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Monkeying Around With the Establishment Clause and Bashing Creation-Science

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We dance 'round in a ring and suppose
But the Secret sits in the middle and knows.

Robert Frost

I. INTRODUCTION AND OVERVIEW

This article examines the nature of scientific creationism[1] and its educational value. Creation scientists and evolutionists study the origins of life, but their disagreements[2] produce controversies that radiate far beyond the scientific community. Controversies about the content of science courses in public schools are widely reported in the press and have become political footballs. The debates be-

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1. Creation-science or design-science can be compared and contrasted with "the single most important and unifying principle of modern biology," which is "[t]hat organisms have evolved rather than having been created." D. BROOKS & E. WILEY, EVOLUTION AS ENTROPHY: TOWARD A UNIFIED THEORY OF BIOLOGY at ix (1986).

Creation-science consists in part of "a collection of scientific data supporting the theory that the physical universe and life within it appeared suddenly and have not changed substantially since appearing." Edwards v. Aguillard, 107 S. Ct. 2573, 2592 (1987) (Scalia, J., dissenting) (citations omitted).

Scientific evidence supporting theories of sudden creation is derived *inter alia* from paleontological studies, comparative morphological studies, genetic studies, and includes molecular data from studies in biochemistry. *See* Brief for Appellants at A7-A40, *Edwards*, 107 S. Ct. 2573 (the appendix to appellants' brief includes affidavits that had been filed originally to support appellants' opposition to plaintiff-appellees' motion for summary judgment).

Creation-scientists agree with evolutionists that there are genetic variations that change the structure of living organisms, and that within limits there is evolution of species. For example, the evidence that moths, fruit flies and finches evolve as products of speciation is not gainsaid. What creation-scientists deny are broad statements that the appearance of all complex life forms can be explained by purely random interactions of natural forces. That is to say, creation-scientists believe that many, if not most, genera and families of organisms originate separately, and are not related genetically by ancestry. Brief for Appellants at A21, 107 S. Ct. 2573.

2. Creationists disagree with evolutionists who maintain that all living organisms are governed by fortuitous random mutations, genetic recombination and natural selection. *See infra* note 5 and Part IV.

The Supreme Court's motive inquiry as applied in *Edwards* is discussed in Part II of this article. The educational value of creation-science in discussed in Parts I, III, and IV.

tween Clarence Darrow and William Jennings Bryan, and their contemporary counterparts, are the themes of motion pictures and plays. There is enormous public interest in the battle that is portrayed by combatants on both sides as a fight involving not only academic freedom but good, evil, and truth.

The contending forces have convictions that apparently cannot be compromised, and there is hardly a spirit of collegiality among the scientists who lock horns with each other. The scientific community, by and large, rejects the very idea of creationism. Stephen Jay Gould, for example, dismisses the "kooky,"[3] creation-science concept as "self-contradictory nonsense"[4]—and those are his kindest words. Evolutionists[5]—at least those who write best selling books[6]—also reject scientific creationism,[7] alleging that it is the product of ignorance, dogma and religion, rather than science.

Creation-science,[8] contrary to its public image, is quite different from the religious doctrines of any fundamentalist sect.[9] Although several institutes of creation-science are directed by Christian fundamentalists,[10] many creation-scientists realize that a literal inter-

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3. S. GOULD, HEN'S TEETH AND HORSE'S TOES 253 (1983).

4. *Id.* at 256.

5. Evolution refers in part to "[t]he process by which all organisms have arisen by descent from a common ancestor." S. LURIA, S. GOULD & S. SINGER, A VIEW OF LIFE 767 (1981); *see also* T. DOBZHANSKY, F. AYALA, G. STEBBINS & J. VALENTINE, EVOLUTION 8 (1977) ("[S]ome of the most important evolutionary events have been increases in structural complexity . . . ."); F. AYALA & J. VALENTINE, EVOLVING: THE THEORY AND PROCESSES OF ORGANIC EVOLUTION 1 (1979) ("[M]illions of diverse living species we find around us in the modern world are all descended from a *common ancestor*.").

6. Science writer Isaac Asimov, on behalf of the American Civil Liberties Union, has publicly declared that the American Civil Liberties Union will challenge "every creationist statute in every state in which it is introduced." Letter from Isaac Asimov of ACLU to general public (Mar. 1982) *quoted in* Wendell R. Bird's Brief on behalf of Appellees at 515, *Edwards v. Aguillard*, 107 S. Ct. 2573 (1987) [hereinafter Bird's Brief].

7. The scientific conception of creation is not dependent on the religious doctrine of any sect. Therefore, there are no religious references in a proper presentation of creation-science. My notion of properly presented creation-science will be further developed throughout this article.

8. I have hyphenated creation-science throughout this article, except when quoting sources, because this usage was adopted by the Louisiana legislature when it enacted the Balanced Treatment for Creation-Science and Evolution-Science in Public School Instruction. LA. REV. STAT. ANN § 17:286.1 to -286.7 (West 1982).

9. The religious sounding name, creation-science, suggests that the Bible rather than scientific experimentation is the source of data describing life's origins. Litigators exploit the hyphenated name by constructing sophistic arguments based on negative myths. This forensic strategy outrages creation-scientists but wins cases. The idea is to convey unfairly the thought that creation-science necessarily entails discussion of a Creator (namely God) and *the* Creation in public schools.

10. *See generally* E. LARSON, TRIAL AND ERROR (1985). The Supreme Court has twice re-

pretation of the Bible cannot be scientifically validated,[11] and they recognize that the Bible[12] should be separated from creation-science courses that are *properly presented*[13] in the public schools.

In *Edwards v. Aguillard*,[14] the United States Supreme Court invalidated a statute[15] that required secular creation-science[16] instruction[17] whenever evolution was taught,[18] and vice-versa.[19] The Supreme Court has unfortunately reinforced the erroneous public perception of an inevitable and improper connection between reli-

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viewed the historical and contemporary antagonisms between the theory of evolution and religious movements when legislatures seek to subvert the influence of the theory of evolution in public schools. *Edwards*, 107 S. Ct. at 2481 nn.9-10; *see* Epperson v. Arkansas, 393 U.S. 97 (1968).

11. *See, e.g.*, D. YOUNG, CREATION AND THE FLOOD (1977).

12. The idea of the earth's relatively recent inception is not a major premise or an essential part of creation-science. Creation-scientists disagree with each other concerning the age of the universe and earth. I am not convinced that a properly presented course in creation-science may inform students that the earth is approximately six thousand years old, or that there was a world-wide flood.

13. Creation-science properly presented in public schools is not bibliocentric, and it does not deal with the supernatural in any religious sense. On the other hand, many contemporary theories of evolution-science are inherently agnostic, if not atheistic.

14. 107 S. Ct. 2573 (1987). Donald Aguillard, a high school biology teacher, sued as a citizen, taxpayer and teacher. *Id.* at 1 Joint Appendix C-5 [hereinafter the two volume Joint Appendix is cited either as 1 App. or 2 App.]. Most of the plaintiffs were parents, taxpayers, teachers' organizations, evolutionists, or religious groups (like the United Methodist Church and the Louisiana Interchurch Conference). 1 App., *supra*, at C-5-18. Plaintiffs were represented by advocates associated with the American Civil Liberties Union. *Id.* at C-29-30.

15. The statute held unconstitutional is entitled formally the Balanced Treatment for Creation-Science and Evolution-Science in Public School Instruction Act. LA. REV. STAT. ANN. §§ 17:286.1 TO -286.7 (WEST 1982) [hereinafter Balanced Treatment Act].

16. The definition of creation-science in the Balanced-Treatment Act is devoid of substance. The statute itself does not define what is meant by "creation" and it leaves unidentified the scientific evidence that supports statements in creation-science instructional materials. *Id.*

17. LA. REV. STAT. ANN. § 17:286.4 ("[P]ublic schools within this state shall give balanced treatment to creation-science and to evolution-science."). Public schools, however, were not required to provide instruction in the subject of origins. *Id.* § 17:286.5.

18. *See id.* § 17:286 ("This Subpart . . . simply permits instruction in both scientific models [of evolution-science and creation-science] if public schools choose to teach either.").

19. S. Res. 956 (1980), as originally introduced in the Louisiana Senate in June of 1980, was based on a model act adopted by the Arkansas legislature, which "[b]oth [in its] concepts and wording . . . convey[s] an inescapable religiosity." McLean v. Arkansas Bd. of Educ., 529 F. Supp. 1255, 1265 (E.D. Ark. 1982), *aff'd*, 723 F.2d 45 (8th Cir. 1983), *cited with approval in* Edwards v. Aguillard, 107 S. Ct. 2573, 2586 (1987) (Powell, J., concurring). The author of the model bill was motivated religiously as his correspondence dated September 9, 1980 indicates. *Id.* at 2582 n.14 (citing 2 App., *supra* note 14, at E-763-64). The sponsor subsequently secured legal advice, including that of Wendell R. Bird, Esq., and the Bill was redrafted in order to reflect the sincerely held secular purposes of the sponsor and the Louisiana legislature. Personal communication from Wendell Bird (August 7, 1987).

gion and creation-science. By focusing on legislative purposes,[20] the Court avoided the question of whether secular creation-science may ever be a required subject.[21] This article addresses that question.

In my judgment, legislatures may require students in public school to study competing scientific theories so long as required instructional materials in so-called creation-science refer to the same kind of evidence that is useful to evolutionists. Examples of such evidence include biochemical studies, data produced by molecular biologists, and the fossil record.

Appellees' lawyers in *Edwards* downplayed the extent to which many secular creationists have accepted evolution.[22] There are creation-scientists who have concluded that evolution accounts for possibly ninety-percent of the organisms that live or have lived on earth.[23] These scientists disagree with evolutionists mainly on the question of macroevolution, which deals with the gradual and random evolution of phyla (i.e., groups of organisms) above the species level.[24]

Macroevolution entails a mathematically improbable radical change in genetic codes that "begins with mutations in genetic molecules."[25] A vast amount of genetic information is required for an organism in one genus or family[26] to become a radically differ-

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20. *See infra* Part II (discussing the Court's purpose inquiry at length).

21. In this article, a shorthand reference to public schools refers, unless otherwise indicated, to public secondary and elementary schools.

