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# Intelligent Design And Evolutionary Theory: Legal Battles And Classroom Relevance For School Leadership

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Intelligent Design And Evolutionary Theory:  
Legal Battles And Classroom Relevance For School Leadership

by

Larry R. Plank

A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Education Specialist  
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Larry R. Plank

ABSTRACT

Evolutionary theory in the scientific curricula of public education has been scrutinized by religious societies for the better part of a century around the globe. Although Darwin's explanation of the mechanism of evolution—the process of natural selection—is widely accepted by scientists in the United States and other industrialized nations, the U.S. has lagged behind these other countries in accepting evolutionary theory in public school curricula. The debate of what to include in textbooks and classroom lessons is one of America's most controversial issues. The creationist worldview of life's origins has been incorporated into science curriculum as a direct challenge to natural selection and evolutionary theory, stretching the interpretation of the First Amendment and the Establishment Clause of the U.S. Constitution under the guise of academic freedom. The debate has reached the U.S. Supreme Court on more than one occasion. Each landmark case has resulted in the Court's decision to keep public school science courses free of theistic explanations of the origins of life or creation of species, most specifically humankind. The battle has continued and gained momentum in recent years, even in light of the Court's decisions. The idea of intelligent design (ID) is the latest attempt by creationists to explain the existence of life, and many state boards of

education and school districts throughout the country are considering the adoption of new science curricula that include ID as an adequate alternative to evolutionary theory. In the recent federal case *Kitzmiller v. The Dover Area School District* Justice John E. Jones, III ruled that ID was not a science at all, and instead was a religious belief violating Establishment Clause of the First Amendment of the U.S. Constitution.

Intelligent design is considered by scientists to be pseudoscience posing as scientific principle. The scientific perspective is that unsubstantiated pseudoscientific principles create misconceptions and have a deleterious effect upon science education. It is argued herein that educational leaders must play a role in preventing cases of pseudoscience arising in public school curriculum, thus strengthening the ability of our country to produce knowledgeable scientists.

## Introduction

The perspective of this discussion is that external forces—politics, religion, and social trends—are impacting, in new ways, the science curriculum of American schools (Chapman, 2004; Singham, 2000a). From my viewpoint as a science teacher/biologist, intelligent design (ID) is the primary tool by which conservatives, Christian groups, and right-wing politicians are grasping control over the substance and direction of American science curriculum. It is possible to argue that the purpose of science education—proliferation of scientific thought and discovery of the natural world—is violated by politically contentious interjections, particularly ID, into school-based science curriculum. This paper contends that ID is interfering with the quality of science education at the high school level and teachers' ability to produce scientifically literate citizens.

### *Writer's Bias*

The discussion of the origins of life is an inevitably sensitive issue. It should be noted here, early in this discussion, that a certain level of bias is held by the writer of this paper. As a scientist and science education curriculum strategist, my concern is that science education be taught in our public schools without influence of religion or politics. Intelligent design theory will not aid us in producing knowledgeable scientists or doctors, which is my primary goal as a science educator teaching in a public high school.

It is also important to note that although I am not religious, I am also not antireligious. In my view, religion provides a guideline for moral law and serves as a necessary component of a successful, peaceful society. I understand that many people

subscribe to a viable, hybrid worldview that originates from both spiritual and scientific thought. Science and religion share a similarity in that both concerned with explaining the presence of the great variety of living organisms, science concerned with how such diversity came to exist and religion devoted to answering the question of why. Those who choose to explain life in both scientific and spiritual terms are intelligent, rational people. Perhaps the words of the late Reverend Martin Luther King, Jr., best describe the continuum, “Science investigates; religion interprets. Science gives man knowledge, which is power; religion gives man wisdom, which is control.”

Charles Darwin himself struggled with ideas of evolution and creationism. Born to an English physician, Darwin often described himself agnostic throughout his life, but did refer to a Creator in early writings on his famous excursion on the Beagle to the Galapagos Islands. Darwin’s biggest issue with scripture was this: If God did indeed exist, how he could allow pain and evil to exist within man? It was ultimately the death of his beloved daughter, Annie, in 1851 that led Darwin away from the church for good, and solidified his decision to go ahead with the publication of his theories of natural selection (Adler, Underwood & Adams, 2005).

### *Structure and Focus*

The larger issue informing this discussion that synthesizes the relevant literature involves the influence of religion in supplanting scientific thought in the secondary science classroom. The particular issue at hand highlights the shortcomings in learning that inevitably ensue for adolescents when an untested theory, such as ID, is perpetuated as scientifically valid explanations of life’s diversity and origin.

The following five themes provide the chronological structure and order for the writing: 1) the background of science education in America, 2) a review of past creationist viewpoints and legal battles, 3) a summary of intelligent design as a current strategy of creationist proponents, 4) how strategies such as ID permeate scientific thought, and 5) and implications for educational leaders.

### Science in America: A Brief History

By its own nature, science is fueled by change. Science is not merely a collection of facts, nor is it equipped to solve all problems (e.g., Campbell & Reece, 2005; Duschl, 1990; Singham, 2000a; Solomon, Berg & Martin, 2004). Science is neither certain nor absolute. Science as a process attempts to understand and explain natural phenomena, ultimately in the form of theories—the scaffolding that supports scientific thought (Campbell & Reece, 2005; Duschl, 1990). It is the nature of science itself that leads to questioning and retooling of concepts, breaking down intelligent thought and rebuilding with new, improved ideas (Dawson et al., 2002; Duschl, 1990). Science is a dynamic field that continues to grow with every discovery made at the hands of scientists worldwide (Campbell & Reece, 2005; Solomon et al., 2004).

### *America's Scientific Revolution*

While technological creativity and innovation formed the backbone of America's industrial success in the 1800s and into early 1900s, an American passion for scientific literacy did not erupt until the middle of the 20th century (Duschl, 1990). It was nearly 50 years ago that two major events—a Russian space capsule leaving the Earth's atmosphere and Watson and Crick's Nobel Peace Prize, awarded for the ground breaking discovery of deoxyribonucleic acid, a double helix known as DNA—changed the way science was

perceived by Americans (Duschl, 1990). Since that time, scientific thought and inquiry have permeated every aspect of American culture, from fashion to medicine. But learning more about our natural world has come at a price. Along the road to scientific literacy, naturalists uncovered knowledge about our own existence at odds with creationist stories of deities that have been passed from one generation to another around the globe.

As theories describing the origin and diversity of life became mainstream, a polarization between scientific and religious thought emerged (Wali, 2004). The dichotomy of thought remains evident today in society's politically-charged feuds. As Forrest (2001) argues, although industrial and technical nations have been relatively free of a religious hold over scientific research and curriculum in recent years, the United States, with its conservative national leadership, has experienced growing pains when dealing with science, especially when its experimental practices tread moral and ethical waters. From stem cell research, to euthanasia, to evolutionary theory in schools, the nation is divided with respect to the boundary between science and religion.

