Principle*, 9 J. INTERDISC. STUD. 63 (1997).

135. Meyer, *supra* note 134, at 56-57 (citations omitted).

136. Hugh Ross, *Big Bang Model Refined By Fire*, in MERE CREATION: SCIENCE, FAITH & INTELLIGENT DESIGN, *supra* note 6, at 363, 372.

. . . even one" planet on which life "would occur anywhere in the universe."¹³⁷ Physicist and Nobel laureate Arno Penzias similarly writes: "[A]stronomy leads us to a unique event, a universe which was created out of nothing, and delicately balanced to provide exactly the conditions required to support life. In the absence of an absurdly-improbable accident, the observations of modern science seem to suggest an underlying, one might say, supernatural plan."¹³⁸ Using Dembski's filter of specified complexity, ID proponents maintain that this conjunction of small probabilities and independent specificity warrants the inference of ID.¹³⁹ Like the irreducible complexity in biological systems as described by Michael Behe, the ability of the universe to support human life is sufficiently contingent, complex, and specified.

c. The Information Content of DNA

The information content of DNA can also be used to support the ID argument. According to Meyer, it is virtually impossible that unguided chemistry could produce the information-rich DNA molecule, which functions like a written text or machine code.¹⁴⁰ In the words of Darwinian Richard Dawkins, "The machine code of the genes is uncannily computerlike."¹⁴¹ Computer mogul Bill Gates agrees: "DNA is like a computer program but far, far more advanced than any software we've ever created."¹⁴² The information content of DNA therefore exhibits the requisite contingency, complexity, and specificity to warrant an ID inference.

d. The Fossil Record

Finally, some design theorists have argued that the fossil record fits better with a design hypothesis than with a Darwinian one. For, as

137. *Id.* at 381.

138. Dr. Arno A. Penzias, Remarks Upon Being Awarded the 1983 Joseph Handelman Prize in Science at the 57th Annual Convocation Jewish Academy of Arts & Sciences (May 11, 1983).

139. *See, e.g., Meyer, supra* note 134, at 58.

140. *See* Stephen C. Meyer, *DNA By Design: An Inference to the Best Explanation for the Origin of Biological Information*, 1.4 RHETORIC & PUB. AFF. 519-56 (1998); Stephen C. Meyer, *DNA and the Origin of Life: Information, Specification and Explanation*, forthcoming in *DARWINISM, DESIGN, AND PUBLIC EDUCATION*, *supra* note 107, and *DEBATING DESIGN: FROM DARWIN TO DNA*, *supra* note 108; Stephen C. Meyer, *The Explanatory Power of Design*, in *MERE CREATION: SCIENCE, FAITH & INTELLIGENT DESIGN*, *supra* note 6, at 113.

141. RICHARD DAWKINS, *RIVER OUT OF EDEN* 17 (1995).

142. BILL GATES, *THE ROAD AHEAD* 228 (rev. ed. 1996).

evolutionists admit, the record does not reveal gradual development from simple to more complex species, as predicted by Darwin.¹⁴³ Rather, in what is called the "Cambrian explosion,"¹⁴⁴ the record shows the sudden appearance of information-rich organisms within a hierarchical diversity of species at differing times with apparently no precursors. The body plans with their improbable arrangement of parts including the information content of their DNA and the irreducible complexity of their biological systems exhibit the characteristics of specified complexity. Hence, some design theorists employ the Cambrian explosion to challenge Darwinism as well as its leading naturalistic competitor, "punctuated equilibrium."¹⁴⁵

The philosophical infrastructure of evolution is based upon the following two propositions: (1) Although living beings appear to be designed, they have actually been fashioned by the unguided forces of natural selection (perhaps in combination with other natural, non-agent directed, processes, such as random change), and (2) Strictly material processes can account for the entire universe and all the natural entities in it without the need for any non-material agent, designer, or creator as an explanation for the natural universe as a whole or any part of it. Design theorists present a serious, sophisticated challenge to both of these assertions that can be summarized as follows:

- (A) If a given entity exhibits specified complexity, an inference of ID is warranted.
- (B) Specified complexity can be reliably detected by an explanatory filter (though that does not preclude the detecting of specified complexity by an analysis of the function of systems themselves, e.g., biological systems).
- (C) Specified complexity is illustrated by the irreducible complexity of some biological systems, the fine-tuning of the universe to support life, the information content of DNA, and the fossil record.

143. See, e.g., Niles Eldredge & Stephen Jay Gould, *Punctuated Equilibria: An Alternative to Phyletic Gradualism*, in *MODELS IN PALEOBIOLOGY* 82-115 (T.J. Schopf ed., 1972); Stephen Jay Gould & Niles Eldredge, *Punctuated Equilibrium Comes of Age*, 366 *NATURE* 223-27 (1993).

144. The Cambrian explosion refers "to the geologically sudden appearance of at least twenty animal body plans 530 million years ago." Stephen C. Meyer et al., *The Cambrian Explosion: Biology's Big Bang*, forthcoming in *DARWINISM, DESIGN, AND PUBLIC EDUCATION*, *supra* note 107.