22. Not all scientists regard creationism and evolution as mutually exclusive theories, and some scientists seek to create a synthesis of evolution and creation. Indeed, contemporary creation-science includes within it much of the evidence, inferences and theories of evolutionists. Brief for Appellants at G48 n.55, 107 S. Ct. 2573.

23. Kenyon, *The Creationist View of Biologic Origins*, NEXA JOURNAL, Spring 1984 at 34. Kenyon writes: "It is of course possible that new species, genera, and occasionally even families, may have arisen by natural means since the original creation provided that the new forms did not contain significantly more genetic information than their progenitors." *Id.* at 28.

24. The taxonomic category "species" refers to a group of similar organisms that can usually breed among themselves and produce offspring. Speciation, or the development of one or more species from an existing species, is not denied by creation-scientists.

25. R. CANN, *In Search of Eve*, THE SCIENCES 30, 33 (Sept.-Oct. 1987).

26. Genus is a taxonomic category used in the classification of organisms. A genus consists of similar or closely related species. Similar genera are grouped into larger categories called families. Brief for Appellants at G62, 107 S. Ct. 2573.

The concepts of genus and family are standard terms of biological classification. Some schools of classification (certain cladists) prefer to use the term "natural groups." In the 19th century, creation-scientists used the word "types" but now use genera or families in accordance with the INTERNATIONAL CODE OF ZOOLOGICAL NOMENCLATURE and THE INTERNATIONAL CODE OF BOTANICAL NOMENCLATURE.

ent genus or family. The quantity and quality of genetic information needed to transform a white moth into a brown one (microevolution) is much less than the genetic information needed to transform a quadruped creature with an ape-like brain into a highly cultured, intelligent human being.[27] Such radical phylogenetic[28] transformations (random macroevolution) are enormously improbable.[29]

Evolutionists admit they have been unable to describe with specificity the mechanics of the gene mutations that lead to increasingly complex, identifiable genera and families.[30] Evolutionists also admit that "substantial amounts of genetic change may not be subject to natural selection . . . ."[31] Nevertheless, some argue that organisms evolve through a random combination of causal links between an organism's gene potential and its capacity for reproductive success (i.e., selective survival in the environment where they are located).[32] Secular creationists, however, suggest that some organizing principle or operating agent (other than random mutation and natural selection) caused the original appearances of genera which have the genetic information that accounts for all the organisms' complex features.[33]

The creation-science paradigm[34] also includes secular theories of cosmic[35] and biochemical[36] design. Cosmic design theories refer to abrupt appearance of first life (perhaps a single-celled organism),

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27. *See infra* notes 152-70 and accompanying text.

28. Phylogeny refers to the evolutionary history of an organism or a group of related organisms.

29. *See infra* notes 193-208 and accompanying text.

30. *See infra* notes 192-95 and accompanying text.

31. S. GOULD, *supra* note 3, at 255.

32. I am indebted to Dr. William Woolcott, Chairman of the University of Richmond's biology department, for this argument.

33. C. THAXTON, W. BRADLEY & R. OLSEN, THE MYSTERY OF LIFE'S ORIGINS: REASSESSING CURRENT THEORIES 146 (1984).

34. Thomas Kuhn speaks of paradigms or models which help scientists "determine what will be accepted as an explanation and as a puzzle-solution" to a problem that attracts scientific interest. T. KUHN, THE STRUCTURE OF SCIENTIFIC REVOLUTIONS 184 (enlarged 2d ed. 1970).

35. Many, not all, evolutionists "speak of the evolution of the entire universe, the solar system, and the physical earth, apart from the organisms that inhabit it." T. DOBZHANSKY, F. AYALA, G. STEBBINS & J. VALENTINE, *supra* note 5, at 9.

36. Biochemical evolution is a term sometimes used to refer to "the hypothesis that life [on earth] began in an organic [prebiotic] soup . . . ." F. HOYLE, THE INTELLIGENT UNIVERSE: A NEW VIEW OF CREATION AND EVOLUTION 23 (1983). A discussion of the differences between cosmic and biochemical evolutionists and creationists is beyond the scope of this article.

while biochemical design theories refer to the abrupt appearance in complex form of galactic clusters, galaxies, stars, and the solar system. Evolutionists have theories of cosmic and biochemical evolution that are antithetical to creationist models. Both models presuppose many premises that are untestable. For example, there is no way to test or falsify the hypothesized conditions preceding the big bang, which is the starting point taken for granted by some evolutionists and creationists. Similarly, the composition of the prebiotic soup (possibly consisting in part of amino acids) has been presupposed by evolutionists rather than fully documented.

The Louisiana Balanced Treatment Act,[37] which was designed to provide a balanced secular presentation[38] of evolution and creation-science models, was *not* invalidated " 'because the underpinnings of creationism . . . [were not] supported by scientific evidence.' "[39] However, intimations that creation-science necessarily embodies religious belief were implicit in Justice Brennan's misleading opinion for the Court.[40] The Court stopped just short of holding that creation-science is not among the "scientific critiques of prevailing scientific theories . . . ."[41]

By and large, the Court's opinion reinforces the widespread impression that creation-science is an oxymoron.[42] The majority opinion also contains dicta[43] indicating that creation-science instruction has the primary effect of establishing religion in violation of the establishment clause.[44] The Supreme Court left the door open

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37. LA. REV. STAT. ANN. §§ 17:286.1 to -286.7 (West 1982).

38. The invalidated statute prohibited state schools, including state supported universities, from discriminating against persons who choose to teach creation-science along with evolution. *Id.* § 17:286.4(C). The legislation should have also prohibited discrimination against teachers of evolution, but this omission is understandable; there was not any evidence in the legislative history indicating that discrimination against evolutionists had been a problem in recent years.

39. Edwards v. Aguillard, 107 S. Ct. 2573, 2588 (1987) (Powell, J., concurring) (quoting Edwards v. Aguillard, 765 F.2d 1251, 1256 (5th Cir. 1985)).

40. 107 S. Ct. at 2582 (The Act "embodies the religious belief that a supernatural creator was responsible for the creation of humankind.").

41. *Id.*

42. Attorneys for Appellee Donald Aguillard called the Balanced Treatment Act an "oxymoronic marriage of 'creation' and 'science.' " Brief of Appellees at 25.

43. Justice Brennan reminds us that a challenged "statute's principal or primary effect must be one that neither advances nor inhibits religion . . . [and] must not result in an excessive entanglement of the government with religion." 107 S. Ct. at 2577 (citing Lemon v. Kurtzman, 403 U.S. 602, 612-13 (1971)).

44. U.S. CONST. amend. I. The first amendment's establishment clause obviously prohibits legislation that requires public schools to offer a science course that endorses a version of the Creation that is religious. Creation-science, properly presented, is not such a course.

for non-compulsory instruction in creation-science by properly motivated public schoolteachers,[45] but creation-science proponents who believe that students are entitled to a legislatively mandated balanced presentation[46] of competing scientific viewpoints are discouraged[47] by the *Edwards* Court's hostility.

II. A Case Study of Unduly Intrusive Motive Inquiry

A. *Is the Court or the Legislature Guilty of A Pretext?*

In *Edwards v. Aguillard*,[48] the Balanced Treatment Act did not survive the *Lemon v. Kurtzman*[49] test, which requires statutes *inter alia* to have "a secular legislative purpose."[50] The Supreme Court incorrectly stated that "the primary purpose of the Creationism Act[51] is to endorse a particular religious doctrine."[52] The Court's opinion did not distinguish between the purposes of the legislative body as a group and the purposes of its individual members, nor did it differentiate between the aims of special pleaders (including out-of-state meddlers) and the motives of legislative committee members, their constituents, and their witnesses.

Evolution-science, properly presented, is also not such a course. Obviously, evolution-science is not always properly presented.

45. The Court stated, "[T]eaching 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." 107 S. Ct. at 2583 (emphasis added). The emphasized word "might" raises a host of unanswered questions. For example, under what circumstances might creation-science be taught by teachers? Will the Court search the psyche of the teacher for telltale signs of improper motivation?

46. A balanced presentation is a course of instruction that compares fairly and contrasts the inferences drawn by evolutionists with those inferences drawn by creation-scientists. A legislature's definition of balanced treatment that seems fair follows: " 'Balanced Treatment' means providing whatever information and instruction in both creation and evolution models the classroom teacher determines is necessary and appropriate to provide insight into both theories in view of the textbooks and other instructional materials available for use in his classroom." La. Rev. Stat. Ann. § 17:286.3(1) (West 1982).

47. A state legislature considering a balanced treatment act must consider the high costs of defending such legislation in court. McLean v. Arkansas Bd. of Educ., 529 F. Supp. 1255 (E.D. Ark. 1982), *aff'd*, 723 F.2d 45 (8th Cir. 1983) (awarding attorney's fees to plaintiff).

48. 107 S. Ct. 2573 (1987).

49. 403 U.S. 602 (1971).

50. *Id.* at 612.

51. The Opinion of the United States Supreme Court often refers to the invalidated statute as the Creationism Act. This is akin to calling a law that requires the teaching of evolution the Atheistic Act. The Louisiana Act, as noted, is entitled the "Balanced Treatment for Creation-Science and Evolution-Science Act." La. Rev. Stat. Ann. § 17:286.1 (West 1982). Justice Scalia's dissenting opinion refers to the invalidated statute as the "Balanced Treatment Act." *Edwards v. Aguillard*, 107 S. Ct. at 2573, 2591 (1987) (Scalia, J. dissenting).

52. *Edwards*, 107 S. Ct. at 2583.

Justice Scalia smartly criticized "the Court's facile rejection of the Louisiana Legislature's stated purpose"[53] of "academic freedom."[54] His dissent demonstrated that the Court went astray by "stubbornly misinterpreting"[55] the stated secular purpose of the Act in order to hold that the academic freedom of teachers was not advanced.[56] The *Edwards* Court made the *Lemon* test more stringent by requiring legislation to have a secular purpose that is demonstrably furthered by legislatively mandated curriculum changes. In other words, a means-oriented test with bite has been introduced into the establishment clause line of cases.

The Court was unduly skeptical of the Louisiana Act's stated secular purposes. Perhaps some state legislators supported the Act solely for religious reasons, but the Court failed to identify many such persons. Moreover, contrary to the Court's view, "the literal interpretation of the Bible"[57] is *not* necessarily advanced by the scientific evidence[58] relied on by many creationists. Furthermore, the Court neglected to mention that virtually all creation-scientists admit that within species, there are dramatic genetic variations ("microevolution").[59]

The scientific evidence referred to by the Act[60] hardly advances spiritual values or stimulates religious enthusiasm.[61] For example,

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53. *Id.* at 2604 (Scalia, J., dissenting).