### *Revolutionary Science Education*

Religion and politics impact and direct the educational process in our country, and what children learn about their natural world is subsequently controlled and monitored by the political and religious views of the time (Chapman, 2004; Duschl, 1990). For example, when Sputnik became the first artificial satellite to orbit the Earth in 1957, schools and school boards nationwide revised their science curriculum across all grade levels in hopes of turning out knowledgeable scientists (Duschl, 1990; Phillips, 2005). At that time, fear drove the public into believing that our ineptitude in science and technology would lead to our ultimate demise as a sovereign nation. Quickly these issues

became the focus of many political platforms and the citizenry as a whole, and hence science education was believed to be key in competing globally and retaining a position of power in the world (Duschl, 1990).

As America strived to be scientifically literate to protect its lot, a new love for science and inquiry developed in pockets of metropolitan areas in the north and west (Galley, 2004a). Marching forward, teachers began educating children about the biological and physical world more enthusiastically, supported by increased funding, retooled science standards and new science textbooks (Duschl, 1990). With this revolution, the new scientific nation in the late 1950s incorporated the views of the biologist Thomas Huxley, a contemporary of Charles Darwin, who defended Darwin's theory of natural selection. Terry (2004) claimed that Huxley's greatest accomplishment was his ideas about how science should be taught to students, that is, as a hands-on, laboratory experience. In addition to Huxley's ideas, a preponderance of scientific theory flooded American schools, including that of Huxley's fellow evolutionary biologist, Charles Darwin. This is not to say that scientific thought and inquiry supplanted Christian worldviews, however. The new science curriculum of the 50s was met with resistance in many regions of the country, primarily in the south. By the late 1960s "creation science", the description of creationism as a valid scientific argument, was born (Singham, 2000b).

#### *The Nature of Science and Darwin's Theory*

Even though a major shift in science curriculum and teaching strategies occurred over 50 years ago, the public still has very little understanding of the nature of science, or how science is done. A misunderstanding of how science works as a process makes it

difficult to distinguish science from non-science. This often leads to the inclusion of nonscientific principles and ideas into science curriculum.

Science seeks to explain the natural world by gathering evidence and testing explanations utilizing this evidence. The conclusions of science are reliable, but are constantly modified as new evidence of the natural world is uncovered. Science's conclusions about the natural world, although tentative, are well founded in their factual content. The tentativeness of science is often viewed as science's weakness by those who do not understand the process of scientific inquiry, continually molding theories to fit new discovery and knowledge. However in reality, the ability of scientific theory to be modified when new evidence is discovered is science's greatest strength (Campbell & Reece, 2005; Duschl, 1990; Solomon et al., 2004).

It is important, therefore, that we educate the public on the nature of science. Over the past decade, 18 states, including Florida, have restructured science education curriculum to incorporate new strategies for defining and teaching how science works (Florida Sunshine State Standards for Science, 1999; Hoff, 2002; Ishizuka, 2004; Moore, 2002, 2004). Duschl (1994) states that "we are in the midst of a revolutionary period for understanding the nature of science in science education" (p. 443).

As with any revolution, confusion among the constituency is often a result, as in the case of the nature of scientific theory. For example, the average American associates "theories" with the unknown or unproven, typically with a negative connotation or skepticism. However, in science, a theory is not an unfounded or unsupported idea. A theory is a carefully constructed, scientifically accepted concept by professionals in the field, based upon years of inquiry, collected data and relentless discussion by scientists

worldwide (Campbell & Reece, 2005; Duschl, 1990; Singham, 2000a; Solomon et al., 2005; Wallace & Louden, 2002). According to Duschl, scientific theories are concrete, as he writes,

The status of theories in science is a type of paradox or enigma of scientific knowledge. On the one hand, we must recognize that theories are the standard bearers of science. On the other hand, history of science clearly establishes times when there is a consensus about the status of a theory and times when there is a dissensus. There are times when scientists agree and times when scientists agree to disagree. (Duschl, 1990, p. 45)

One such scientific theory is that of the evolution, or adaptive change, of living organisms on our planet. When first published in *On the Origin of Species* (1859), Darwin's ideas were met with challenge from the scientific community in England and outside of it. In the U.S., it was not until the 1870s, that is, after the Civil War, that Darwin's thoughts pushed evolution to the pinnacle of the debate between creationists and those subscribing to a scientific view of the origin and diversity of life (Numbers, 2004).

While creationists tend to associate evolutionary theory with soullessness, scientists are equally annoyed by creationists' apparent mindlessness. With neither side able to understand the position of the other, nor seemingly willing to accommodate a view that contradicts their own, Rabbi Brad Hirschfield asserts that

The increasingly nasty debate between believers in Darwinian evolution and advocates for intelligent design theory hinges on the fact that most creationists

relate to evolutionists as if they have no soul, and most evolutionists relate to the creationists as if they have no brain. (Hirschfield, 2005, para. 1)

What is peculiar about the argument, in Darwin's case, is that although his name is often linked with the concept, Darwin (1859) never used the term *evolution* to describe his theory of change. He instead employed the phrase "survival of the fittest," and explained this natural phenomenon with his theory of *natural selection* (Introduction, p. 2). Although it was challenged, and even met with hostility, natural selection is now the most widely known and accepted mechanism of adaptive change or evolution, therefore making it the cornerstone of biology (Campbell & Reece, 2005; Solomon et al., 2005).

The misunderstanding of the validity of scientific theory, particularly Darwin's, has led to the general populous to take the "theory" concept out of scientific context as nothing more than hunch. Leaders, such as politicians, often prey on the American misconception of the meaning of scientific theory to garner support for their own worldviews and political positions (Singham, 2000a). As Judge John E. Jones, III, explains in his recent decision,

To be sure, Darwin's theory of evolution is imperfect. However, the fact that a scientific theory cannot yet render an explanation of every point should not be used a pretext to thrust an untestable alternative hypothesis into the science classroom or to misrepresent the well established scientific propositions.

*(Kitzmiller v. Dover Area School District [2005] 342 F. Supp. 2688, p. 124)*

Attacks on the gaps in Darwin's theory are prevalent in today's society, as seen in at least two current court cases in the U.S. debating the relevance of evolutionary theory: *Kitzmiller v. Dover Area School District* (2005) and *Selman et al. v. Cobb County School*

*District* (2004). When Darwin's theory is disregarded as invalid, misunderstanding of natural selection—the mechanism by which change occurs in the natural world—can result. Scientists agree that natural selection has shaped the continuum of biological hierarchy, from the molecules that make up living things to the behaviors of complex organisms (e.g., human beings), and without an understanding of mechanisms of change within the genomes of the living organism, biomedical study, for instance, cannot be fully comprehended (Campbell & Reece, 2005). More simply stated, “Nothing in biology makes sense except in the light of evolution,” (Dobzhansky, 1973, p. 125).