145. See, e.g., MICHAEL RUSE, *THE DARWINIAN PARADIGM: ESSAY ON ITS HISTORY, PHILOSOPHY, AND RELIGIOUS IMPLICATIONS* 118 (1989); Meyer, *supra* note 144.

(D) Naturalistic theories (such as neo-Darwinism, chemical evolutionary theory, or the many worlds hypotheses) cannot account for the instances of specified complexity listed in (C).

(E) Thus, the only reason not to consider ID as the best accounting of organized complexity is a prior commitment to methodological naturalism (and the ontological materialism it entails).

(F) Given the above, there is no non-circular scientific or philosophical justification for excluding ID as a legitimate account of some natural phenomena.

III. *MCLEAN V. ARKANSAS*

McLean reviewed an Arkansas statute, Act 590 of 1981,¹⁴⁶ which mandated that “[p]ublic schools within this State shall give balanced treatment to creation-science and to evolution-science.”¹⁴⁷ Judge Overton employed the three-prong *Lemon* test in his analysis.¹⁴⁸ After specifically noting that deficiencies in the statute regarding even one prong would indicate a violation of the Establishment Clause,¹⁴⁹ he concluded that the Act failed all three prongs. Although his opinion also addresses several other issues,¹⁵⁰ we will focus only on Judge Overton’s application of the *Lemon* test.

Regarding the first prong (whether the law has a secular purpose), Judge Overton focused on the history and motivations of the statute’s proponents (and the history of the creation-evolution controversy generally) and the wording of the Act. He asserted that the Act’s origin could be traced back to the time of the *Scopes* trial, revealing a

146. Requirement for Balanced Treatment Act, ARK. CODE ANN. § 80-1663 (Cumulative Supp. 1985).

147. *McLean v. Arkansas Bd. of Educ.*, 529 F. Supp. 1255, 1256 (E.D. Ark. 1982).

148. The Supreme Court’s three-part *Lemon* test is used to determine whether a given policy or law violates the Establishment Clause. If a challenged policy or law passes this test, it is constitutional; however, it need only fail one prong of the test in order to be declared unconstitutional. First, the statute must have a secular legislative purpose; second, its principle or primary effect must be one that neither advances nor inhibits religion; and third, the statute must not foster “an excessive government entanglement with religion.” *Lemon v. Kurtzman*, 403 U.S. 602, 612-13 (1971) (citations omitted).

149. “It is under this three part test that the evidence in this case must be judged. Failure on any of these grounds is fatal to the enactment.” *McLean*, 529 F. Supp. at 1258.

150. Judge Overton identified four arguments—two proposed by each side—for which there was “no need to reach legal conclusions.” *Id.* at 1272-73. The plaintiffs asserted that (1) the word “balanced” in the Act was too vague, and (2) the Act violated the academic freedom of teachers. The defendants contended that (1) evolution is itself a religion and thus the teaching of it in public schools violates the free exercise rights of students, and (2) a sizable majority of Americans believe that creation science should be taught if evolution is taught. *Id.* at 1273-74.

historical context relevant to the interpretation of the Act's purpose.¹⁵¹ In addition, both the Act's author and its legislative sponsor¹⁵² "had publicly proclaimed the sectarian purpose of the proposal," the latter doing so "contemporaneously with the legislative process."¹⁵³ Moreover, Judge Overton continued, the Act's non-secular purpose can be detected from "the lack of any legislative investigation, debate or consultation with any educators or scientists" as well as "the unprecedented intrusion in school curriculum."¹⁵⁴ Although Judge Overton conceded that "courts should look to legislative statements of a statute's purpose in Establishment Clause cases and accord such pronouncements great deference"¹⁵⁵ and that "remarks by the sponsor or author of a bill are not considered controlling in analyzing legislative intent,"¹⁵⁶ he concluded that "courts are not bound . . . by legislative statements of purpose or legislative disclaimers."¹⁵⁷ He cited precedent authorizing use of the following factors to ascertain legislative intent: "evidence of the historical context of the Act,"¹⁵⁸ "the specific sequence of events leading up to passage of the Act, departures from normal procedural sequences,"¹⁵⁹ and "contemporaneous statements of the legislative sponsor."¹⁶⁰

In reference to the Act's wording, Judge Overton held that the

151. "The State of Arkansas, like a number of states whose citizens have relatively homogeneous religious beliefs, has a long history of official opposition to evolution which is motivated by adherence to Fundamentalist beliefs in the inerrancy of the book of *Genesis*." *Id.* at 1263 (citing *Epperson v. Arkansas*, 393 U.S. 97, 98-99 (1968)).

152. Act 590 was initially drafted by Paul Ellwanger, founder of Citizens for Fairness in Education. His interactions with clergy, politicians, and the press indicated that he was "motivated by his opposition to the theory of evolution and his desire to see the Biblical version of creation taught in the public schools," according to Judge Overton. Similarly, Senator James L. Holstead, who introduced the Act, was "a self-described 'born again' Christian Fundamentalist." *Id.* at 1262-63.