54. LA. REV. STAT. ANN. § 17:286.2 (West 1982) (This purpose was stated in the text of the Act).

55. *Edwards*, 107 S. Ct. at 2600. (Scalia, J., dissenting).

56. *Id.* The majority opinion leads the reader to think that the Louisiana legislature chose not to further the students' academic freedom because of amendments deleting that purpose from the Act. *See id.* at 2580 n.8. However, the deletion was made for the purpose of streamlining the statutory language; it was not intended to expunge from the record the Legislature's intention to expand the academic choices of students. *See infra* text accompanying notes 97-117. In any event, the Court held, for reasons not altogether clear, that the interest in advancing the students' academic freedom was not advanced. *Edwards*, 107 S. Ct. at 2580 n.8.

57. *Edwards*, 107 S. Ct. at 2581. The Court referred to the supporters of an Arkansas law as being motivated by other anti-evolution statutes—as if Louisiana and Arkansas legislators are fungible.

58. The information content of the double-helical structure of DNA may be a thing of beauty, but it does not suggest, let alone prove, that God almighty created Eve by taking from Adam's rib all or a portion of its encoded nucleotide sequence.

59. Brief for Appellants at A27, *Edwards*, 107 S. Ct. 2573 (affidavit of Dr. Morrow, a creationist biochemist).

60. The Balanced Treatment Act restricts expressly the presentation of creation-science to scientific evidence that describes the origins of life. LA. REV. STAT. ANN. § 17:286.3.4(A) (West 1982).

61. Nothing in the legislative history of the Balanced Treatment Act controverts the affiants' averments "that creation science is a strictly scientific concept that can be presented without religious reference." *Edwards*, 107 S. Ct. at 2592 (Scalia, J., dissenting).

when students read about the molecular dissymmetry of L-amino acids and D-sugars in the nucleic acids of organisms, they are not likely to sense the presence of the Holy Ghost.

The Act "did not fly through the Louisiana Legislature on the wings of fundamentalist religious fervor . . . ."[62] Even if fundamentalists generated the steam that led to the idea of balanced treatment in science courses, "Christian fundamentalists are quite entitled as a secular matter, to have whatever scientific evidence there may be against evolution presented in [public] schools."[63] The law is settled that "[a] decision respecting the subject matter to be taught in public schools does not violate the Establishment Clause simply because the material taught 'happens to coincide or harmonize with the tenets of some or all religions.' "[64] Nevertheless, according to seven Justices,[65] the Louisiana Act "employ[s] the symbolic and financial support of government to achieve a religious purpose."[66] The Court calls the legislation a "sham."[67] But the only sham was the Court's reading of the legislative history.

Justice Scalia, referring to the Court's intrusive and shameful purpose inquiry, notes that it has "made such a maze of the Establishment Clause that even the most conscientious governmental officials can only guess what motives will be held unconstitutional."[68] The well-documented dissent[69] demonstrates that "discerning the subjective motivation of those enacting a statute is . . . almost always an impossible task."[70] Moreover, to search for "*the sole purpose* of even a single legislator is probably to look for something

62. *Id.* at 2597 (Scalia, J., dissenting).

63. *Id.* at 2604.

64. *Id.* at 2594. (quoting Harris v. McRae, 448 U.S. 297, 319 (1980) (quoting McGowan v. Maryland, 366 U.S. 420, 442 (1961))).

65. Justice Brennan delivered the opinion of the Court, in which Justices Blackmun, Marshall, Powell, and Stevens joined. Justice O'Connor also joined the opinion, except for Part II, which describes the Court's extraordinary vigilance in cases involving impressionable school children. Justice O'Connor also joined in a separate concurring opinion filed by Justice Powell. Justice White, perhaps keeping his powder dry for the next case, filed a noncommittal concurring opinion. Chief Justice Rehnquist joined Justice Scalia's dissent. *Edwards*, 107 S. Ct. at 2575.

66. *Id.* at 2584.

67. *Id.* at 2600 (Scalia, J., dissenting).

68. *Id.* at 2605.

69. Justice Scalia's dissent compressed a remarkably large amount of information into each page.

70. 107 S. Ct. at 2605 (Scalia, J., dissenting).

that does not exist."[71] A lawmaker's motives are multifarious and, in many instances, "the secular and the spiritual are so tightly interwoven that they cannot be successfully separated."[72]

It is disappointing to see how the Court pretends to have the ability to discern the illicit motives[73] of a legislative body.[74] Yet, Justice Brennan, who frequently confesses his inability to discern the intent of the framers of the Constitution, drew upon "visceral knowledge"[75] to read the minds of the Louisiana legislators. Neither their "fervor or tepidity,"[76] nor their ulterior motives or ineffable urges[77] were disclosed by the fragments of legislative history cited by Justice Brennan.[78]

The Court obviously lacks a credible theory of psychology that can fathom the collective mental state of an entire assembly. Although unconstitutional legislative motivation has been confidently inferred in the past, "in most of these cases, . . . proof that the act was the product of an unconstitutional motivation was obviously overwhelming."[79] The problem for the *Edwards* Court was the overwhelming *lack of evidence* concerning the motivation of most, if not all, of the legislators. The Court, however, chose to rest its decision on improper motivation. This justification is designed to appeal to public opinion, which had already been conditioned to associate creation-science with religion. This strategy, however in-

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71. *Id.* at 2606.

72. Gianella, *Religious Liberty, Nonestablishment, and Doctrinal Development, Part I: The Religious Liberty Guarantee*, 80 HARV. L. REV. 1381, 1404 (1967).

73. If a clever legislator wants to sabotage an enactment, she might pretend that her motives were religious by making religious statements—calculated to deceive—during the legislative debate.

74. Justice Scalia produces a cogent summary of the reasons why subjective motive inquiry is usually an exercise in arrogant futility. *Edwards*, 107 S. Ct. at 2605-06 (Scalia, J., dissenting). For another plea in support of the abandonment of subjective motive inquiry, see Leedes, *Taking the Bible Seriously* (Review Essay), 1987 AM. B. FOUND. RES. J. 311, 314-15.

75. *Edwards*, 107 S. Ct. at 2591 (citing Aguillard v. Edwards, 778 F.2d 225, 227 (5th Cir. 1985) (Gee, J., dissenting) (Judge Gee was joined by five other circuit court judges in dissenting from the Fifth Circuit's denial of a rehearing en banc.)).

76. *Id.* at 2606 (Scalia, J., dissenting).

77. "The motivations of legislators include conscious and unconscious aspects of cognition and emotion, and large areas of their lawmaking activity cannot be regarded as intellectually motivated." Leedes, *supra* note 74, at 314.

78. Justice Scalia, of course, concedes that it is "possible to discern the objective 'purpose' of a statute (*i.e.*, the public good at which its provisions appear to be directed), or even the formal motivation for a statute where that is explicitly set forth . . . ." *Edwards*, 107 S. Ct. at 2605 (Scalia, J., dissenting).

79. J. ELY, DEMOCRACY AND DISTRUST: A THEORY OF JUDICIAL REVIEW 139-40 (1980).

tellectually dishonest, is politically safer and more effective than a strategy which employs a case by case approach to enjoin individual teachers who inject religious materials and religious speculation into their scientific presentations.

Justice Scalia stated, "[w]e cannot say that on the evidence before us in this summary judgment context . . . that 'creation-science' is [or is not] a body of scientific knowledge rather than revealed belief."[80] The Court, however, let the summary judgment stand[81] in light of the specific sequence of events that led to the passage of the Act,[82] and because of several indications of legislative intent supposedly found in the Joint Appendix.[83]

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80. *Edwards*, 107 S. Ct. at 2604 (Scalia, J., dissenting).

81. The district court awarded summary judgment in favor of the plaintiffs and the judgment was affirmed on appeal. Aguillard v. Treen, 634 F. Supp. 426 (E.D. La.), *aff'd sub. nom.* Edwards v. Aguillard, 765 F.2d 1251 (5th Cir. 1985), *aff'd*, 107 S. Ct. 2573 (1987). The appeals presented several relevant issues of law that should not have been resolved on a motion for summary judgment because the scientific validity of creation-science was contested. Indeed, the material facts, concerning the nature of creation-science (as spelled out in Plaintiffs' Complaint and Affidavits), were not contradicted by responsive affidavits or pleadings. Therefore the remaining controverted facts should have been resolved against the party seeking summary judgment.

82. The Court referred generally to "a historic and contemporaneous link between the teachings of certain religious denominations and the teaching of evolution." *Edwards*, 107 S. Ct. at 2580-81. Although the Court did not document how this "contemporaneous link" connected with the Louisiana legislation, its opinion refers to " 'fundamentalist' religious fervor." *Id.* at 2581 (quoting Epperson v. Arkansas, 393 U.S. 97, 98 (1968)). This "fervor" was not evident in the legislative history printed in the Joint Appendix filed with the Court.

The Court's intrusive motive inquiry is a departure from its normal deference to formal expressions of legislative purposes. *See, e.g.*, Committee for Pub. Educ. & Religious Liberty v. Regan, 444 U.S. 646, 654 (1980); Meek v. Pittenger, 421 U.S. 349, 363, (1975); Levitt v. Committee for Public Educ. & Religious Liberty, 413 U.S. 472, 479-80 n.7 (1973); Lemon v. Kurtzman, 403 U.S. 602, 613 (1971); Board of Educ. v. Allen, 392 U.S. 236, 243 (1968). The Court does not usually presume that the sole purpose of a law is to advance religion merely because it was supported by adherents of certain religious sects or denominations. *See* Walz v. Tax Comm'n, 397 U.S. 664, 670 (1970).

Justice Powell also suggested a link between the Louisiana legislation, in its original form (before amendments), and an Arkansas statute (references to evidence of a worldwide flood). *Edwards*, 107 S. Ct. at 2586-87 n.3 (Powell, J., concurring). The rough draft of the original bill introduced during the 1980 session of the Louisiana Legislature was drafted by the same person who drafted the Arkansas law. However, within a week of the first legislative hearing on May 28, 1981, the Bill's references to a flood were deleted immediately and unanimously. The deletions were made because "[w]hoever drafted [this] bill evidently had this list and put these in," *Edwards*, 107 S. Ct. at 1 App. E-438, and they "ought to be excluded" and "ought not have been included." *Id.* No one objected to the amendments, and they were supported by the sponsor, Senator Keith, and three of the State's expert witnesses who were present.