### Creationism, Classrooms and Courtrooms

In the United States, the discussion over whether or not creationism is rooted in religion or science is not solely academic, since the First Amendment to the U.S. Constitution can be invoked to prevent the teaching of religious ideas in public schools (Alexander & Alexander, 2001; Singham, 2000a). This is evident in current high profile cases in Georgia (*Selman et al. v. Cobb County School District*, 2004) and Pennsylvania (*Kitzmiller v. Dover Area School District*, 2005) and as well as several landmark cases decided in federal courts, such as *Epperson v. Arkansas* ([1968] 393 U.S. 97) and *McLean v. Arkansas Board of Education* ([1982] 529 F. Supp. 1255).

### *The Scopes Monkey Trial*

In 1925, religious fundamentalism was clung to so steadfastly by the nation that teacher John Scopes was convicted in Tennessee for teaching evolutionary theory in his high school biology classroom (Singham, 2000a; Terry, 2005). During this time period, evangelical Christians, who had previously focused their attention on attacking modern interpretations of scripture, challenged the new evolutionary thought that was sweeping

America just as more and more children attended its public schools (Numbers, 2004). This religious undertow eventually led to the “monkey trial”, as it was coined, serving as the first significant legal battle between the scientifically literate and the Christian population. The trial peaked the public interest so much so that it was the very first courtroom debate of any kind to receive immediate media attention through radio broadcast (Numbers, 2004). Although Scopes’ lesson on the evolutionary history of man and apes violated Tennessee’s curriculum standards at the time, leading to his defeat in court, his attorney, Clarence Darrow, successfully persuaded many Americans that the biblical accounts of life’s origins were not scientifically valid, thus earning a victory for the scientific community (Numbers 2004; Singham, 2000a).

In the 30 years that followed the conviction of Scopes, the nation’s opinion of science education changed drastically due to the events of the time. During this period, the National Science Foundation (NSF) was born, and, by 1962 this federally-funded organization was supporting science and math instruction in public schools with unprecedented numbers of grants (Duschl, 1990). However, the views of conservatives and Christian groups still had an effect upon what was being taught in science classrooms across the nation (Scott, 2004).

Creationism, the view that all life on Earth was due to the work of a divine creator, was no longer a chic idea after the 1950s, and, in the 1960s was replaced by “creation science” (Scott, 2004). Although the nation was enthusiastically embracing technology and science, conservative school boards across the country slowly began to react to the nation’s new passion for naturalism by banning the teaching of evolutionary theory and natural selection in schools. The argument reached the Supreme Court in

1968, and by 1975 the federal government withdrew all funding for science education from the budget of the NSF (Duschl, 1990).

### *Resurgence of Fundamentalism in the South*

As America's opinions about science and education changed through the scientific revolution of the 1950s and 60s, another revolution of sorts began to take place in the religious sect of the country. Fundamentalism regained momentum, especially in the south. By the late 1960s, the new fundamentalists began impacting American culture on a broader scale, including the American science classroom (Numbers, 2004; Terry, 2004).

In 1967, a science teacher in Arkansas sought to challenge a current state statute pertaining to evolutionary concepts and their place in education (Matsumura, 2001). The fundamentalist statute made it unlawful for a teacher in any state-supported school or university to teach, or to use a textbook that declared humankind ascended from a lower order of animals. In essence, the statute prohibited the teaching of human evolution, leaving the biblical account of man's origins as the only discussable theory.

Although the plaintiff enjoyed a victory in a lower court, the Supreme Court of Arkansas found that the schools in the state had the right to set curriculum as they see fit. Epperson, the plaintiff, appealed to the U.S. Supreme Court; in 1968 the Court heard the case. The Supreme Court invalidated the Arkansas statute and ruled the statute unconstitutional on the grounds that the First Amendment to the U.S. Constitution does not permit a state to require that teaching and learning must be tailored to the principles or prohibitions of any religious sect or doctrine (*Epperson v. Arkansas* [1968] 393 U.S.

97). With the decision of the Supreme Court, states could no longer ban the teaching of evolution, including that of humans, on religious grounds.

*Balanced Treatment of Creation Science and Evolution Science*

After the Epperson decision, the game plan of creationists changed to a “if you can’t beat ’em, then join ’em” approach to the struggle over the teaching of evolution in public high schools (Matsumura, 2001). During the 1970s, 22 states proposed that “creation science” and “evolution science” be taught side by side in classrooms, and two states, Louisiana and Arkansas, adopted the idea (Matsumura, 2001). The Arkansas statute required that public schools give balanced treatment and equal consideration and study to “creation science” and “evolution science.” The Arkansas law supported the teaching of creation science and stated the following.

Creation science includes scientific evidences and related inferences that indicate:

- (1) Sudden creation of the universe, energy, and life from nothing;
- (2) The insufficiency of mutation and natural selection in bringing about development of all living kinds from a single organism;
- (3) Changes only within fixed limits of originally created kinds of plants and animals;
- (4) Separate ancestry for man and apes;
- (5) Explanation of the earth’s geology by catastrophism, including the occurrence of a worldwide flood; and
- (6) A relatively recent inception of the earth and living kinds. (Singham, 2000a, p. 6)

As expected, a fury of courtroom battles followed in state and federal courts.

In 1982, a federal court found that the balanced treatment statute of the state of Arkansas violated the Establishment Clause of the U.S. Constitution (*McLean v. Arkansas Board of Education* [1982] 529 F. Supp. 1255). The decision was particularly important because it defined the characteristics and nature of science in detail, and declared that “creation science” was in fact not a science at all. The court also found that the Arkansas law did not have a secular purpose, noting that the statute used language peculiar to creationist literature in emphasizing origins of life as an aspect of the theory of evolution. The court noted that while the subject of life’s origins was within the scope of biology, the scientific community does not consider the subject as part of evolutionary theory, or the explanation of how life evolved after it originated. Thus, the absence or presence of a creator was considered essential for a discussion of the mechanisms evolution (Matsumura, 2001).

In Louisiana, the creationism dispute again forged its way to the U. S. Supreme Court. Louisiana officials defended the Louisiana Balanced Treatment for Creation-Science and Evolution-Science in Public School Instruction Act (1981), stating that the purpose of the act was to protect a legitimate secular interest, namely, academic freedom, by allowing alternative views to evolution to be included and hence, discussed in science education. In 1987, the Supreme Court held unconstitutional the Louisiana statute, and found that by advancing the belief that a supernatural being created humankind the “Creation Act” impermissibly endorsed religion and was in direct violation of the First Amendment of the Constitution (*Edwards v. Aguillard* [1987] 482 U.S. 578). In addition, the Court found that requiring evolutionary thought to be taught in congruence with creationist views served to undermine the integrity of science education.