153. *Id.* at 1264. In a footnote, Judge Overton adds, "Senator Holsted testified that he holds to a literal interpretation of the Bible; that the bill was compatible with his religious beliefs; that the bill does favor the position of literalists; that his religious convictions were a factor in his sponsorship of the bill; and that he stated publicly to the *Arkansas Gazette* (though not on the floor of the Senate) . . . that the bill does presuppose the existence of a divine creator." *Id.* at 1263, n.14.

154. *Id.* at 1264.

155. *Id.* at 1263 (citing *Comm. for Pub. Educ. & Religious Liberty v. Nyquist*, 413 U.S. 756, 773 (1973); *McGowan v. Maryland*, 366 U.S. 420, 445 (1961)).

156. *Id.* (citing *United States v. Enmons*, 410 U.S. 396 (1973); *Chrysler Corp. v. Brown*, 441 U.S. 281, 311 (1979)).

157. *Id.* (citing *Stone v. Graham*, 449 U.S. 39 (1980); *Sch. Dist. of Abington Township v. Schempp*, 374 U.S. 203 (1963)).

158. *Id.* (citing *Epperson v. Arkansas*, 393 U.S. 97, 98-99 (1968)).

159. *Id.* (citing *Vill. of Arlington Heights v. Metro. Hous. Corp.*, 429 U.S. 252 (1977)).

160. *Id.* at 1263-64 (citing *Fed. Energy Admin. v. Algonquin SNG, Inc.*, 426 U.S. 548, 564 (1976)).

“evidence is overwhelming that both the purpose and effect of Act 590 is the advancement of religion in public schools.”¹⁶¹ In order to support this finding, he took a critical look at some of the Act’s language, particularly the definitions in Section 4:

(a) “Creation-science” means the scientific evidences for creation and inferences from these scientific evidences. Creation-science includes the scientific evidences and related inferences that indicate: (1) Sudden creation of the universe, energy, and life from nothing; (2) The insufficiency of mutation and natural selection in bringing about development of all living things from a single organism; (3) Changes only within fixed limits of originally created kinds of plants and animals; (4) Separate ancestry for man and apes; (5) Explanation of the earth’s geology by catastrophism, including the occurrence of a worldwide flood; and (6) A relatively recent inception of the earth and living things.

(b) “Evolution-science” means the scientific evidences for evolution and inferences from those scientific evidences. Evolution-science includes the scientific evidences and related inferences that indicate: (1) Emergence by naturalistic processes of the universe from disordered matter and emergence of life from nonlife; (2) The sufficiency of mutation and natural selection in bringing about development of present living kinds from simple earlier kinds; (3) Emergence by mutation and natural selection of present living kinds from simple earlier kinds; (4) Emergence of man from a common ancestor with apes; (5) Explanation of the earth’s geology and the evolutionary sequence by uniformitarianism; and (6) An inception several billion years ago of the earth and somewhat later of life.¹⁶²

Citing expert testimony from both plaintiff’s and defendant’s witnesses, the judge linked five of the six aspects of creation-science as defined in Section 4 to parallels in *Genesis*.¹⁶³ He then used this correlation to hold that the Act had no secular purpose and failed the first prong of the *Lemon* test.

Although Judge Overton’s application of *Lemon*’s first prong may have been appropriate for the Arkansas statute, it would be inapplicable to ID. First, ID is neither historically connected to *Scopes* nor is its literature replete, as is creationist literature, with recommended curricula that are transparently derived from *Genesis*.

161. *Id.* at 1264.

162. *Id.*

163. *Id.* at 1265 n.19. Judge Overton cites no parallel for Section 4(a)(2), yet its parallel may be inferred from the other five. Further, two expert witnesses for the plaintiffs, both noted evolutionists, agreed with this premise. *Id.* at 1267.

ID's intellectual pedigree is of a different order than the creation-science repudiated in *McLean*. As noted previously, the works of ID proponents have been published by prestigious academic presses and respected academic journals, attracting the attention of the wider academic and research community. Although many design theorists are theists, ID is promoted by individuals who span a wide range of religious beliefs.¹⁶⁴

Jay Wexler argues that ID has *some* historical connection to the creation-evolution controversy and therefore necessarily violates the Establishment Clause,¹⁶⁵ but that claim seems patently unreasonable. To hold so would make the genetic fallacy¹⁶⁶ a principle of constitutional jurisprudence. For if a historical connection of any sort, no matter how distant or loose, is sufficient to prohibit the teaching of a subject, then astronomy and chemistry ought also to be prohibited from public school classrooms since they are derived from the religiously-oriented practices of astrology and alchemy. After all, the *McLean* court emphasized the Arkansas statute's transparent connection to the book of *Genesis* and the contents of the previously repudiated statute in *Epperson* as well as the creation-evolution debate arising from the famous *Scopes* trial. The court was asking: How closely does the curricular content required by the statute parallel the creation story in *Genesis*, and does the statute proscribe curricular content because it is inconsistent with the creation story in *Genesis*? Therefore, if there were no essential differences between ID and creationism, the teaching of ID in public schools would not pass constitutional muster. ID is, however, substantially different than creationism even though it, like creationism, challenges the veracity of evolution. ID arguments do not require the book of *Genesis* as an explicit or implicit proposition. Unlike creationism, the principles of ID are not derived from, nor are they grounded in, any particular religion or its interpretation of a special revelation. They are, rather, the result of empirical facts (e.g., the structure of the cell), well-grounded conceptual notions (e.g., specified complexity and

164. H. Wayne House notes that the "contributors to the seminal volume, *MERE CREATION*, represent diverse theological beliefs, e.g., John Mark Reynolds (Eastern Orthodox), Jonathan Wells (Unification Church), David Berlinski (Judaism), and Michael Behe (Roman Catholic)." H. Wayne House, *Darwinism and the Law: Can Non-Naturalistic Scientific Theories Survive Constitutional Challenge?* 13.2 REGENT U. L R. 355, 403 (2000-01).