83. For example, the Court referred to correspondence between the Act's legislative sponsor, Senator Keith, and the author of a model bill similar to the first draft of the Louisiana Bill. *Edwards*, 107 S. Ct. at 2582 n.14. There is no indication that this correspondence was

Because of the summary judgment, a trial record disclosing evidence supporting the secular basis of creation-science was unavailable. Like the courts below, the Court seemed to be less than completely informed about the secular nature of *a properly presented model of creationism.* Instead of educating the nation about the nature of creation-science, the Court "on the gallop"[84] reinforced a stereotype: that only ignorant or rigidly dogmatic people seriously challenge theories of evolution.[85]

The Court is "particularly vigilant in monitoring the Establishment Clause in elementary and secondary schools"[86] because school children are impressionable. Indeed, children are impressed when a biology teacher states that the hypothesis of evolution is corroborated beyond a reasonable doubt.[87] To the extent this factual assertion is not criticized, questioned, or qualified by supplemental instructional materials, students are being propagandized.

Contrary to the Court's suggestion, the Act does not simply discredit " 'evolution by counterbalancing its teaching at every turn with the teaching of creation science' . . . ."[88] The Act also requires the teaching of evolution whenever creation-science is taught. Therefore the Act counterbalances creation-science just as much as it counterbalances evolution. The legislation does not require "restructur[ing] the science curriculum to conform with a particular religious viewpoint,"[89] and yet the Supreme Court managed to impute bad faith to the legislators.[90]

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disclosed to other members of the Louisiana's legislature, and there is no evidence that Keith relied on the advice of this out-of-state meddler.

84. *Id.* at 2592 (Scalia, J., dissenting).

85. The Court's opinion gives readers the impression that the "legislation's stated purpose must be a lie" because "no one could be gullible enough to believe that there is any real scientific evidence" that contradicts the theory of evolution. *Id.* at 2604 (Scalia, J., disssenting).

86. *Id.* at 2577.

87. Teachers Manuals, which supplement the textbooks distributed in biology classes in Louisiana's public schools, instruct school teachers to stress evolution at the expense of any competing theories; these competing theories do not get mentioned in most high school text books. *See generally* Bird's Brief *supra* note 6.

88. *Edwards*, 107 S. Ct. at 2580 (quoting Edwards v. Aguillard, 765 F.2d 1251, 1257 (5th Cir. 1985)).

89. *Edwards*, 107 S. Ct. at 2582. The court of appeals also erroneously concluded that the Balanced Treatment Act is a "law respecting a *particular* religious belief." *Edwards*, 765 F.2d at 1257 (emphasis added).

90. However, Justice Scalia wrote, "[t]he people of Louisiana, including those who are Christian fundamentalists, are quite entitled, as a secular matter, to have whatever scientific evidence there may be against evolution presented in their schools just as Mr. Scopes was entitled to present whatever scientific evidence there was for [evolution]." *Edwards*, 107 S. Ct. at 2604 (Scalia, J., dissenting).

The Act, on its face, did not prohibit the teaching of evolution. Instead, it provided that both evolution or creation-science, if offered, had to be taught as theories, not facts.[91] Of course, statements in textbooks and by teachers about origins trigger conjectures about the agents of creation and its ultimate causes.[92] Statements of evolutionists also provoke religious questions when they write, for example "[w]e are here for a reason . . . that . . . lies in the mechanics of engineering rather than in the volition of a deity."[93] Although science is value neutral, scientists, including evolutionists, are not.

Evolutionists refer to various mathematically improbable[94] processes: natural selection, gene rates, genetic drift, and intrinsic preadaptability. Properly presented creation-science steers clear of such speculation. It does not identify ultimate or transcendent agents of creation, natural or supernatural, external to or intrinsic within any organism. Legitimate creation-science has a much narrower scope—well within the confines of demonstrable empirical data.[95] Unfair critics, however, never cease placing psuedo-science and creation-science in the same category of bogus learning.

B. *The Witnesses' Testimony According to the Court*

Creation-science, if properly presented to students, does not refer to deities described by religious materials. Moreover, creation-science does not involve a moral code, nor spiritual fulfillment; nor does it necessarily inspire religious feelings such as a sense of guilt, adoration, or other forms of devotion. Nevertheless, when Justice Brennan uses the word supernatural in *Edwards*, he always seems to be referring to an object of religious veneration.

The Court in *Edwards v. Aguillard* concluded that creation-science presupposes a superhuman creator. Of course, the concept of

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91. LA. REV. STAT. ANN. § 17:286.4(A) (West 1982).

92. Parts III and IV of this article cite scholarly materials that refer to the scientific evidence relied on by creation-scientists. *See infra* text accompanying notes 118-219. This is basically the same data relied on by evolutionists. The evidence has educational value and is quite unlike the unscientific evidence that supports religious doctrine.

93. *See* S. GOULD, THE PANDA'S THUMB 139 (1980).

94. Brief for Appellants, at A-27, *Edwards*, 107 S. Ct. 2573 (Affidavit of Dr. Morrow); *see also* T. DOBZHANSKY, F. AYALA, G. STEBBINS & J. VALENTINE, *supra* note 5, at 5, 125, 157 (listing other speculative factors relied on by evolutionists to "prove" their theories).

95. Creation-science does not rely on supernatural explanations, but only upon scientific evidence. *See supra* notes 16 and 60.

creation, in science as in religion, logically implies a creative agent. But, creation-scientists do not claim to have sufficient empirical evidence as to any characteristics of the first cause. In short, to the extent that practitioners of creation-science posit a creator, its name and nature are topics that lie outside the realm of their pedagogy in public high schools.

Presumably, a legislature can distinguish between religious and scientific materials. This distinction is necessary if creation-science is to be properly presented in public schools. Had there been a trial in *Edwards*, rather than a summary judgment, the trial record might have indicated how local school boards were planning to implement the Louisiana Balanced Treatment Act. Then, the courts would have been in a better position to determine whether lesson plans successfully separated science from religion. In lieu of a trial record, the Justices chose to rely on selected fragments of legislative history to ascertain whether the legislature was improperly motivated. This legislative history was improperly distorted by the Court.

The Court, often citing the Joint Appendix, stated that "[t]he preeminent purpose of the Louisiana legislature was clearly to advance the religious viewpoint that a supernatural being created humankind."[96] Justice Brennan wrote,

> Senator Keith's leading expert on creation-science, Edward Boudreaux, testified at the legislative hearings that the theory of creation-science included belief in the existence of a supernatural creator. Senator Keith also cited testimony from other experts to support the creation-science view that "a creator [was] responsible for the universe and everything in it." The legislative history therefore reveals that the term "creation science," as contemplated by the legislature that adopted this Act, embodies the religious belief that a supernatural creator was responsible for the creation of humankind.[97]

This is untrue and Justice Brennan's conclusory statements lack a foundation in the record. For example, Justice Brennan mixed up his page references[98] when he wrote that Boudreaux testified "life

96. *Edwards v. Aguillard*, 107 S. Ct. 2573, 2581 (1987).

97. *Id.* at 2581-82 (citations and footnotes omitted).

98. In the Joint Appendix, the transcribed material that appears in 1 App. at E-421-22 is Senator Keith's report of a statement made by Nobel Prize winner, Sir John Echols. Therefore, it does not support Justice Brennan's argument.

was 'created by an intelligent mind.' "[99] The Joint Appendix indicates that the quoted words were not uttered by Boudreaux.[100] They were the words of Senator Keith who was quoting a Nobel Prize winner as follows:

> Sir John Echols, in 1963 was talking about the possibility, the probability of evolution and . . . he said that . . . the *improbability of life not being created by an intelligent* mind [is] 400 thousand trillion, trillion, trillion to one. This is [also] what creation scientists are trying to tell us today.[101]

Keith only referred to Echols because he was concerned about the relevance of mathematics, whereas Justice Brennan, who mistakenly thought he was quoting Boudreaux, was intent upon showing that Keith's witness was concerned about God. Other bizarre mistakes are evident throughout the Court's slanted opinion.

C. *The Secular Purpose of the Balanced Treatment Act*

Justice Brennan's fallacious argument "proving" that no secular purpose was advanced by the Louisiana statute followed a familiar pattern of legal reasoning. First, certain purposes cited by the state legislature or its attorneys are arbitrarily ruled out as inefficacious, yet other efficacious purposes are ignored. Finally, by process of elimination, an improper purpose is isolated and deemed preeminent.[102]

The inefficacious secular purpose, in the Court's judgment, was the academic freedom of teachers. The Court leaves the impression that the legislation expressly refers to the academic freedom of teachers while excluding the students' freedom of choice. However, the stated purpose of the statute does not refer solely to the academic freedom of teachers. On the contrary, the legislative history demonstrates overwhelmingly that the beneficiaries of this academic freedom included the schoolchildren.[103] The Court's distortion, with all due respect, is outrageous.

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99. *Edwards*, 107 S. Ct. at 2581.

100. 1 App., *supra* note 14, at E-421-22.

101. *Id.* (emphasis added).

102. *Cf.* Eisenstadt v. Baird, 405 U.S. 438 (1972). This technique, often disingenuously applied, was exposed and cogently criticized in Note, *Legislative Purpose, Rationality, and Equal Protection*, 82 YALE L.J. 123 (1973).

103. A witness, Dr. Kent, who opposed the bill acknowledged that the purposes of the bill include the protection of academic freedom "by providing student choice." 1 App., *supra* note 14, at E-380.

