

## **Kitzmiller, et al. v. Dover Area School District - Expert Report**

Robert T. Pennock, Ph.D.

### **I. Basis of my expertise**

I am Associate Professor of Science & Technology Studies at Michigan State University's Lyman Briggs School of Science and Associate Professor of Philosophy in the Department of Philosophy. I'm also a faculty member in MSU's Ecology & Evolutionary Biology and Behavior Program and in the Department of Computer Science.

My Ph.D. was in History and Philosophy of Science from the University of Pittsburgh. My dissertation advisor was Wesley Salmon, whose causal-mechanical account is the most important contemporary analysis of the nature of scientific explanation. My dissertation was on the nature of evidence in science, especially on causal reasoning. I have also done research on naturalism as a National Endowment for the Humanities Summer Institute Fellow.

I have studied the creationist movement for over 20 years, focusing especially on the intelligent design creationists since the early 1990's. I have published over a dozen articles on philosophical issues in the creationism debate and a book *Tower of Babel: The Evidence against the New Creationism*. I also edited *Intelligent Design Creationism and its Critics: Philosophical, Theological and Scientific Perspectives*, which is the most complete source book on the topic, and am currently editing a collection of new articles that rebut the claims of Jonathan Wells' book *Icons of Evolution*.

I also do scientific research on experimental evolution and evolutionary design using evolving computer organisms, including work showing how evolutionary mechanisms can produce the kinds of complex features creationists say is impossible. I am a member of the

education committee of the Society for the Study of Evolution, the international professional organization for evolutionary biologists.

I have published numerous papers and given well over a hundred invited talks on these subjects at universities and professional conferences nationally and internationally. With regard to creationism in particular, I have testified on the subject before State Boards of Education, assisted legislators dealing with proposed intelligent design legislation, and helped in school districts in cases where individual teachers have taught intelligent design. I am the founder and current board president of Michigan Citizens for Science, which works to defend and promote sound science education in Michigan.

I have won two awards given by the Templeton Foundation for my writing and teaching on issues in science and religion. I am on the National Advisory Board of Americans United for Separation of Church and State.

I grew up and attended public schools in central Pennsylvania.

## **II. General Opinion**

In my considered opinion, allowing so-called intelligent design (ID) to be included as part of a science class would have the effect of introducing material that is not only unscientific, but is essentially religious in nature. Like other kinds of creationism, the ID movement rejects the scientific findings of evolution and posits instead creation by a supernatural entity. This is a truly radical proposition. To teach such a view, under whatever name, is not only to dismiss well-established scientific findings that are a fundamental part of biology in favor of an unsupported religious belief, but also to reject the very nature of science. In what follows, I will explain the reasons and evidence for this general opinion in detail, but here is a brief abstract of my opinion.

Science as it is understood by practicing scientists is not so much a list of conclusions as it is a set of methods for investigating the physical world and thereby adding or revising conclusions. ID departs from the acceptable methodological practice of science from the very first step, in appealing to a realm beyond nature. The concept of “design” as it is used by ID theorists is inherently supernatural. Science does not reject the supernatural dogmatically, but rather because such claims cannot be tested by empirical evidence. One will look in vain in the peer-reviewed scientific literature for any method that could be used to confirm supernatural hypotheses. By its own admission, ID wants to “change the ground rules of science” by allowing supernatural “explanations”. However, without any acceptable method to test such hypotheses, ID has no positive evidence for its core claim. Like earlier forms of creationism, it can do no more than try to win by default by claiming that there are “weaknesses” in evolutionary theory and pointing to “problems” that science purportedly cannot explain, such as what ID proponents call “irreducible complexity”. ID theory also makes specific commitments to theological propositions that identify it as a theistic view, and even a narrowly sectarian view. However, even if one were to overlook these aspects of the view, ID remains at base inherently supernaturalistic. By virtue of that fact alone it is not science, but religion.