165. Wexler, *supra* note 9, at 465.

166. The genetic fallacy occurs when the *origin* of a given viewpoint, rather than its *merits*, is employed to dismiss it summarily, even though the origin of the idea is not a necessary condition for the soundness of the arguments for it.

irreducible complexity), and critical reflection. These subsequently serve as the basis from which one may infer that an intelligent agent is likely responsible for the existence of certain apparently natural phenomena. Granted, the conclusions inferred by these premises may be consistent with, and lend support to, a tenet or tenets of a particular belief system. But that, in itself, does not convert ID into creationism.

Although Judge Overton's analysis under the first *Lemon* prong would have justified his ruling, he also considered the second prong (whether the statute advances or inhibits religion) at some length. Aside from the second prong inquiry mentioned above, Judge Overton focused on two issues: (1) whether the Act was pedagogically sound, and (2) whether creation-science is really science. In response to the first, he again referred to specific language, arguing that Section 4(b), "as a statement of the theory of evolution . . . is simply a hodgepodge of limited assertions, many of which are factually inaccurate."¹⁶⁷ Further, he described the Act's two-model approach as "a contrived dualism," for there are not merely two options: creation-science and godless evolution.¹⁶⁸ Judge Overton concluded that Act 590 was not pedagogically sound. Interestingly, he also stated:

Although the subject of origins of life is within the province of biology, the scientific community does not consider origins of life a part of evolutionary theory. The theory of evolution assumes the existence of life and is directed to an explanation of how life evolved. Evolution does not presuppose the absence of a creator,¹⁶⁹ God and the plain inference conveyed by Section 4 is erroneous.

This statement is inconsistent with the literature,¹⁷⁰ probably because of the equivocation of the term "evolution." If all that is meant by evolution is that biological species adapt over time to changing environments and pass on those adaptations genetically to their offspring, even most creationists would not disagree with evolution. Judge Overton's assertion that the existence of God and evolution, if defined in this most unpretentious fashion, are not inconsistent is entirely correct. The evolution Judge Overton defines is neither what many people find objectionable nor what is actually affirmed by proponents of evolutionary theory. Instead, what is described in the literature as evolution is the methodological

167. *McLean*, 529 F. Supp. at 1267.

168. *Id.* at 1266.

169. *Id.* (footnote omitted).

170. *See supra* Part II.B.

naturalism that evolution presupposes and the ontological materialism it entails.

Although belief (in the popular sense of unproven opinion) in the existence of God is not logically inconsistent with materialism, the actual existence of God, where God is defined as the immaterial self-existent creator of all that exists, is necessarily and inherently incompatible with materialism. Materialism holds that the natural universe is all that exists and that all the entities in it can be attributed to strictly material processes without resorting to any designer, creator, or non-material entity as an explanation for any aspect of the natural universe or the universe as a whole. Given that materialist explanations are the only ones accorded the privilege of being called "knowledge" by naturalists who dominate the academy (while other explanations are pejoratively called "supernatural" or "miraculous" and dismissed summarily), to say that *belief* in God's existence is not inconsistent with naturalistic evolution is to imply that God is not really an object of knowledge. Thus, Judge Overton's claim (namely, that the existence of God is consistent with the truth of evolution) is coherent only if (1) he defines evolution in such a modest fashion that it is unobjectionable to even hard-line creationists or (2) he equates evolution with materialist metaphysics thereby defining belief in God in such a subjective fashion that God is not a proper object of knowledge.

To determine if creation-science constitutes "real science," Judge Overton relied heavily on the expert witnesses presented by the plaintiffs. He decided that creation-science is inconsistent with general descriptions of "what scientists think" and "what scientists do,"¹⁷¹ and the five "essential characteristics of science,"¹⁷² and, as such, cannot really be considered science. He noted:

The scientific community consists of individuals and groups, nationally and internationally, who work independently in such varied fields as biology, paleontology, geology and astronomy. Their work is published and subject to review and testing by their peers. The journals for publication are both numerous and varied. There is, however, not one recognized scientific journal which has published an article espousing the creation science theory.¹⁷³

Clearly, this criticism is inapplicable to design theorists, whose highly sophisticated arguments have been published by prestigious

171. *McLean*, 529 F. Supp. at 1268.

172. *Id.* at 1267.