Justice Scalia's dissent cites numerous references sufficient to convince a reasonable reader that prima facie, the preeminent purpose of the statute is inextricably intertwined with the legislature's desire to protect the "*students'* freedom from *indoctrination.*"[104] Justice Scalia's accurate references to the record can be supplemented with many others. For example, on July 10, 1981, the President of the Senate signed the Balanced Treatment Act—officially described in part as an Act "to protect academic freedom by providing student choice . . . ."[105] Morris, a witness for the state, testified, "[n]ow, are we going to . . . deny students an opportunity to hear another viewpoint? Normally in science books . . . at least two viewpoints are presented. This is not the case in the textbooks that are used in the public school systems in the State of Louisiana."[106] Young, another witness, stated, "[w]e want to give the children here in this state an equal opportunity to see both sides of the theories."[107]

Professor Kalivoda of Louisiana State University testifed that he wanted the legislature "to determine whether children will . . . be handicapped educationally by having little or no information about creation [science]."[108] Kalivoda thought it was "reprehensible for anyone who claims to be a scientist or an educator to limit the information from a view that might attack his own view."[109] He added, "I am interested in communication of the truth, so that our children won't be brainwashed by one point of view."[110]

On the question of academic freedom, Keith, the sponsor, stated, "one of the basic reasons" for favoring the balanced treatment concept was to provide a "choice" for the students without "censorship."[111] Keith agreed that "the Genesis account is not a scientific account."[112]

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104. Edwards v. Aguillard, 107 S. Ct. 2573, 2601 (1987) (Scalia, J., dissenting).

105. 2 App., *supra* note 14, at E-747.

106. *Id.* at E-514. Other remarks of Morris are cited by Justice Scalia. *Edwards*, 107 S. Ct. at 2603 (Scalia, J., dissenting).

107. 2 App., *supra* note 14, at E-516-17.

108. 1 App., *supra* note 14, at E-79.

109. *Id.* at E-81.

110. *Id.* at E-82.

111. *Id.* at E-283.

112. *Id.* at E-282.

In his final presentation, Keith stated:

> [T]here has been a lot of misrepresentation about what scientific-creationism really is . . . . For instance, some people try to make it a religion versus science conflict, and that's simply not true . . . . Therefore, what we will attempt to establish today is that there is a body of scientific evidence, a body of scientific data called scientific-creationism that is totally apart and separate from the Bible.[113]

Keith called no pastors to testify on behalf of his bill. He stated, "I do not think [it is] a religious issue. I think [that] it is a scientific issue and I believe that it does great wrong to try and make this a religious issue."[114] Yet Justice Brennan, acting as an over-zealous advocate rather than as an impartial judge, selects from the record materials that convey a different impression.[115]

After carefully reviewing the evidence, Justice Scalia concludes that "the Court today plainly errs in holding that the Louisiana Legislature passed the Balanced Treatment Act for exclusively religious purposes."[116] Justice Scalia also argues that the Court's methods and sources for discerning legislative motivation are "eminently manipulable."[117] The Court's contentious use of the legislative history proves his point.

III. TRASHING CREATION-SCIENCE

The Court in *Edwards v. Aguillard* was aware of the reputation of creation-science in the scientific community. It varies between very poor and unprintable.[118] Well-known television personalities like Stephen Jay Gould, allege that "creationism is a mere stalking horse . . . in a political program that would . . . erase the political and social gains of women . . . and reinstitute all the jingoism and distrust of learning that prepares a nation for demagoguery."[119] Gould concludes that "[f]or all their talk about weighing both sides

113. 2 App., *supra* note 14, at E-491-93.

114. 1 App., *supra* note 14, at E-417.

115. Justice Scalia politely engaged in an understatement when he wrote, "[w]e cannot accurately assess whether this purpose [academic freedom] is a 'sham' . . . until we first examine the evidence presented to the legislature far more carefully than the Court has done." *Edwards v. Aguillard*, 107 S. Ct. 2573, 2597 (1987) (Scalia, J., dissenting) (citations omitted).

116. *Id.* at 2600 (Scalia, J., dissenting).

117. *Id.* at 2606.

118. S. GOULD, *supra* note 3, at 275.

119. *Id.* at 275 (some of Professor Gould's own demagoguery is deleted by the ellipses).

(a mere question of political expediency), [creationists] would also substitute biblical authority for free scientific inquiry as a source of empirical knowledge."[120]

Gould alleges that creationists engage in "willful misquotation to impart a 'scientific patina' to creationism."[121]Much of this rhetoric is untrue. It is false to allege that "the creationists have presented not a single new fact or argument"[122] since the Scopes trial of 1925.[123] Gould makes it appear that contemporary creation-science exists in order to justify the ideas about special creation held by William Jennings Bryan, whom Clarence Darrow called "the idol of all Morondom."[124] Although Darrow's ad hominem attacks[125] have outlived their usefulness, creation-science is still confused with the fundamentalism of Bryan whose expertise in scientific matters was hardly superior to that of the apes he abhorred as putative ancestors.

Creation-science is not wholeheartedly embraced by most Christian fundamentalist sects. Of course, any criticism of evolution pleases those who take the Bible literally. Gould, a highly paid expert witness for groups who use the courts when their legislative lobbying efforts fail, conveniently conflates any criticism by creation scientists with its religious implications. Gould knows very well that " '[t]he fact that an idea emanates from a particular class, or accords with their [religious] interests . . . proves nothing as to its truth or falsity.' "[126]

Gould wants school children to believe evolution is a fact, but even he states that evolutionists "have often been dogmatic and elitist"[127] and he admits that they gladly accept the benefits that scientists derive by "appearing as a new priesthood."[128] Gould writes that "[t]heories are structures of ideas that explain and in-

120. *Id.* at 276.
121. *Id.* at 275.
122. *Id.* at 253.
123. *See* unedited trial transcript reprinted in T. STEWART & A. HAYS, THE WORLD'S MOST FAMOUS COURT TRIAL: STATE OF TENNESSEE V. JOHN THOMAS SCOPES (1971); *see also* Scopes v. State, 154 Tenn. 105, 289 S.W. 363 (1926).
124. C. DARROW, THE STORY OF MY LIFE 249 (1932).
125. Critical advocates, like the American Civil Liberties Union, usually fail to note that the classical Darwinism defended by Darrow is now discredited by most modern theories of evolution.
126. S. GOULD, *supra* note 93, at 68 (quoting Karl Kautsky's defense of socialism).
127. S. GOULD, *supra* note 3, at 261.
128. *Id.*

terpret facts"[129] and admits that evolutionists should make no claim that their current theories are perpetually true,[130] and yet he dogmatically asserts that "human beings evolved from apelike ancestors."[131] This assertion needs to be further documented, qualified, and criticized and subjected to further study. The picture of evolution that is actually supported by the evidence is far less clear than that presented to many impressionable school children.[132]

Gould maintains that *Australopithecus afarensis* (hereinafter called "Lucy," a sixty-pound erect-walking creature with an apelike brain and palate) is an ancestor of *Homo Sapiens* (man).[133] However, many other experts, including Richard Leakey, disagree.[134] Indeed, anthropologists do not agree on the details of australopithecine evolution, or many other so-called facts of evolution.[135] There are "no securely known fossils on the *Homo* line from . . . between about 3.0 million and about 2.0 million [years ago]. What was in there?," asks Dr. Johanson, the finder of Lucy.[136] Dr. Johanson admits that when new fossils are found, concerned experts frequently go "back to the drawing board."[137]

Much of Gould's writings before 1980, as well as those of every other evolutionist, have to be reconsidered in light of the flow of new evidence produced by sophisticated biochemical techniques. Although Gould himself persuasively demolishes many venerated concepts of classical Darwinism and neo-Darwinism,[138] his own ideas are not accepted by the majority of scientists. Indeed, the consensus among evolutionists is disintegrating.[139] Gould admits that many of his colleagues are muting their own internal debate and "trade secrets"[140] out of concern that they are providing too

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129. S. GOULD, *supra* note 3, at 254.

130. *Id.* at 255.

131. *Id.* at 254.

132. R. CANN, *supra* note 25, at 30-32.

133. In this article, the general term "man" is used to include both males and females of the genus *homo*.

134. D. JOHANSON & M. EDEY, LUCY: THE BEGINNINGS OF HUMANKIND 305 (1981).

135. R. CANN, *supra* note 25, at 32.

136. D. JOHANSON & M. EDEY, *supra* note 134, at 305.

137. *Id.*

138. Neo-Darwinism is referred to by Gould "as a reigning if insecure, orthodoxy. Contemporary neo-Darwinism . . . united the theory of population genetics with the classical observations of morphology, systematics, embryology, biogeography, and paleontology." S. GOULD, *supra* note 93, at 186.

139. If there was not a rival paradigm, like creation-science, evolutionists would have to invent it—for only in their opposition to creationism are they united.

140. Gould, *Evolution's Erratic Pace*, NAT. HIST., May 1977, at 12, 12.

much information that gives aid and comfort to their antagonists.[141] Muting debate and concealing trade secrets is contrary to the spirit of science. Since the Enlightenment, the very idea of science has implied an untrammeled exchange of ideas. But, dogmatic evolutionists do not want the schools to present the critiques that are written by creation-scientists.

Evolutionists have no moral or legal right to close off debate about origins, and scientists normally do not control social, educational and political policymaking. But if the communal and constitutional balance between competing interests and theories must be struck by a legislature (and ultimately a court), the dominant view of scientists is but one factor among many to be weighed by a state legislature that has the power to accord weight to the minority views of creation-scientists.

Gould correctly points out that the creationist program must do more than criticize the shortcomings of evolutionary theory; they must present affirmative evidence.[142] His position is somewhat misleading because affirmative evidence[143] was presented to the Louisiana legislature. To be sure, the most impressive assertions of creation-scientists demonstrate that evolutionists have oversold their case to the public. Among the questions that evolutionists cannot answer are these: "Where and when, exactly, did modern man evolve? On this issue the paleontological record [often relied on by Gould] is frustratingly silent."[144]

IV. The Rational Basis for a Balanced Program of Biology

Students in public schools are often caught unaware by the theory that a single-celled organism lacking a nucleus evolved from a prebiotic soup chock-full of chemicals. They are taught that humans descended from primordial blobs of life (prokaryotes). Some pupils are persuaded to believe that evolution is the only "scientific" explanation of humanity's lineage. Impressionable students are easily propagandized if they are not offered critiques of evolution and other explanations deserving of their consideration.

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141. S. Gould, *supra* note 3, at 261-62.

142. *Id.* at 256.

143. Creation-scientists maintain that their theories are supported by affirmative evidence, and Bird's Brief, *supra* note 6, summarizes this data. The Court really never discussed this affirmative evidence, some of which will be presented in Parts IV and V of this article.