After the second Supreme Court decision, religious fundamentalists continued their struggle for scientific credibility in courtrooms across the country throughout the early 90s, but never won any significant decision in a federal court (Matsumura, 2001). In response to these courtroom losses, the creationist movement in public education appeared to dissipate, until a born again Christian contemplating the reason for life itself found his way into a London bookstore and discovered a book that challenged evolutionary thought (Forrest & Gross, 2004). When Phillip Johnson returned to the U.S., he readied his pen and devised a new strategy for changing America's culture (Forrest & Gross, 2004).

#### Present-Day Creationists and Their Intelligent Design

Intelligent design is the latest attempt to infuse public education with religious thought under the guise of science education. The strategy was devised to wedge into American thought and eventually schools, with support from a newly created institute for studying intelligent design theory.

#### *Introducing the Wedge*

University of California-Berkley law professor Phillip Johnson and his conservative peers found the progress of scientific naturalists and the bloom of materialism in American culture revolting. Johnson (1997) stated

If we understand our own times, we will know that we should affirm the reality of God by challenging the domination of materialism and naturalism in the world of the mind. With the assistance of many friends I have developed a strategy for doing this...we call our strategy 'The Wedge'. (p. 3)

In 1992, Johnson—with the assistance of others of the Religious Right, such as Lehigh chemistry professor Michael Behe, Stephen Meyer and Bruce Chapman—began work on a new Christian platform based on English theologian William Paley’s original work (Forrest, 2001; Forrest & Gross, 2004). Paley, who penned *Natural Theology* in 1802, compared human complexity to that of a carefully manufactured watch. Paley’s argument held that since a watch cannot self-manufacture, neither could a human or any other complex organism, and therefore a creator must exist for complex living things and non-living things alike (cited in Boston, 2005). While an intelligent human could be the creator of a watch, Paley posited an intelligent, supernatural entity as the designer of complex living things on Earth. In Paley’s argument, Johnson saw the opportunity to provide evidence of a creator’s work (Forrest, 2001).

Paley’s theory was perhaps first presented as science in 1989 when Percival Davis and Dean H. Kenyon published *Of Pandas and People*, a biology textbook offering an alternative to evolution theory that served as a springboard for Johnson and his colleagues (Forrest, 2001). Although Davis and Kenyon pointedly use the term *intelligent design*, their book struck evolutionists as a creationist ploy to infiltrate science education curriculum. In fact, early editions of the text, produced before the 1987 decision of the Supreme Court in *Edwards v. Aguillard*, referred to intelligent design as creation science (Land, 2005).

As Forrest (2001, 2004) writes, the Wedge is a Christian movement developed by Johnson and his peers with a plan to undermine public support for the teaching of evolution, while at the same time cultivating a supposedly sound alternative: “intelligent design theory” (ID). The Wedge proposes “the salvation of Western Civilization” by,

among other things, removal of evolutionary education and institution of a Christian belief system in American society. The overall plan is thought to be simple but clever: Once the creationists validate their religious theories of origins in public science education, they can continue pressing for creationism in other forms. The ultimate goal, says creationist and staunch Wedge supporter Howard Ahmanson, Jr., is “the total integration of biblical law into our lives” (cited in Forrest & Gross, 2004, p. 8).

### *Intelligent Design and American Life*

Regardless of its strong creationist ties, the ID concept is different from other attempts at incorporating creationist viewpoints into public science education. ID downplays many of the features of traditional creationism and in that it does not attempt to explain the world through scripture and omits discussion of Genesis (Numbers, 2004; Scharmann, 2003; Staver, 2003; Young & Edis, 2004). Numbers (2004) contends that “the proponents of intelligent design have staked out a position somewhere between theistic evolution (the belief that God creates by means of evolution)...and scientific creationism on the other” (p. 51).

ID and Wedge supporters challenge naturalistic evolution in different venues by convincing state and local boards of education—such as Kansas and Pennsylvania—that ID should not replace evolution per se, but rather be taught as a sound concept in its own right as a scientifically valid, alternative theory describing the diversity and complexity of life (Moore, 2004). Supporters of ID successfully persuade educational leaders, politicians and even science teachers that currently unexplainable gaps in the fossil record and the “irreducible complexity” of some natural structures make evolution theory and natural selection theories in crises. Supporters of ID hold that many complex structures in

nature, such as the bacterial flagellum, serve a greater purpose than the sum of their parts, and that the structure could not have evolved from simple components in stepwise fashion. They argue that evolutionary theory—the scientific explanation how current life forms evolved from simpler, more primitive forms—cannot adequately document or explain the complete ancestry of all living things, including humans, and therefore is nothing more than an incomplete idea when compared to their own account of organismal complexity and diversity (Numbers, 2004). The ID movement is well-funded and business-savvy, with strong political support, and the experiences of two major Supreme Court losses on their side. The movement’s cornerstone, however, is a buzzing “scientific” center for research exploring their own ideas of life’s existence (Forrest, 2004).

#### *The Discovery Institute*

Founded in 1991 by former Reagan administration official Bruce Chapman, the Seattle-based Institute has an operating budget of over \$2 million (Slevin, 2005). Terry (2005) explains that ID has become such a central feature of the organization's work that it created a separate division, the Center for the Renewal of Science and Culture, to devote all of its time to that cause. To promote the concept of ID, the Institute works with 48 fellows, directors and advisors who are responsible for producing research, publishing texts and hosting conferences related to intelligent design theory. Researchers at the Discovery Institute claim to have found valid scientific evidence that the wealth of diversity and complexity of organisms on Earth stem not from the laws of genetics or inheritance, or theories of adaptation and evolution, but rather the work of a supreme being or supernatural intelligent designer. According to researchers at the Discovery

Institute, while data exist to support their discoveries, the information has not yet appeared in a peer-reviewed scientific journal (*Kitzmiller v. Dover Area School District* [2005] 342 F. Supp. 2688). Despite the lack of publication, the researchers' view is that all scientists—even those outside of the institute—should take into account an intelligent designer when explaining their work and the natural world (Johnson, 1997).

Intelligent design proponents have made certain that no direct reference to God is evident in their argument, primarily in fear of losing another legal decision citing the Establishment Clause and separation of church and state. Lawrence (2005) claims that Phillip Johnson has remained far away from current debates over intelligent design in our courts, fearing that a loss in federal court could open the door to a broader court ruling that bars the teaching of intelligent design in public school classrooms, effectively leaving Darwinism as the uncontested orthodoxy of our time. ID critics note that, other than space aliens, which is regarded as a joke, the only "designer" candidate ever fingered is God (Terry, 2004; 2005). These opponents see the ID concept as a faith-based initiative, not a scientifically-based concept, since ID lies outside of testable scientific theory. This position on ID is echoed by America's research institutions and organizations. Judge Jones refers to the opinion of the National Academy of Sciences, an organization that he and many others consider to be the most prestigious scientific organization in the country, in his decision in *Kitzmiller*

Creationism, intelligent design, and other claims of supernatural intervention in the origin of life or of species are not science because they are not testable by the methods of science. These claims subordinate observed data to statements based on authority, revelation, or religious belief. Documentation

offered in support of these claims is typically limited to the special publications of their advocates. These publications do not offer hypotheses subject to change in light of new data, new interpretations, or demonstration of error. This contrasts with science, where any hypothesis or theory always remains subject to the possibility of rejection or modification in the light of new knowledge. (*Kitzmiller v. Dover Area School District* [2005] 342 F. Supp. 2688, p. 69-70)

### *Intelligent Design in Public Secondary Schools*

In 1999 the Kansas Board of Education voted to adopt a new science curriculum for grades K-12 that did not include evolutionary concepts and to persuade students to look to Christian ideals when pondering the origins of life (Matsumura, 2001). One year later, two of the anti-evolution members were voted off the board and another resigned amid the outcry. At that time, the new school board reinserted evolutionary theory into the state science curriculum. Then, in the state school board elections of November 2004, conservatives once again grasped an edge in board seats. The debate over science standards was revisited in 2005, and the standards were again changed to remove evolution from state standards and to include alternative views to evolution, such as ID, in the state science curricula.