173. *Id.* at 1268.

presses and academic journals, challenged in major universities and other institutions, and ultimately recognized by leading periodicals, both academic and non-academic. Moreover, eleven years after *McLean*, the Supreme Court held that "publication (or lack thereof) in a peer reviewed journal [is] a relevant, though not dispositive, consideration in assessing the scientific validity of a particular technique or methodology on which an opinion is premised."¹⁷⁴ The Court also noted that peer reviewed publication "does not necessarily correlate with reliability . . . and in some instances well-grounded but innovative theories will not have been published."¹⁷⁵ In *Daubert*, the Court rejected the widely held evidentiary standard established in *Frye v. United States*, that a scientific opinion is reliable and therefore admissible if it is generally accepted within the scientific community.¹⁷⁶ This, of course, does not mean that there are no standards by which to assess scientific opinion; rather, it means that polling scientists, though relevant, is no longer sufficient or necessary. According to the Court, "[p]roposed testimony must be supported by appropriate validation—i.e., 'good grounds,' based on what is known."¹⁷⁷ That is, "the requirement that an expert's testimony pertain to 'scientific knowledge' establishes a standard of evidentiary reliability."¹⁷⁸ This means that "the test of scientific legitimacy comes from the validation of the empirical research supporting the evidence."¹⁷⁹ It is, very simply, now a matter of arguments and their soundness, not a matter of popularity.

Judge Overton used the following definition of science, drawn from the work of Michael Ruse: "(1) It is guided by natural law; (2) It has to be explanatory by reference to natural law; (3) It is testable against the empirical world; (4) Its conclusions are tentative, i.e., are not necessarily the final word; and (5) It is falsifiable."¹⁸⁰ This definition offers a classic demarcation theory, a theory by which science can be distinguished from non-science. Judge Overton found that creation-science postulates non-natural explanations for the existence of the universe, life, and the immutability of species (violating points one,

174. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 594 (1993).

175. *Id.* at 593 (citations omitted).

176. *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923).

177. *Daubert*, 509 U.S. at 590.

178. *Id.*

179. David K. DeWolf et al., *Teaching the Origins Controversy: Science, Religion, or Speech?*, 2000 UTAH L. REV. 39, 77 (citing *Daubert*, 509 U.S. at 594).

180. *McLean*, 529 F. Supp. at 1267.

two, and three),¹⁸¹ relies exclusively on creationist writings (violating points one, two, and four),¹⁸² and is “dogmatic, absolutist and never subject to revision” (violating points four and five).¹⁸³ Thus, creation-science does not count as science.

Although based on the expert testimony of Ruse, Judge Overton’s reliance on a demarcation theory has been described as anachronistic.¹⁸⁴ Even scholars who agreed that creationism ought not to be part of public school science curricula were critical of this aspect of the opinion.¹⁸⁵ Ruse himself has subsequently tempered his views,¹⁸⁶ although it is difficult to say whether he has actually repudiated his Arkansas testimony.¹⁸⁷ For these reasons, as well as the

181. *Id.* at 1267-68.

182. *Id.* at 1268.

183. *Id.* at 1267-69.

184. Larry Laudan, *Commentary on Ruse: Science at the Bar—Causes for Concern, in CREATIONISM, SCIENCE, AND THE LAW: THE ARKANSAS CASE*, *supra* note 37, at 161, 166 (writing that the “[n]o one familiar with the issues can really believe that anything important was settled through anachronistic efforts to revive a variety of discredited criteria for distinguishing between the scientific and the non-scientific”). *But see* Michael Ruse, *Response to Laudan’s Commentary: Pro Judice*, in *CREATIONISM, SCIENCE, AND THE LAW: THE ARKANSAS CASE*, *supra* note 37, at 167.

185. *See, e.g.*, Philip L. Quinn, *The Philosopher of Science as Expert Witness*, in *BUT IS IT SCIENCE?: THE PHILOSOPHICAL QUESTION IN THE CREATION/EVOLUTION CONTROVERSY* 367, 384 (Michael Ruse ed., 1996) (maintaining that the expert testimony in *McLean* did not accurately represent “settled consensus of opinion in the relevant community of scholars”).

186. In 1993, Ruse stated the following:

And to a certain extent, I must confess, in the ten years since I performed, or I appeared, in the creationism trial in Arkansas, I must say that I’ve been coming to this kind of position myself. And, in fact, when I first thought of putting together my collection *But Is It Science?*, I think Eugenie [Scott] was right, I was inclined to say, well, yes, creationism is not science and evolution is, and that’s the end of it, and you know just trying to prove that.

Now I’m starting to feel—I’m no more of a creationist now than I ever was, and I’m no less of an evolutionist now that [*sic*] I ever was—but I’m inclined to think that we should move our debate now onto another level, or move on. And instead of just sort of, just—I mean I realize that when one is dealing with people, say, at the school level, or these sorts of things, certain sorts of arguments are appropriate. But those of us who are academics, or for other reasons pulling back and trying to think about these things, I think that we should recognize, both historically and perhaps philosophically, certainly that the science side has certain metaphysical assumptions built into doing science, which—it may not be a good thing to admit in a court of law—but I think that in honesty that we should recognize, and that we should be thinking about some of these sorts of things.

Michael Ruse, Speech at the Annual Meeting of the American Association for the Advancement of Science (Feb. 13, 1993) (transcript at <http://www.arn.org/docs/orpages/or151/mr93tran.htm> (last visited Feb. 1, 2003)).