144. R. Cann, *supra* note 25, at 30.

The scientific data studied by creationists are not dissimilar to the data that support the theory of evolution. Creationists who study the same evidence relied upon by evolutionists argue plausibly the following points: (a) concerning invertebrates, "all major invertebrate phyla appear suddenly;"[145] (b) there was a "veritable explosion in population and species" of fish;[146] (c) amphibians, reptiles,[147] and birds appear suddenly in complex form in the fossil record;[148] (d) mammals,[149] primates, and modern humans do not make a slow gradual appearance but appear abruptly. It has been said that "modern gorillas, orangs, and chimpanzees spring out of nowhere, as it were. They are here today; they have no yesterday."[150] The same has been said about human beings.[151]

Both creationists and evolutionists depend on evidence drawn from the same disciplines; for example, paleontology, morphology, zoology, cytology, biochemistry, information science, mathematics, molecular biology, and genetics. Commentary on this data is presented below in the following order: (a) the fossil record; (b) comparative morphology; (c) mathematical probabilities; (d) genetic limits on biological change; (e) systematic anomalies in classification, anatomy and biochemistry.

A. *The Fossil Record*

Macroevolution is a word of art referring to evolutionary change above the species level. It is only a "partly demonstrated" theory.[152] According to one model of macroevolution, "[T]he first living cell 'evolved' into [more] complex . . . forms of life; these evolved into animals with backbones. Fish evolved into amphibia, amphibia into reptiles, reptiles into birds and mammals, early

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145. W. STANSFIELD, THE SCIENCE OF EVOLUTION 75 (1977).

146. F. OMMANNEY, THE FISHES 60 (1963).

147. *See* Patterson, Book Review, 29 SYSTEMATIC ZOOLOGY 216, 217 (1980).

148. *See, e.g.*, W. SWINTON, 1 BIOLOGY AND COMPARATIVE PHYSIOLOGY OF BIRDS 1 (A. Marshall ed. 1960).

149. Ager, *The Nature of the Fossil Record*, 87 PROC. OF GEOLOGICAL A. 131, 133 (1976).

150. D. JOHANSON & M. EDEY, *supra* note 134, at 363.

151. Gould, *Evolution: Explosion, Not Ascent*, N.Y. Times, Jan. 22, 1978, § E, at 6; S. ZUCKERMAN, BEYOND THE IVORY TOWER 64 (1970).

152. T. DOBZHANSKY, F. AYALA, G. STEBBINS & J. VALENTINE, *supra* note 5, at 5 (1977). The three primary factors in a mechanism for macroevolution are natural selection, mutation, and genetic recombination. *Id.* The neo-Darwinian theory of "gradual" macroevolution offers an explanation of macroevolution at odds with the theory of punctuated equilibria. *Id.* *See infra* notes 203-08 and accompanying text.

mammals into primates, and primates into man."[153] Based on the fossil record, several critical assessments of the model of gradual macroevolution can be briefly summarized:

1. Any fortuitous transformations from single-celled organisms that lack a nucleus (prokaryotes) to single-celled organisms with a distinct nucleus (unicellular eukaryotes) is an assumption "so fraught with confusion and contradiction that most modern biologists have ignored it."[154]

2. The evidence from the fossil record does not solidly support the hypothesis of gradual macroevolution from eukaryotes to invertebrate animals.[155]

3. Gradual macroevolution from invertebrates to chordate and vertebrate fish is not wholly supportable by the fossil record. According to Ommanney, the stages of evolutionary development that gave rise to truly fish-like creatures are unknown.[156] "[I]t is tempting to think that [lungfish] might have some direct connection with the amphibians which led to the land-living vertebrates. But they do not; they are a separate order . . . ."[157]

4. Paleontologist Colin Patterson of the British Museum agrees that the plausible fossil evidence does not support the "will-o'-the wisp" account of tetrapod evolution—that is the evolution from fish to amphibians.[158]

5. There is no direct proof from the fossil record that supports the hypothesis of macroevolution from amphibians to reptiles.[159]

6. The fossil evidence that discloses the stages through which any change from reptile to bird was achieved is suspicious.[160] The *Archaeopteryx*, whose ancestors are unknown, is often classified as a bird, although it has some features of the reptile, teeth for example. Studies of its soft biology and organ system indicate that *Archaeopteryx* was not an intermediate step in the evolution of

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153. A. THOMPSON, BIOLOGY, ZOOLOGY AND GENETICS 1 (1983).

154. L. MARGULIS, ORIGIN OF EUKARYOTIC CELLS 27 (1970).

155. Axelrod, *Early Cambrian Marine Fauna*, 128 SCIENCE 7, 7 (1958); *see also* Cloud, Gustafson & Watson, *The Works of Living Social Insects as Pseudofossils and the Age of the Oldest Known Metazoa*, 210 SCIENCE 1013 (1980).

156. F. OMMANNEY, *supra* note 146, at 60.

157. *Id.* at 65.

158. PATTERSON, *supra* note 147, at 217.

159. R. STIRTON, TIMES, LIFE AND MAN 416 (1957).

160. W. SWINTON, *supra* note 148, at 1.

birds.[161] "The precise origin of birds is still to be discovered."[162] In fact, a newer theory proposed by evolutionists maintains that birds are reptiles.[163] Sir Fred Hoyle writes, "*Archaeopteryx*, the much-acclaimed 'link' between reptiles and birds, is isolated in the fossil record. There are no steps in the record from reptile to *Archaeopteryx* . . . as the Darwinian theory requires. Indeed the situation is the opposite of what the theory predicts."[164] Hoyle's argument is regarded as heresy in some quarters, but no one doubts his credentials as a distinguished scientist.

7. Gradual macroevolution from reptiles to lower mammals and from lower mammals to higher mammals is not completely supported by the fossil record.[165] Macroevolution from lower mammals to primates is postulated to have come from insectivores, but according to Kelso, this "transition from insectivore to primate is not documented by fossils."[166]

8. "Modern Apes . . . seem to have sprung out of nowhere. They have no yesterday, no fossil record."[167] "In spite of recent findings, the time and place of origin of . . . [p]rimates remains shrouded in mystery."[168] "Missing links have for the most part remained missing."[169] "No fossil or other physical evidence directly connects man to ape."[170]

Owing to the lack of transitional fossils, Ayala and Valentine conclude "that most of the really novel taxa that appear suddenly

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161. M. DENTON, EVOLUTION: A THEORY IN CRISIS 177-78 (1986). *But see id.* at 194-95.

162. P. GRASSÉ, THE EVOLUTION OF LIVING SYSTEMS 74 (trans. 1977).

163. I am indebted to Dr. William Woolcott, Chairman of the University of Richmond's biology department, for this information.

164. F. HOYLE, THE INTELLIGENT UNIVERSE 43 (1983).

165. G. SIMPSON, LIFE BEFORE MAN 42 (1972); T. KEMP, DARWIN UP TO DATE 33 (1982); *accord* W. SCHEELE, THE FIRST MAMMALS 24 (1955).

166. A. KELSO, PHYSICAL ANTHROPOLOGY: AN INTRODUCTION 142 (2d ed. 1974).

167. Watson, *The Water People*, 90 SCI. DIG., May 1982, 44, 44.

168. Simons, *The Origin and Radiation of the Primate*, 167 ANNALS OF N.Y. ACAD. OF SCI. 318 (1969).

169. E. RUSSELL, THE DIVERSITY OF ANIMALS 130 (1962). Tree shrews do not provide the link. Campbell, *Taxonomic Status of Tree Shrews*, 153 SCIENCE 436 (1966). Nevertheless, in the Louisiana public schools, textbooks state, "[m]an shares a common ancestor with apes." BIOLOGICAL SCIENCE CURRICULUM STUDY, BIOLOGICAL SCIENCE: MOLECULES TO MAN 383 (3d ed. 1973).

170. Gliedman, *Miracle Mutations*, SCI. DIG., Feb. 1982, at 90; *accord*, Gribbin & Cherfas, *Desent of Man—or Ascent of Apes?*, 91 NEW SCIENTISTS 592, 594 (1981) (referring to the frailty of the conventional history of man and the apes); *see also* S. ZUCKERMAN, *supra* note 151, at 64 (1970).

in the fossil record did in fact originate suddenly."[171] In order to account for the gaps in the fossil record, Gould's theory of evolution *per saltum* (jumps or leaps) has become popular. Gould asserts that the steps up the evolutionary ladder occur too episodically to leave fossil evidence.

This theory of suddenly appearing genera sounds like creationism, but it is not; Darwin's speciation is simply replaced with jerky leaps of evolution. Such theories of so-called punctuated equilibria have been criticized as tautological.[172] It is a claim that where the fossil record indicates a missing link, there was necessarily a jump that skipped a transitional stage of development[173]—a theory of mutations not based on evidence, but upon its absence. Gould does not even admit the possibility that a pre-set design could play a part in the origins of life.

Grassé, a distinguished non-Darwinian evolutionist, agrees that vast systemic mutations, which supposedly give rise to new phyla, are "the myth of evolution"[174]—"pure fantasy."[175] He writes,

> From the almost total absence of fossil evidence relative to the origin of the phyla, it follows that any explanation of the mechanism in the creative evolution of the fundamental structural plans is heavily burdened with hypothesis . . . . The lack of direct evidence leads to the formulation of pure conjectures as to the genesis of the phyla; we do not even have a basis to determine the extent to which these opinions are correct.[176]

Hoyle points out,

> The trouble with [Gould's] attempted solution of the problem [of missing intermediate links in the fossil record] is that it ducks the

171. F. AYALA & J. VALENTINE, *supra* note 5, at 267. Ayala and Valentine also write, "[m]ost orders, classes, and phyla appear abruptly and commonly have already acquired all the characters that distinguish them." *Id.*; *see also* Simpson, *The Sudden Appearance of Higher Categories* in THE EVOLUTION OF LIFE 149 (S. Tax. ed. 1960).

172. Brady, *Natural Selection and the Criteria by Which a Theory is Judged*, 28 SYSTEMATIC ZOOLOGY 600, 608 (1979).

173. Stanley recognizes this problem. *See* S. STANLEY, MACRO-EVOLUTION 28 (1979). Raup and Stanley contrast punctuated equilibria with the gradualistic model of neo-Darwinism. D. RAUP & S. STANLEY, PRINCIPLES OF PALEONTOLOGY 326-27 (2d ed. 1978); *see* Bird's Brief, *supra* note 6, at 105.

174. P. GRASSÉ, *supra* note 162, at 8.

175. *Id.* at 31.