A similar debate in Ohio erupted in 2002 when the state revised its science curriculum to include space for alternative viewpoints to evolutionary theory. The state standards do not require districts to adopt such a curriculum; however, they do provide teachers and/or districts in the public school system to teach alternative viewpoints such as the idea of intelligent design to students in high school biology courses. If individual public school districts in Ohio allow the teaching of intelligent design alongside that of

evolutionary theory, lawsuits and public outcry, such as in Grantsburg, Wisconsin, are expected to follow (Hoff, 2002).

In June of 2004, the school board of Grantsburg, Wisconsin, voted unanimously to adopt a new science curriculum, which directed the science department to teach all theories of the origins of life. Although the Grantsburg School Board curriculum did not specify which theories should be taught, Phillips (2005) contends that intelligent design will have its fair share of time in the classroom. Parents have already expressed some concern with the school board decision. In November 2004 a letter was sent to the Grantsburg School Board and superintendent of schools from 300 biology and religious study faculty from 43 colleges and universities, both public and private, requesting that the school board revise its policy. According to Ripley (2005), an earlier letter, sent by 43 college deans from the state of Wisconsin, made a similar request, claiming that alternative theories of evolution, such as intelligent design, are nothing more than misinformed attacks upon complex, fact-based evolutionary thought combined with misleading, simplistic versions of evolution itself.

Also in 2004, U.S. District Judge Clarence Cooper heard arguments in a lawsuit challenging a disclaimer inserted into Cobb County science textbooks that states evolution is a theory, not fact (*Selman et al. v. Cobb County School District*, 390 F. Supp. 2d 1286). The sticker, affixed to biology textbooks in the district, also promotes the idea of intelligent design, and the results of an appeal of the original case are expected to have national implications since the school district is one of the country's largest. Judge Cooper assessed in 2005 that the purpose of the argument was arguably secular, however because it could also have the effect of advancing religion (Galley, 2004; Ripley, 2005).

Cooper decided against the textbook disclaimer, stating that it was in violation of the Establishment Clause of the U.S. Constitution (Land, 2005). Judge Cooper states

The Court believes that an informed, reasonable observer would interpret the Sticker to convey a message of endorsement of religion. That is, the Sticker sends a message to those who oppose evolution for religious reasons that they are favored members of the political community, while the Sticker sends a message to those who believe in evolution that they are political outsiders. (*Selman et al. v. Cobb County School District*, 390 F. Supp. 2d 1286).

The sticker case followed the decision of Kathy Cox, state school superintendent of Georgia, to remove the word *evolution* from science teaching standards. She reneged after receiving a plethora of complaints from constituents and science teachers, including one from former President Jimmy Carter (Galley, 2004).

#### *The Dover Case: Kitzmiller et al. v. the Dover Area School District*

Although important, none of the cases mentioned above reached the status of the case of *Kitzmiller et al. v. the Dover Area School District* ([2005] 342 F. Supp. 2688). In the fall of 2004, this Dover, Pennsylvania school board voted to include intelligent design in the district's high school science curriculum. The Dover Area School Board passed an amendment requiring biology teachers to read the following verbal disclaimer at the beginning of the evolution unit:

The Pennsylvania Academic Standards require students to learn about Darwin's Theory of Evolution and eventually to take a standardized test of which evolution is a part.

Because Darwin's Theory is a theory, it continues to be tested as new evidence is discovered. The Theory is not a fact. Gaps in the Theory exist for which there is no evidence. A theory is defined as a well-tested explanation that unifies a broad range of observations.

Intelligent Design is an explanation of the origin of life that differs from Darwin's view. The reference book, *Of Pandas and People*, is available for students who might be interested in gaining an understanding of what Intelligent Design actually involves.

With respect to any theory, students are encouraged to keep an open mind. The school leaves the discussion of the Origins of Life to individual students and their families. As a Standards-driven district, class instruction focuses upon preparing students to achieve proficiency on Standards-based assessments.

*(Kitzmiller v. Dover Area School District [2005] 342 F. Supp. 2688)*

The Dover board was the first in the country to require the teaching of ID as an alternative view to evolution, stating that the requirement serves a secular purpose, namely academic freedom. Immediately after the implementation of this ID policy, two school board members resigned in fear of an inevitable lawsuit over the board's decision. The two members saw the change in curriculum as a purposeful challenge to previous Supreme Court decisions regarding creationism in schools (Slevin, 2005). Biology teachers in Dover refused to read the disclaimer, and constructed a strongly worded declaration to the Dover Area School Board bearing their signatures,

You have indicated that students may 'opt-out' of this portion [the statement read to students at the beginning of the biology evolution unit] of the

class and that they will be excused and monitored by an administrator. We respectfully exercise our right to ‘opt-out’ of the statement portion of the class. We will relinquish the classroom to an administrator and we will monitor our own students. This request is based upon our considered opinion that reading the statement violates our responsibilities as professional educators as set forth in the Code of Professional Practice and Conduct for Educators.

INTELLIGENT DESIGN IS NOT SCIENCE.

INTELLIGENT DESIGN IS NOT BIOLOGY.

INTELLIGENT DESIGN IS NOT AN ACCEPTED SCIENTIFIC THEORY.

I believe that if I as the classroom teacher read the required statement, my students will inevitably (and understandably) believe that Intelligent Design is a valid scientific theory, perhaps on par with the theory of evolution. That is not true. To refer the students to ‘Of Pandas and People’ as if it is a scientific resource breaches my ethical obligation to provide them with scientific knowledge that is supported by recognized scientific proof or theory. (*Kitzmiller v. Dover Area School District* [2005] 342 F. Supp. 2688, p. 126-128; capitalized letters appear in the original statement).

With the refusal of science teachers to read the statement, school administrators, principals and superintendents alike, took the place of the biology teacher at the beginning of the evolution lesson and read the statement regarding evolution and intelligent design. Afterward, the parents of 11 students filed a lawsuit in a U.S. district court in Harrisburg, Pennsylvania that began in September 2005.