187. *E.g.*, RUSE, CAN A DARWINIAN BE A CHRISTIAN?, *supra* note 24, at 101. Ruse claims that he was not providing the court with a prescriptive definition of science, but rather a descriptive one, that is, what scientists do and what scientists mean when they use the term “science.” He writes:

fact that this demarcation theory may be employed against design theory in a future case, I will summarize some of the problems with the court's analysis.

Judge Overton's demarcation theory is self-refuting. If the five characteristics listed are essential to science, then Overton's demarcation theory is itself not science, and thus, on its own grounds, ought not to be taught in public school classes or employed by public school educators, state legislatures, or judges as a means to distinguish science from non-science. After all, Overton's standard is not "guided by natural law," "explanatory by reference to natural law," or "testable against the empirical world." For it is a theory *about* science resulting, presumably, from thoughtful and sustained philosophical reflection. Its conclusions are not tentative, and it is not falsifiable, for it is being employed as the absolute standard by which to assess the scientific status of other theories. Further, if it were conceded that this theory may not be definitive, and is thus falsifiable, then there is no logical reason to insist on its retention. This theory could as easily be replaced by a different one, such as the one suggested by design theorists, which incorporates philosophical and scientific reasons to reject methodological naturalism and ontological materialism.

Alternately, if it were conceded that this demarcation theory is not scientific, but philosophical (and therefore a theory *about* rather than *of* science), then its supporters would necessarily be admitting that it is not inappropriate to use philosophical arguments when assessing the conceptual fruitfulness, empirical fitness, and rationality of a given scientific theory.¹⁸⁸ To do so would require that ID not be dismissed as unscientific simply because it does not presuppose the materialism presupposed in points one, two, and three of Judge

It would indeed be very odd were I and others to simply characterize "science" as something which, by definition, is based on a (methodologically) naturalistic philosophy and hence excludes God, and then simply leaving things like that. Our victory . . . would be altogether too easily won. We would indeed simply be ruling religion out by fiat. But this is not quite what is happening. . . . What is going on—what I was trying to do in Arkansas—is the offering of a lexical definition: that is to say, we are giving a characterization of the use of the term "science."

Id.

188. Laudan argues that external conceptual problems—namely, where two scientific theories are in tension, where a scientific theory is in conflict with the methodological theories of the scientific community, and where a scientific theory is in conflict with any component of the prevalent world view—affect the acceptance (or rejection) of scientific theories much more than is commonly recognized. See LARRY LAUDAN, *PROGRESS AND ITS PROBLEMS: TOWARD A THEORY OF SCIENTIFIC GROWTH* 54-64 (1977).

Overton's demarcation theory, for ID, at its core, challenges materialism as a philosophical but not scientific presupposition.

Judge Overton's criteria, at least as applied to creation-science, are seriously flawed.¹⁸⁹ Laudan denounces Judge Overton's demarcation theory—specifically, the final three components—as “of dubious merit.”¹⁹⁰ Despite Judge Overton's conclusions, Laudan indicates that creation-science does make empirical claims, including the following: the earth is relatively young, the geological features of earth are the result of Noah's flood, and the variability of species is limited. He continues, “[T]hese claims are testable [Judge Overton's requirement], they have been tested, and they failed the tests.”¹⁹¹ ID is similarly empirical as far as it attempts to explain certain phenomena in the natural world, and that empirical data may count against or for a design inference. Its inconsistency with naturalism, however, is not relevant to the quality of its arguments.

Similarly, Judge Overton's concern regarding the dogmatism of creation-science is misplaced, according to Laudan, since “[c]reationists do, in short, change their minds from time to time.”¹⁹² Even if Judge Overton referred only to creationism's three foundational assumptions (namely, that a Supreme Being created the universe out of nothing, that a worldwide flood occurred, and that humans did not descend from lower life forms), its resistance to theoretical modification is not unique in the history of science. “[H]istorical and sociological research on science,” Laudan points out, “strongly suggest that the scientists of any epoch likewise regard some of their beliefs as so fundamental as not to be open to repudiation or negotiation.”¹⁹³ He continues:

189. See, e.g., Laudan, *supra* note 184; Quinn, *supra* note 185; Stephen C. Meyer, *The Methodological Equivalence of Design and Descent*, in THE CREATION HYPOTHESIS, *supra* note 5, at 72.

190. Laudan, *supra* note 184, at 162.

191. *Id.* Laudan points out the irony of employing Overton's criteria to dismiss creation-science:

By arguing that the tenets of Creationism are neither testable nor falsifiable, Judge Overton . . . deprives science of its strongest argument against Creationism. Indeed, if any doctrine in the history of science has ever been falsified, it is the set of claims associated with “creation-science.” Asserting that Creationism makes no empirical claims plays directly, if inadvertently, into the hands of creationists by immunizing their ideology from empirical confrontation. The correct way to combat Creationism is to confute the empirical claims it does make, not to pretend that it makes no such claims at all.

Id.

192. *Id.* at 163.