176. *Id.*

> crucial issue of how the relevant genetic information originated in the first place. The whole system of terrestrial biology cannot evolve entirely by species taking in each others' genetic material. At some stage the genesis of the information must be explained.[177]

Thompson writes, "rather than supporting evolution, the breaks in the known fossil record support the *creation* of major groups with the possibility of some limited variation within each group."[178] Clark adds, "on the basis of the paleontological record, the creationist has the better of the argument."[179]

To summarize, the fossil record indicates that genera/families suddenly appear, an apparent fact that supports diametrically opposed assertions of evolution *per saltum* and design or separate creation. Therefore, if it is rational to require students to study the evolutionists' theses, it is rational to require them to study the antitheses described by creation-scientists. The point is that reasonable persons can disagree about the inferences about origins that can be fairly drawn from the fossil record.

B. *Comparative Morphology*

When fossils are compared with living organisms, studies indicate that organisms living in the remote past are not vastly different from members of the same species alive today. This is curious: if the hypothesis of evolution were true, one would think that many species living in the remote past would be quite unlike the species alive today.[180] The morphological evidence revealing anatomical and physiological stability (stasis) raises serious questions about many aspects of evolutionary theory.

Gould believes "that the inertia of large populations explains the stasis of most fossil species over millions of years,"[181] and that lack of change over a ten million year period is to be expected.[182] But ten million years is one thing, stasis for a hundred million years is another. The universally respected French zoologist, Pierre P.

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177. F. HOYLE, *supra* note 164, at 47.

178. A. THOMPSON, *supra* note 153, at 76 (emphasis added); *accord* N. GILLESPIE, CHARLES DARWIN AND THE PROBLEM OF CREATION 26 (1979).

179. Clark, *Animal Evolution*, 3 Q. REV. BIOLOGY 523, 539 (1928). Dr. Austin Clark was curator of paleontology at the Smithsonian Institute.

180. Rose, *Theories of Life-History Evolution*, 23 AM. ZOOLOGIST 15, 20 (1983).

181. S. GOULD, *supra* note 3, at 260.

182. *See id.* at 259-60.

Grassé,[183] notes that a comprehensive comparative morphological analysis reveals that "no new broad organizational plan [for any zoological group] has appeared for several hundred million years, and for an equally long time numerous species, animal as well as plants, have ceased evolving."[184] Admittedly, the evidence does not show clearly that macroevolution never occurred, but this implication is strongly suggested by the evidence.

C. *Mathematical Probabilities*

A vast amount of genetic information is contained in DNA, a molecular structure which plays an essential role in determining hereditary characteristics.[185] Grassé writes that "[a]ny living being possesses an enormous amount of . . . 'intelligence' . . . called 'information' . . . condensed on a molecular scale in the chromosomal[186] DNA . . . . This 'intelligence' is the *sine qua non* of life. If absent, no living being is imaginable."[187]

Carl Sagan, a popularizer of scientific theories, describes several salient features of the genetic material, DNA:

> It is shaped like a ladder twisted into a [double] helix, [and] the rungs . . . called nucleotides . . . spell out the hereditary instructions for making a given organism. Every lifeform on earth has a different set of instructions . . . . The reason organisms *are* different is the differences in their nucleic acid instructions. A mutation is a change in a nucleotide, copied in the next generation, which breeds true. Since mutations are *random* nucleotide changes, most of them are harmful or lethal . . . . It is a long wait before a mutation makes an organism work better. And yet it is that improbable event, a small beneficial mutation in a nucleotide a ten-millionth of a centimeter across, that makes evolution go.[188]

According to Sagan, despite the odds, random sequential events have produced the informational content needed to enable evolv-

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183. Grassé is not a creationist although his work is often cited by creation-scientists.

184. P. GRASSÉ, *supra* note 162, at 84.

185. A messenger (mRNA) "is responsible for carrying the 'genetic code' transcribed from DNA to specialized sites within the cell (known as ribosomes) where the information is translated into protein composition." DICTIONARY OF BIOLOGY: DERIVED FROM THE CONCISE SCIENCE DICTIONARY 210-11 (1985).

186. Chromosomes carry the genes that determine the individual characteristics of organisms. A gene is a unit of heredity composed of DNA.

187. P. GRASSÉ, *supra* note 162, at 2.

188. C. SAGAN, COSMOS 21 (1980).

ing organisms, however complex, to survive the do-or-die process of natural selection. He asserts that since the alleged "big bang" over four billion years ago, there has been enough time for the slow accumulation of patterns of favorable mutations.[189] However, Sagan also writes,

> Human DNA is a ladder a billion nucleotides long. Most possible combinations of nucleotides . . . would cause the synthesis of proteins that perform no useful function. Only an extremely limited number of nucleic acid molecules are any good for human lifeforms as complicated as we. Even so, the number of useful ways of putting nucleic acids together is stupefyingly large—probably far greater than the total number of electrons and protons in the universe.[190]

This statement leads to a consideration of mathematical probabilities. A living organism, as noted, requires biologically meaningful sequences of DNA and RNA. When Grassé, whose "knowledge of the living world is encyclopedic,"[191] considers the explanations of Darwinists, he asks:

> What gambler would be crazy enough to play roulette with random evolution? The probability of dust carried by the wind reproducing Dürer's "Melancholia" is less infinitesimal than the probability of copy errors in the DNA molecule leading to the formation of the eye; besides, these errors had *no relationship whatsoever* with the function that the eye would have to perform or was starting to perform. There is no law against daydreaming, but science must not indulge in it.[192]

Schutzenberger, at a conference of "Mathematical Challenges to the Neo-Darwinian Interpretation of Evolution," stated:

> [W]e believe that [the probability of evolution by mutation and natural selection] is not conceivable. In fact if we try to simulate such a situation by making changes randomly at the typographic level . . . on computer programs we find that we have no chance . . . . [The computer just jams.] Thus to conclude, we believe that there is a considerable gap in the neo-Darwinian theory of evolution, and we

189. *Id.* at 21.
190. *Id.* at 25.
191. Dobzhansky, Book Review, 29 EVOLUTION 376, 376 (1975).
192. P. GRASSÉ, *supra* note 162, at 104.

> believe this gap to be of such a nature that it cannot be bridged within the current conception of biology.[193]

Eden, a specialist in mathematics from Massachusetts Institute of Technology, also finds the probabilities of evolution to be insignificant. He writes, "the randomness postulate [of many evolutionists] is highly implausible and that an adequate scientific theory of evolution must await the discovery and elucidation of new natural laws—physical, physico-chemical and biological."[194] The mathematical improbabilities[195] diminish the prestige of evolution-science as a cogent and irrefutable explanation of origins.

D. *Genetic Limits*

Geneticists have much to learn about the mechanisms for transmitting heritable genes.[196] An organism's genes are "the smallest segment[s] of the DNA macromolecule capable of determining a constant characteristic."[197] "We know of the genes only as revealed to us by the mutation[s] they undergo."[198]

Although mutations are the ultimate sources of the genetic variations that make an evolutionary process possible, Grassé points out "that a gene can only change within certain limits. In other words, it cannot become any sort of a gene. It is almost certain that the number of possible variations is limited."[199]

Yet Carl Sagan, admittedly not the most authoritative expert, writes, "evolution works through mutation and selection."[200] Grassé rejects this kind of daydreaming because numerous DNA copy errors resulting in "mutations do not coincide with evolu-

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193. Schutzenberger, *Algorithims and the Neo-Darwinian Theory of Evolution*, MATHEMATICAL CHALLENGES TO THE NEO-DARWINIAN INTERPRETATION OF EVOLUTION 73, 74-75 (P. Moorhead & M. Kaplan eds. 1967); *accord* Noda, *Probability of Life, Rareness of Realization in Evolution*, 95 J. THEORETICAL BIOLOGY 145 (1982).

194. Eden, *Inadequacies of Neo-Darwinian Evolution as a Scientific Theory*, MATHEMATICAL CHALLENGES TO THE NEO-DARWINIAN INTERPRETATION OF EVOLUTION 109 (P. Moorhead & M. Kaplan eds. 1967).

195. There are many other articles, similar in nature to those quoted in the text above, which demonstrate the improbability of various theories of evolution. *See* Bird's Brief, *supra* note 6, at 68-74.

196. P GRASSÉ, *supra* note 162, at 100.

197. *Id.* at 185.

198. *Id.*

199. *Id.* at 96.

200. C. SAGAN, *supra* note 188, at 26.

tion."[201] Grassé therefore criticizes contemporary biologists who "as soon as they observe a mutation, talk about evolution."[202]

Gould has tried to imagine how sudden evolutionary leaps can be caused by genes that have a limited potential to produce major structural changes.[203] After suggesting that "certain kinds of small genetic changes may have major, discontinuous effects upon morphology,"[204] Gould refers to homeotic mutants (gene regulation rather than structural genes),[205] acknowledging that critics dismiss his idea as "highfalutin . . . speculation."[206] According to Gould's numerous critics,[207] the sequences of genetic information needed to produce a rapidly evolved new species—as presupposed by a theory of punctuated equilibria—are such that "it seems impossible to explain these events in terms of random mutation alone."[208] Indeed, there is not any substantial evidence that supports Gould's theory of evolution. To be sure, Gould is not a geneticist or a biologist, and it may turn out that DNA research will answer many questions that he fails to answer.

E. *Systematic Anomalies in Classification, Anatomy, and Biochemistry*

"Taxonomy is the theory and practice of naming, describing, and classifying organisms."[209] Many evolutionists "infer relationships of evolutionary descent (phylogeny) on the basis of resemblance and dissimilarity."[210] Evidence for macroevolution exists whenever a group of organisms can be arranged in what appears to be a neat

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201. P. GRASSÉ, *supra* note 162, at 88.

202. *Id.* at 88.

203. S. GOULD, *supra* note 3, at 172.

204. *Id.* at 181.

205. Gould distinguishes between "structural genes that direct the assembly of proteins" and homeotic genes that "are switches or regulators; they produce some signal, of an unknown nature, that turns on whole blocks of structural genes." *Id.* at 195.

Patterson is critical. He points out that "regulatory genes," which supposedly "switch on and off batteries of protein-producing [structural] genes" involves an area where "speculation is free, for we know nothing about these regulatory master genes, and that they exist is only an informed guess." C. PATTERSON, EVOLUTION 143 (1978).