After testimony spanning nearly 2 months from experts on both sides of the debate, U.S. Federal District Judge John E. Jones, III, delivered a lengthy 139-page report. In his decision, Judge Jones found that the inclusion of ID in the Dover schools biology curriculum violated the Establishment Clause of the First Amendment of the U.S. Constitution and ordered the Dover Area School Board to cease its actions.

To preserve the separation of church and state mandated by the Establishment Clause of the First Amendment to the United States Constitution, and Art. I, § 3 of the Pennsylvania Constitution, we will enter an order permanently enjoining Defendants from maintaining the ID Policy in any school within the Dover Area School District, from requiring teachers to denigrate or disparage the scientific theory of evolution, and from requiring teachers to refer to a religious, alternative theory known as ID. (*Kitzmiller v. Dover Area School District* [2005] 342 F. Supp. 2688, p. 138)

The drama unfolding in this Pennsylvania town has gained much momentum nationwide, with even the president weighing in on the case. In reference to inclusion of intelligent design in science standards, President George W. Bush states

Both sides ought to be properly taught so people can understand what the debate is about...part of education is to expose people to different schools of thought...you're asking me whether or not people ought to be exposed to different ideas, and the answer is yes. (cited in Baker & Slevin, 2005, p. 1)

Bush's comments echo those of the majority of Americans (55%) who believe creationism should be taught alongside evolutionary theory in public science education classes (Lawrence, 2005)

John West, Associate Director of the Center for Science and Culture at Discovery Institute, says "The Dover decision is an attempt by an activist federal judge to stop the spread of a scientific idea and even to prevent criticism of Darwinian evolution through government-imposed censorship rather than open debate, and it won't work" (cited in Crowther, 2005, para. 2). Legal experts do not expect an appeal in this district, since Dover Area School Board members supporting ID were voted out of office in the fall of 2005 and current member voted 7-1 not to appeal the decision on their behalf (Associated Press, CNN News, 2006).

The debate over inclusion of intelligent design in high school science curriculum is surely not to end in Pennsylvania. As Casey Luskin, the attorney for the Discovery Institute states, "In the larger debate over intelligent design, this decision will be of minor significance...as we've repeatedly stressed, the ultimate validity of intelligent design will be determined...by the scientific evidence pointing to design." Luskin hints at further courtroom drama by acknowledging the ruling only applies to the federal district in which it was handed down (cited in Crowther, 2005, para. 6).

On December 15, 2005, just 5 days before the Dover decision, the 11th Circuit Court of Appeals began hearing the appeal of proponents of ID in the case of *Selman et al. v. Cobb County School District* (Land, 2005). Parents and civil rights groups are planning a lawsuit in Kansas over the state school board's decision to remove evolution from state high school science standards. These cases, or any other outside of Dover, could someday reach the Supreme Court for a landmark, final ruling on ID.

*Other Religious Perspectives on the Origins of Life and ID*

Terry (2004) states that perhaps what is most interesting about the ID debate is how adaptable the theory appears to all religious foundations and viewpoints. It appears as though ID was crafted for applicability into Muslim, Jewish, Catholic, Episcopal and Baptist discussions of the origins of life, since the intelligent designer is unnamed. Johnson and the Discovery Institute have been very careful to make certain that their theory is non-denominational in nature, of course, so that it span all religious arenas and has secular applicability and purpose.

Johnson and many of his colleagues are devout Catholics, but claim their fellowship has had very little impact upon their development of ID theory. However, a closer look at statements made by other Catholic pillars, such as author George Sim Johnston and Cardinal Christoph Schoenborn, reveals that Johnson's views mirror those of Catholic authorities. It appears that Catholicism's account of life's origins and Darwinian thought are two worldviews that meld as well as oil with water. Johnston and Schoenborn (2005) feel the only truth delivered by evolution and Darwinian thought is that of a common ancestor, which they contend is God. Johnston (2005) believes that the "Church has no problem with evolutionary theory...so long as divine causality is not left out of the picture" (para. 3). Each discredits most scientists as materialists.

The Catholic opinion of Darwinian thought is not the most vicious, however. Albert Mohler, president of the Southern Baptist Theological Seminary and radio show host, argues on behalf of Evangelical Baptists, and contends Darwinian thought and the theory of evolution are immoral and "inherently indignant" (Mohler, 2005, p. 1). He holds that creationism is foundational to all Christian belief. On the other end of the spectrum, Rabbi Brad Hirschfield believes that evolutionary theory and Darwinian

thought have a place in the world. He contends that Jewish intellectual culture is based upon healthy debate, and that those who hold opposing worldviews have much to benefit from one another. Hirschfield (2005) exclaims

Jewish tradition has always made room for both...the only unacceptable position in this debate between Intelligent Design folks and proponents of Darwin is the one that insists there is no room for both of these positions in our classrooms, homes and hearts. (para. 4)

Episcopalian Katherine Schori, the bishop of the Episcopal Diocese of Nevada, contends that “human beings are meant to be stewards of creation and revelation, and that mankind works in a partnership with God” (Schori, 2005, para. 2). She attributes the vast scientific advancements over the past few decades to this partnership and God’s work in the minds of scientists (Schori, 2005). The Episcopal view does not rest alone. According to Muslim Sulayman Nyang, a professor of African Studies at Howard University, Muslims “embrace much of the scientific argument about human origins”, but not all. The primary objection, of course, is that “Allah was responsible for creating man, not a primordial soup” (Nyang, 2005, para.3).

### Pseudoscience, Creation Science and Intelligent Design

#### *Definition of Pseudoscience*

*Pseudoscience* is defined as “a system of theories, assumptions, and methods erroneously regarded as scientific” (Merriam-Webster Online Dictionary, 2005), and is generally assigned a negative connotation. Ideas such as creation science and intelligent design fall into the category of pseudoscience since they fail to meet the criteria of scientific principle: lack of empirical evidence, unfalsifiability, or failure to comply with

scientific method (Duschl, 1990). It is important to note, however, that reasonable scientific theories, such as those of evolution and Darwin's natural selection, have been referred to as "pseudoscience" by those who support alternative views, such as ID (Scott, 2004; Singham, 2000a). Therefore, the source of the label may be of more importance than the label itself.

Intelligent design theory fails to meet the requirements of scientific theory as set forth by leading scientific organizations in the U.S., such as the National Academy of Sciences (NAS) and the American Association for the Advancement of Science (AAAS), and is considered by scientists to be pseudoscientific in nature (*Kitzmiller v. Dover Area School District* [2005] 342 F. Supp. 2688). ID does not lend itself to testing in a laboratory, and like creation science, relies upon the inconclusiveness of other theories for validation, which does not follow the prescribed manner in which science is conducted according to the nature of science (Duschl, 1990).