193. *Id.*

Would Newton, for instance, have been tentative about the claim that there were forces in the world? Are quantum mechanicians willing to contemplate giving up the uncertainty relation? Are physicists willing to specify circumstances under which they would give up energy conservation? Numerous historians and philosophers of science (e.g., Kuhn, Mitroff, Feyerabend, Lakatos) have documented the existence of a certain degree of dogmatism about core commitments in scientific research and have argued that such dogmatism plays a constructive role in promoting the aims of science. I am not denying that there may be subtle but important differences between the dogmatism of scientists and that exhibited by many creationists; but one does not even begin to get at those differences by pretending that science is characterized by an uncompromising openmindedness.¹⁹⁴

Historian and philosopher Thomas Kuhn emphasizes that scientific investigation of any kind necessarily occurs within a paradigm or set of beliefs tacitly accepted by a community of scientists.¹⁹⁵ Only within such a framework can scientists conduct experiments, make predictions, and explain phenomena, processes which Kuhn calls "normal science." According to Kuhn, the chosen paradigm determines the nature of the problems that normal science can solve. Therefore, although individual experiments and predictions may succeed or fail, the paradigm must remain intact. Ultimately, the paradigm colors all of a scientist's perceptions (specifically, which problems are important).¹⁹⁶ Throughout history, scientific paradigms have not remained constant (e.g., from Newton to Einstein); Kuhn refers to these changes as "revolutionary science." Paradigm shifts, he notes, are typically preceded by the extended failure of problem solving within the existing paradigm, which results in a proliferation of alternate theories. The triumphant theory and its accompanying paradigm is therefore "a direct response to crisis."¹⁹⁷ This distinction between revolutionary and normal science is problematic for demarcation theories, however, since "more than one theoretical construction can always be placed upon a given collection of data."¹⁹⁸ In addition, Kuhn notes that when anomalies arise that appear to falsify the paradigm, scientists "will devise numerous articulations and *ad hoc* modifications of their theory in order to eliminate any

194. *Id.*

195. See Thomas S. Kuhn, *THE STRUCTURE OF SCIENTIFIC REVOLUTIONS* 10 (2d ed., 1970).

196. *Id.* at 1-51.

197. *Id.* at 75.

198. *Id.* at 76.

apparent conflict."¹⁹⁹ Supporters of ID could therefore plausibly argue that any resistance by normal science to ID is due to a prior commitment to the materialist paradigm, rather than a result of critical analysis of the arguments proffered by design theorists.

Laudan interprets Judge Overton's first two factors (defining science as "guided by natural law" and "explanatory in reference to natural law") to mean that "it is inappropriate and unscientific to postulate the existence of any process or fact which cannot be explained in terms of some known scientific laws."²⁰⁰ Yet, this argument mistakenly assumes "that an existence claim is unscientific until we have found the laws on which the alleged phenomenon depends."²⁰¹ Laudan refers to several historical examples:

Galileo and Newton took themselves to have established the existence of gravitational phenomena, long before anyone was able to give a causal or explanatory account of gravitation. Darwin took himself to have established the existence of natural selection almost a half-century before geneticists were able to lay out the laws of heredity on which natural selection depended. If we took the *McLean* opinion criterion seriously, we should have to say that Newton and Darwin were unscientific; and, to take an example from our own time, it would follow that plate tectonics is unscientific because we have not yet identified the laws of physics and chemistry which account for the dynamics of crustal motion.²⁰²

199. *Id.* at 78. Similarly, Paul R. Thagard describes the problem of determining in advance what would count as falsification, citing the work of Karl Popper, the most ardent defender of the falsification theory:

Popper himself noticed early that no observation ever guarantees falsification: a theory can always be retained by introducing or modifying auxiliary hypotheses, and even observation statements are not incorrigible. . . . Methodological decisions about what can be tampered with are required to block the escape from falsification. However, [Imre] Lakatos has persuasively argued that making such a decision in advance of tests is arbitrary and may often lead to overhasty rejection of a sound theory which ought to be saved by anti-falsificationist stratagems

Paul R. Thagard, *Why Astrology is a Pseudoscience*, in *INTRODUCTORY READINGS IN THE PHILOSOPHY OF SCIENCE* 66, 69 (E.D. Klemke et al. eds., 1980) (citations omitted). Popper's views can be found in *KARL POPPER, CONJECTURES AND REFUTATIONS: THE GROWTH OF SCIENTIFIC KNOWLEDGE* (1962). For more on Lakatos, see *IMRE LAKATOS, THE METHODOLOGY OF SCIENTIFIC RESEARCH PROGRAMMES* (1978). For an overview of the demarcation debates within philosophy of science, see *CRITICISM AND THE GROWTH OF KNOWLEDGE* (Imre Lakatos & Alan Musgrave eds., 1970); *W.H. NEWTON-SMITH, THE RATIONALITY OF SCIENCE* (1981).

200. Laudan, *supra* note 184, at 164 (quoting *McLean v. Arkansas Bd. of Educ.*, 529 F. Supp. 1255, 1268 (E.D. Ark. 1982)).