206. *See* C. PATTERSON, *supra* note 205, at 197. Indeed McDonald calls this idea "strictly hypothetical." McDonald, *The Molecular Basis of Adaptation: A Critical Review of Relevant Ideas and Observation*, 14 ANN. REV. ECOLOGY & SYSTEMATICS 77, 85 (1983).

207. *See, e.g.*, Charlesworth, Lande & Slatkin, *A Neo-Darwinian Commentary on Macroevolution*, 36 EVOLUTION 474, 486 (1982); Bird's Brief, *supra* note 6, at 131.

208. E. AMBROSE, THE NATURE AND ORIGIN OF THE BIOLOGICAL WORLD 123-24, 142 (1986).

209. W. STANSFIELD, *supra* note 145, at 98.

210. *Id.*

lineal or sequential arrangement. Even far less than a perfect sequence will do if the overall sequential pattern discloses similarities in structural design providing a plausible basis for the macroevolutionists' theory of ancestral relationship.

Geneological trees disclosing the branching out of new forms of life are commonly found in textbooks, but Bonner believes the textbooks "are, as a rule, a festering mass of unsupported assertions."[211] They add up to a "meaningless waffle."[212]

The word "homologous" is used to describe organisms that appear to have the same evolutionary origin.[213] "Homology provided Darwin with apparently positive evidence that organisms had undergone descent from a common ancestor."[214] For example, "the wings of a bat, the flippers of a dolphin, and the arms of man are [said, by evolutionists, to be] homologous organs, having evolved from the paired pectoral fins of a fish ancestor."[215] Darwin's followers pointed out the persistence of this so-called pentadactyl pattern in the limbs of all the major terrestrial vertebrates from the first amphibian to present day forms.

Some recent advances in genetic research have undercut the significance of resemblances among otherwise distinctive genera and families of organisms.

Denton writes:

> The validity of the evolutionary interpretation of homology would have been greatly strengthened if . . . genetic research could have shown that homologous structures were specified by homologous genes . . . . Such homology would indeed be strongly suggestive of "true relationship; of inheritance from a common ancestor." But it has become clear that the principle cannot be extended in this way. Homologous structures are often specified by non-homologous genetic systems . . . .[216]

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211. Bonner, Book Review, 49 AM. SCIENTIST 240, 242 (1961).

212. Charig, *Systematics in Biology: A Fundamental Comparison of Some Major Schools of Thought*, PROBLEMS OF PHYLOGENETIC RECONSTRUCTION 411-12 (K. Joysey & A. Friday eds. 1982).

213. DICTIONARY OF BIOLOGY: DERIVED FROM THE CONCISE SCIENCE DICTIONARY 115 (1985).

214. M. DENTON, *supra* note 161, at 143.

215. DICTIONARY OF BIOLOGY: DERIVED FROM THE CONCISE SCIENCE DICTIONARY 115 (1985).

216. M. DENTON, *supra* note 161, at 145. Denton notes that "[t]he failure to find a genetic and embryological basis for homology was discussed by Sir Gavin de Beer, British embryologist and past director of the British Museum of Natural History." *Id. See generally* G. DE BEER, HOMOLOGY: AN UNRESOLVED PROBLEM (1971).

Like the geneticists, biochemists interested in molecular biology engage in comparative studies of organisms. At the morphological level, the pattern of nature seems to correspond reasonably well with theories of gradual evolution because of similarities found among different species, genera and families. However, the molecular biological revolution has provided a new, more quantifiable, way of comparing organisms at the biological level.[217] Arranging patterned sequences from the biochemical data sometimes produces different sequences than arrangements from the morphological data. The data[218] produced by biochemists show many anomalies that undercut the plausibility of the evolutionists' subjective judgments based on external appearances.

F. *The Relevance of the Data*

It is rational for a legislature to want some balance in public school presentations of biology. Undeniably, the evidence that evolution came about through random combinations of fits between gene potential and environmental selection is convincing to most scientists. Nevertheless, proponents of balanced treatment legislation should be able to persuade unprejudiced judges of the rational basis for some creation-science component in a biology course. Indeed, the creation-science and anti-theistic evolution-science data are in many instances the same; only the inferential explanations are different, and creation-science properly presented deletes all unreasonable and religious inferences. In short, creation-science is a salutary antidote to dogmatic assertions that evolution must be correct merely because there are not viable alternative theories.[219]

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217. M. DENTON, *supra* note 161, at 275.

218. For example, in human beings, the human ribosomal structure of RNA is so distinctive, it "did not originate from recognizable relatives of present day organisms." Eperon, Anderson & Nierlich, *Distinctive Sequence of Human Mitochondrial Ribosomal RNA Genes*, 286 NATURE 460, 460 (1980). Studies of hemoglobin, insulin A, and cytochrom *c* show widespread anomolies, and do not support common ancestry claims. *See, e.g.*, Address by Dr. Colin Patterson at American Museum of Natural History, transcript at 7-9 (Nov. 5, 1981) (discussing hemoglobin); R. ECK & M. DAYHOFF, ATLAS OF PROTEIN SEQUENCE AND STRUCTURE 110-11 (1966) (discussing insulin A and B).

219. Edwards v. Aguillard, 107 S. Ct. 2573, 2599, 2603 (1987) (Rehnquist, J., dissenting).

V. CONCLUSION

The quest for scientific truth is a means of progressing from darkness to light. It is therefore an ironic development that *Edwards v. Aguillard* keeps from the classroom the full dimensions of a debate among scientists. Nothing could be more contrary to the spirit of science than an orchestrated effort to overcome an idea that challenges conventional wisdom. Contrary to the claims of many evolutionists, the assertions of creation-science are not analogous to those of the flat-earth society.

I have not argued that the explanations of creation-scientists are true, or that creation-scientists have better evidence than evolutionists. Perhaps neither side is on the right track. However, I simply object to the twin presumptions that creation-scientists are all irrationally driven by a monolithic Christian fundamentalism, and that all creation-science courses are the same. Both presumptions are products of stereotypical thinking, and I believe that creation-science is stigmatized unfairly when the unsupportable assertions of some zealots are used unfairly to downgrade an entire school of thought.

Creation-science presents an alternative to a theory that, according to some evolutionists, is undergoing an internal crisis.[220] Evolution, like creation-science, rests largely on descriptive reconstructions of past events and many inferences and extrapolations are necessary to explain how the relevant data supports the theory. Someone has quipped that the only evolution for which there is evidence is the evolution of Darwinian theory. Even Carl Sagan, who tends to exaggerate the power of evolutionary theory, admits "[t]here is still much to be understood about the origin of life, including the origin of the genetic code."[221] He writes, "[b]iology is more like history than it is like physics . . . [and because] [t]here is as yet no predictive theory of biology, just as there is not a predictive theory of history . . . both subjects are still too complicated for us."[222]

Hoyle and Wickramsinghe are less kind; they state "that the general scientific world has been bamboozled into believing that evolution has been proven. Nothing could be further from the

220. *See generally*, M. DENTON, *supra* note 161; *see also* HO & SAUNDERS, PREFACE TO BEYOND NEO-DARWINISM (M. Ho & P. Saunders eds. 1984).

221. C. SAGAN, *supra* note 188, at 28.

222. *Id.* at 30-31.

truth."[223] Grassé notes, "[w]e have gone from Darwinism into neo-Darwinism, and, very recently, to ultra-Darwinism . . . ."[224] All three models of evolution are being savagely attacked by non-creationists. The neo-Darwinian synthesis, which combines classical Darwinism with the findings of modern scientists,[225] has been called by Gould "effectively dead, despite its persistence as textbook orthodoxy."[226] Finally, the punctuated equilibria model preferred by Gould has been rejected as speculative and question begging by most evolutionists.[227]

The *Edwards* Court's biased predisposition is obvious to anyone who fairly compares its opinion with the Joint Appendix, which showed that the Louisiana lawmakers were commendably concerned with a secular problem; namely, a curriculum imbalance. Consequently, debatable Darwinian theories of macroevolution are still taught in the Louisiana public high schools as if "design" were not a competing paradigm to "chance." The Joint Appendix filed in *Edwards* clearly shows that the Louisiana legislature had a rational basis for its requirement of a balanced *secular* presentation of rival scientific theories.[228] Given the stated secular purpose of the legislative body, the religious motivation of a handful of legislators seems innocuous. However, the Court preferred to glean snippets of testimony from the legislative record, which were slanted to show that the religious judgment of, at most, a few supporters of the Bill amounts to a governmental endorsement of the book of Genesis.

Clarence Darrow, during the *Scopes* trial, has been quoted as saying that it is "bigotry for public schools to teach only one theory of origins."[229] John Scopes also "believe[d] in teaching every

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223. F. HOYLE & N. WICKRAMSINGHE, EVOLUTION FROM SPACE 89 (1981); *see also* Patterson, *Significance of Fossils in Determining Evolutionary Relationships*, 122 ANN. REV. OF ECOLOGY & SYSTEMATICS 195, 216 (1981).

224. P. GRASSÉ, EVOLUTION OF LIVING ORGANISMS 5 (1977).

225. According to the neo-Darwinians: "gradual evolution can be explained in terms of small genetic changes ('mutations') and recombination, and the ordering of this genetic variation by natural selection; and . . . macroevolutionary processes and speciation, can be explained in a manner that is consistent with the known genetic mechanisms." Mayr, *Prologue*, in THE EVOLUTIONARY SYNTHESIS 1, 1 (E. Mayr & W. Provine eds. 1980).

226. GOULD, *Is a New and General Theory of Evolution Emerging*, 6 PALEOBIOLOGY 120-21 (1980).

227. *See supra* notes 172-79 and accompanying text.

228. *See supra* notes 155-219 and accompanying text.

229. T. STEWART & A. HAYS, *supra* note 123, at 187.

aspect of every problem or theory."[230] *Edwards v. Aguillard* supports the theory of evolution that Darrow and Scopes believed in, but has lost sight of the legitimate end they had in view, namely the elimination of the deforming forces of prejudice and convention.[231]

230. P. DAVIS & E. SOLOMON, THE WORLD OF BIOLOGY 414 (1974).

231. Allan Bloom writes, "[n]o real teacher can doubt that his task is to assist his pupil to fulfill human nature against all the deforming forces of convention and prejudice." A. BLOOM, THE CLOSING OF THE AMERICAN MIND 20 (1987). In controversies about public school science courses, the deforming forces and prejudices are about equally divided among the extremists on both sides.