#### *Impact of Pseudoscience on Society*

The social issue surrounding pseudoscience is the impact that false pretenses have upon society and culture. Pseudoscientific strategies can permeate scientific thought and education, resulting in immediate harm to believers of the pseudoscientific principle. Such examples are late-night television infomercials peddling cure-all medicines, promising an extended life or better health without scientific foundation. In these cases, and in others like that of intelligent design, pseudoscience is perpetuated as deliberate deception for financial or political benefit, in the process defacing or devaluing entire bodies of otherwise sound scientific principle.

In the case of educating our children, passing along ID or creation science as founded scientific principle can create more confusion about what science entails amongst youngsters who already have very little understanding of the nature of science, or how science really works. Understanding the nature of science is of importance for a scientifically literate and informed society (Dawson, Lederman & Tobin, 2004; Duschl, 1990).

#### Relevance for Leaders of Education

Although evolutionary science is taught as an integral part of biology curriculum at the post-secondary level, it is my experience as a biology teacher of both college and high school curriculum that the topic is reduced or eliminated in high school. Although creationists, such as Phillip Johnson and the Discovery Institute claim that evolution is a theory in crisis, the real crisis surrounding the theory of evolution is not with the theory itself, but rather with the teaching of evolution, and furthermore the teaching of biology and other sciences, especially at the secondary level (Duschl, 1990).

The Fordham Institute's 2005 State of State Science Standards study found that even though the majority of states in our nation have revised or restructured its science standards over the past 5 years, public school science curriculum is no better now than in 2000, when the last analysis was completed. Unfortunately for our country, 15 states received failing grades for its approach to science education, "signifying either that they have no real standards for their science program, or that their standards are so vague and weak as to be meaningless" (The Fordham Institute's 2005 State of State Science Standards, p. 3). Florida is one of those states (Gross, 2005).

The data relating to the state of science and technology in our country is alarming: India and China are currently turning out 6 and 8 times as many scientists and engineers than the U.S., respectively (Gross, 2005). This is due in part to the perception of science as irrelevant and an apparent lack of interest by public school students. The ID issue serves as a perfect example of how scientific thought inquiry has been passed over in favor of less challenging or intellectually demanding explanations of the natural world. Since the last Fordham Institute analysis in 2000, the state school board of Kansas has adopted curriculum that includes ID, and several other states are revisiting their science standards and pondering inclusion of ID as an alternative to evolutionary theory (Gross, 2005). Florida will be revising state science standards in 2007 (Pinzur & Walker, 2005), and governor Jeb Bush has indicated that students of his state should be provided with alternative views to evolution in Florida's classrooms (Matus, 2005).

So how can educational leaders impact student achievement in science and positively contribute to America's ability to produce knowledgeable scientists, at the request and business and industry? The solutions are relatively complex, but not out of grasp. As one possibility, educational leaders can heed the lessons learned by those in Pennsylvania and make certain that all biology—and science—students receive the best education possible, and use their influence and power in the educational setting to ensure excellence in instruction.

#### *It Starts with Informed Teachers*

One reason biology teachers must practice their craft is glaring: Two-thirds of Americans believe that creationism is the only plausible explanation of complexity in nature and should be taught in lieu of, or at the very least balanced with, evolutionary

theory in American public schools (Trani, 2004). The landscape is much different in other countries such as those of Western Europe and East Asia, where 80% and 95% of each population, respectively, support the teaching of evolution in schools.

Even when the environment for teaching evolution is suitable, some teachers still refrain from teaching sound science due to their own creationist views (Trani, 2004). It is estimated that one-third of all secondary school biology teachers support ID in some form, and that another third placed little or no emphasis on evolution while teaching the standard biology course (Alles, 2005).

Contributing to the problem is the difficulty of understanding the basis for complex biological concepts by instructors at any level. It has been my experience as a department chair of a high school science department that few biology teachers in secondary education are considered to be experts in the field (i.e., holding a degree in biology or related discipline), and the problem is worsening as school districts continue to expand and highly qualified science teachers become harder to find. Scientifically literate secondary science teachers, especially those with scientific backgrounds, are becoming an endangered species, so to speak, in the system of education, partly due to our apparent inability to produce enough scientists nationwide and the desire of those that we do produce to make careers in practical scientific settings, such as laboratories or engineering centers (Nancy Johnson Marsh, Secondary Science Supervisor for the School District of Hillsborough County, Florida, personal communications, December 2005).

Educational leaders must be selective in their hiring practices when it comes to science. They must prevent falling prey to the just-put-a-human-in-the-room mentality that often comes over principals when positions remain unfilled as new school years

approach. Better strategies for finding teachers of science must be employed by district personnel, and incentives must be offered to lure scientists into the field of education. For example, the School District of Hillsborough County has chosen a progressive approach to filling the 50 or more annual secondary science vacancies by flying outstanding science teachers from the district to national conferences, such as that of the National Science Teachers Association (NSTA), to recruit science teachers from other parts of the country to Tampa, Florida. The benefit to this strategy, says Nancy Johnson Marsh, the Secondary Science Supervisor for the School District of Hillsborough County, Florida, is that “teachers who attend these conferences are often some of the best in their chosen craft,” and luring even a few of these excellent teachers away from other states into Hillsborough County’s school system “can only help to improve science courses for our community’s children” (personal communications, December 2005).

#### *The Science Funding Issue*

Inadequate funding has created problems for science teachers abroad, but especially here in the United States, where science classrooms and laboratories built during the scientific revolution of 1960s are in dire need of repair and renovation. There is a lack of science funding at all levels in our nation, including at the federal level where President George W. Bush has cut science grants for the fourth year in a row. The Bush administration’s *No Child Left Behind Act of 2001* (U.S. Senate and House of Representatives, 2002) is also partly to blame, since funding for other purposes, such as high stakes testing, has made the slice of pie served to science education even smaller (Terry, 2005).

As other disciplines deal with the shortages by moving into digital, paperless experiences for students, science teachers themselves may be complicating funding matters even worse. While many science and biology teachers, including myself, still subscribe whole-heartedly to Huxley's ideas of "hands-on" scientific experiences as the best way to learn, in this process they spend copious amounts of cash purchasing consumable supplies for dissections and test tubes. While social studies and math teachers overcome the burden of simply incorporating technology into their classrooms, science teachers grapple with letting go of real-life laboratory experiences for their cheaper, more practical digital facsimiles. Indecision over how to approach science education has resulted in a misappropriation of funding for science courses, which are already suffering from financial malnourishment. Leaders in science education, like myself, have much work to do on this issue.

Other funding pressures for science education come from its inability to conform in other means. Other subject areas (e.g., math, English, and social studies) enjoy the luxuries of getting by in tough times with textbooks, pencils, paper, chalk and erasers. Educational leaders in science, such as myself, cringe at the thought of teaching our field by the way of lecture and text only. Uniformed taxpayers, school board members and administrators fail to understand the cost of science supplemental and laboratory supplies; consequently, more often than not the result is that science education simply receives an equal share—not an appropriate share—of the school's budget, as I have witnessed firsthand in my high school and other schools in my district. What exists as a minimal budget for an English department, then, is an insult to a science department

chair, such as myself, attempting to provide even of the most basic hands-on science experience for the students.