201. *Id.*

202. *Id.* Stephen C. Meyer makes a similar point when he writes that "insofar as both creationist and evolutionary theories constitute historical theories about past causal events, neither explains exclusively by reference to natural law." Stephen C. Meyer, *The*

For Laudan, theories such as creation-science should not be deemed unscientific merely because they cannot be reconciled with existing scientific laws; instead, they should only be rejected if there is insufficient evidence for them.²⁰³ As Scriven explains, historical sciences—geology, archeology, and paleontology—are not considered less scientific than chemistry simply because they do not rely on scientific laws to explain phenomena. Instead, it is uncontested that these disciplines, which reconstruct the past through rational inferences based on specific knowledge about particular entities, are science.²⁰⁴

Through his five-part test, Judge Overton concluded that creation-science was not science; further, because it was not science, it was necessarily religion. Thus, a statute promoting creation-science unconstitutionally promoted religion in violation of the second prong of the *Lemon* test.²⁰⁵ Finally, Judge Overton briefly evaluated the third *Lemon* prong (whether the statute fosters an excessive government entanglement with religion). He argued that “[t]here is no way teachers can teach the *Genesis* account of creation in a secular manner” given that creation-science is derived from the Bible.²⁰⁶ Any attempts to enforce this statute, he continued, would require monitoring of individual classrooms to verify that religious instruction was not occurring. Further, since it would require the State to remove religious references from possible curricula, it would “require State officials to make delicate religious judgments.”²⁰⁷ In Judge Overton’s words, “[t]hese continuing involvements of State officials in questions and issues of religion create an excessive and prohibited entanglement with religion.”²⁰⁸

Relationship of Science and Religion, in THE HISTORY OF SCIENCE AND RELIGION IN THE WESTERN TRADITION: AN ENCYCLOPEDIA 22 (Gary B. Ferngren et al. eds., 2002).

203. Laudan, *supra* note 184, at 165 (stating “The core issue is not whether Creationism satisfies some undemanding and highly controversial definitions of what is scientific; the real question is whether the existing evidence provides stronger arguments for evolutionary theory than for Creationism.”).

204. See Michael Scriven, *Causes, Connections, and Conditions in History, in PHILOSOPHICAL ANALYSIS AND HISTORY 238-64* (William H. Dray ed., 1966); see also Stephen C. Meyer, *DNA and the Origin of Life, supra* note 140.

205. Overton wrote: “Since creation science is not science, the conclusion is inescapable that the *only* real effect of Act 590 is the advancement of religion.” *McLean*, 529 F. Supp. at 1272. For a judge who decried “contrived dualism,” *id.* at 1266 (footnote omitted), this seems to be a textbook example of a contrived dualism. After all, because creation science is not science, it does not follow that it is religion. It could be both non-science and non-religion.

206. *McLean*, 529 F. Supp. at 1272.

207. *Id.*

208. *Id.* (citation omitted).

IV. CONCLUSION

In *McLean*, a federal district court struck down an Arkansas statute that required the public schools of Arkansas to offer a balanced treatment of evolution and creation. The court concluded that the statute failed every prong of the *Lemon* test; and since the statute had no secular purpose, Arkansas's ends were inappropriate (teaching a religious doctrine as part of public school curricula) and its means illegitimate (by requiring that creation be taught for the sake of "balance"). Even though *McLean's* reasoning may work well in rejecting the constitutionality of teaching creationism in public schools,²⁰⁹ it conceptually fails to address the challenge of Intelligent Design. Unlike the creationism rejected by the court in *McLean* and the Supreme Court in *Edwards*, ID cannot be repudiated as a political endeavor by Christian fundamentalists to indoctrinate schoolchildren to accept biblical literalism instead of science. Instead, the proponents of ID present a cluster of premises that are not derived from any single religion's special revelation.

Nevertheless, because these premises, if true, seem to support conclusions contrary to materialism, the worldview embraced by the evolutionary establishment, the ID movement offers the promise to open up a serious public conversation, without sectarian rancor or animus, on deep questions about who and what we are and the order and nature of things. These are questions that have been given, for the past several decades, exclusively materialist answers by our public institutions. Ironically, this call for an open and public conversation on such matters was suggested by the American Civil Liberties Union (ACLU) in its opposition to anti-evolution statutes in the 1920s, one of which was assessed in the famous *Scopes* trial: "The attempts to maintain a uniform orthodox opinion among teachers should be opposed. . . . The attempts of education authorities to inject into public schools and colleges propaganda in the interest of any particular theory of society to the exclusion of others should be

209. I do not mean that the *McLean* opinion assessed creationism correctly; I only mean that the reasoning of *McLean* which excludes creationism from public school classrooms would be ineffective if employed to prohibit the teaching of Intelligent Design in public schools on establishment grounds. Further, though design theory is constitutionally permissible, it does not follow that including it in a science curriculum is necessarily desirable as a matter of public policy. Those issues, although important, have not been considered within the scope of this article.

opposed.”²¹⁰ Amen.

210. THE AMERICAN CIVIL LIBERTIES UNION, *THE FIGHT FOR FREE SPEECH: A BRIEF STATEMENT OF PRESENT CONDITIONS IN THE UNITED STATES AND OF THE WORK OF THE AMERICAN CIVIL LIBERTIES UNION AGAINST THE FORCES OF SUPPRESSION* 17-18 (1921).

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