If students in America's schools lack science skill and knowledge largely in part to their disinterest, the equipment missing in high school science laboratories may be at the heart of the problem. How can students be passionate about something they have never seen or used? Digital probes, digital microscopes and other technologies are essential to spurring interest in America's youth and increasing the ability of our country to produce literate scientists, such as those in other industrialized countries.

What has painstakingly debilitated science education over the past 25 years has fueled the opposition's lot as well. Lack of science supplies and minimal laboratory experiences has led to yet another problem for biology teachers attempting to teach evolution in schools. The ID advocates have found it easy to prey on these poorly funded districts by simply seizing upon the opportunity to supplement science teaching with a free text or two, as was the case with *Of Pandas and People* in Dover (*Kitzmiller v. Dover Area School District* [2005] 342 F. Supp. 2688).

Since the ID approach does not lend itself to inquiry-based instruction in a laboratory, schools that fail to teach science in Huxley's manner are no threat to ID's core concepts. The expensive cost of science teaching and inadequate funding has leveled the playing field for the ID competition, who, with the support of organizations such as the Discovery Institute, can easily provide equitable education of their ideas.

Educational leaders at all levels can alleviate funding issues by tackling the problem directly. From school boards to principals, those developing budgets for science courses and departments must remain cognizant of the costs associated with offering such

a program. Alternative funding sources, such as local businesses and private medical practices, can be tapped into as sources for funding science in schools. Science laboratories, hospitals, and even police departments can be summoned for donations of equipment.

### Summary and Concluding Thoughts

This discussion focused upon the following five themes that dealt with the history of political, social and cultural views upon science education in America, creationist objections to K-12 public science education curricula and resulting case law, the intelligent design movement and legal cases, how ID qualifies as a pseudoscience, and implications of the ID debate for educational leaders. The discussion will maintain relevance as Florida revisits its Sunshine State Standards for Science in the midst of the intelligent design controversy.

In the years after Darwin's explanation of the mechanism of evolution—the process of natural selection—religious objections to its validity and inclusion in public science education arose. The controversy surrounding the teaching of evolution is a cultural, emotional and personal issue, and has been for decades. The debate has been played out in courtrooms across the country, most recently in Dover, Pennsylvania, where intelligent design was hailed by religious supporters and conservative politicians as a valid scientific principle to be taught public high schools alongside of evolutionary theory. Like creation science before it, ID was struck down in a federal court decision in 2005 for violating the First Amendment and the Establishment Clause of the U.S. Constitution.

Intelligent design is considered by scientists to be pseudoscience since it falls short of the criteria of scientific principle: lack of empirical evidence, unfalsifiability, and failure to comply with scientific method. The scientific perspective is that unsubstantiated pseudoscientific principles create misconceptions and can have a deleterious effect upon science education and the nation's ability to produce knowledgeable scientists.

Educational leaders can prevent further cases of pseudoscience from entering the domain of scientific curricula and ensure that valid scientific principles are taught in public schools in a variety of ways. As one possibility, educational leaders can heed the lessons learned by those in Pennsylvania and make certain that all biology—and science—students receive the best education possible, and use their influence and power in the educational setting to ensure excellence in instruction. Careful attention to science standards and textbook choice, adequate funding for science curricula including laboratory experiences for students, and hiring and retention of qualified science teachers are some of the means by which educational leaders can improve the lot of science education at the site-based level.

The current conservative administration of the United States has—and will continue to—have an effect upon the views of Americans nationwide in regard to the inclusion of creationist ideas, such as ID, into public high school science curricula. As states across the nation reassess their science education standards, cases similar to those of Georgia, Kansas and Pennsylvania will probably become more prevalent. These cases, or any other outside of Dover, could someday reach the Supreme Court for a landmark, final ruling on ID.

Florida is scheduled to revise its K-12 state science standards in 2007 (Matus, 2005). The current Sunshine State Standards for Science make no mention of evolutionary theory and only two references to natural selection as an agent of biological change (Sunshine State Standards for Science, Florida Department of Education, 1995). This contributed to Florida receiving a failing grade for its K-12 science education in the Fordham Institute's 2005 State of State Science Standards. As state and district standards are being reviewed, ID has become a hot topic in local news surrounding the upcoming standards revision and subsequent adoption of new science textbooks for secondary science education, such as in Pinellas County, Florida (Blair, 2006). The governor has weighed in on his belief that alternatives to those of Darwin should be explored in the state's science classrooms (Matus, 2005).

Although in the recent Dover case the pendulum has appeared to swing in favor of those who support science education devoid of creationist worldviews, the pendulum will undoubtedly swing back in the future, as it has so many times in the past. The intelligent design movement, as creation science and fundamentalism before it, may pass, however the debate over what constitutes science will surely be a part of America's social, cultural, and political landscapes for many years to come. Only through stronger teaching of scientific principle, and greater understanding of the nature of science itself, can the swinging pendulum be halted.

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### ***Professional Biography for Larry Plank***

Larry R. Plank, M.S., is the instructional leader of eight teachers in the science department at Robinson High School, in Tampa, Florida. Plank earned a Bachelors degree in Biological Sciences from Florida State University in 1997, and a Master's degree in Biology from the University of South Florida in 2000. He is currently enrolled in a specialist program at the University of South Florida in Educational Leadership with an anticipated completion date of May 2006. He plans to continue his education in a doctoral program at U.S.F. with an emphasis on new teacher induction and mentoring. In addition to these academic accomplishments, Plank has also been recognized as an Endeavor Academy Technology Leader in Science (2003), Accomplished Teaching Academy graduate (2003), and Project CRISS Training graduate (2001).

Plank currently serves as a co-chairperson of the school's steering committee, of which he has been a member since 2001. He is also a member of the school's literacy committee and served as the Deputy Chairperson for the school's 2004 S.A.C.S. evaluation. In addition to these professional duties, Plank serves as a site-based liaison for the Greater Access Program supported by the Hillsborough Advanced Placement Incentive (HAPI) grant and as the school-based mentor in the Teachers and teaching Initiative (TTI) sponsored by the Council for Educational Change and funded by the Wachovia Foundation. Two of his most important roles, however, are that of National Honor Society sponsor and coach of the R.H.S. Science Team, which finished third of 23 schools in the district's competition in the 2001 Science Bowl.

Plank was selected by his peers as Robinson's Teacher of the Year in 2005 and as the school's mentor teacher in 2004. Also in 2004, Plank was recognized as the *Sigma Xi* Science Teacher of the Year for Hillsborough County. His six-year teaching experience includes Advanced Placement Biology, Honors and Gifted Biology, Biology, Honors and Gifted Chemistry, Honors and Gifted Integrated Science and Integrated Science. He is certificated in Biology, grades 6-12.