### **III. The nature and substance of the intelligent design movement**

I base my opinion on the nature of the intelligent design movement and its substantive claims upon reading and analyzing hundreds of articles, books, films, interviews, and internet postings by its leaders and members, and from listening to them give talks to both supporters and opponents. With some fifteen years of material to draw upon, much of it highly repetitive, one can easily document their views from a wide range of sources, but I will support my opinions here with just some representative quotations drawn mostly from the core leaders of the

movement. In this and in subsequent sections, I will point out ways that ID concepts are exemplified in their text *Of Pandas and People* (the ID “reference book” cited in the Dover curriculum), but it will be equally important to pay attention to other sources of ID materials since it is likely that students will search the Internet as well as the library if they are asked to research the topic. I will not base my opinion upon any assessment of ID creationists’ religious motivations or their connections with other religious organizations, although these are easily documented and relevant to the case at hand, but will confine my analysis to their substantive claims.

### 3.1. The defining concepts of the ID movement

Phillip Johnson is the main pioneer, strategist, and intellectual leader of the ID movement. Others in the movement recognize him as the “leading edge” of what they call “the wedge” of intelligent design, so to understand what ID is one should always look first to him. As Johnson articulates it, **the defining concept of the ID movement is theistic realism.**

My colleagues and I speak of “theistic realism”—or sometimes, “mere creation”—as the defining concept of our movement. This means that we affirm that God is objectively real as Creator, and that the reality of God is tangibly recorded in evidence accessible to science, particularly in biology. (Johnson 1996)

More specifically, this is the God of the New Testament. According to Johnson, **“Either the gospel of Christ is the centerpiece of a new order or it’s nothing.”** (Johnson 2002)<sup>1</sup> He regularly points out that the starting point for intelligent design is John 1 which says: “In the beginning was the word.” William Dembski, another ID leader, cites the same Scripture in

---

<sup>1</sup> Here and elsewhere, I use bold typeface to highlight salient points, whereas terms in quotations that are italicized for emphasis are in the original.

giving a definition of the basic content of intelligent design: “**Intelligent design is the Logos of John’s Gospel restated in the idiom of information theory.**” (Dembski 1999, p. 84)

This sets forth in a nutshell the defining presuppositions of intelligent design. Their other fundamental claims are built upon this foundation. Here are four key elements of the view:

- (1) ID asserts that a transcendent, immaterial, supernatural designer purposefully created biological and physical complexities.
- (2) ID asserts that the naturalistic ground rules of science should be rejected and replaced with a revolutionary “theistic science”.
- (3) ID asserts that the scientific, naturalistic theory of evolution and all other parts of science that deal with functional complexity are false, as is *any* possible naturalistic theory of functional complexity.
- (4) ID asserts that theological views under which evolution and religion are compatible (such as theistic evolution) are unacceptable.

Although the terminology is slightly different in a few points, these central claims are identical to those of creation science, the earlier version of creationism that attempted to bypass the wall of separation by not explicitly mentioning the Bible and claiming to be science. The ID movement aims to provide a big tent for a wide range of creationist views, and for this reason it refuses to take an explicit stand on some claims that are found in creation science, which divide “young earth” creationists from “old earth” creationists.<sup>2</sup> I will focus mostly on the minimal set of

---

<sup>2</sup> The general term “creationism” refers to any view that rejects evolution in favor of the action of some personal, supernatural creator. Creationism is not limited to Bible-based views. Other religions have their own creation accounts that may be in conflict with evolution. For instance, some fundamentalist Hindu sects, like the Hare Krishnas, reject evolution in favor of their own specific theistic account. Many Native American tribal groups do as well, as do various Pagan religions.

Even Bible-based creationism comes in many varieties. For instance, some creationists hold that creation occurred in six literal days just six to ten thousand years ago (“young earth” creationism). Other creationists read Genesis in a different literal manner to allow room for billions of years (“old earth” creationism). Some creationists insist on a global, catastrophic flood, while others hold to a global but tranquil flood, while others think the flood was local. Intelligent design is an alliance of young-earth and old-earth creationists.

Although ID leaders sometimes try to suggest that creationism refers only to young-earth creationism in order to claim the ID is not creationism, they have elsewhere granted this definition of creationism. For instance, Johnson defines creationism:

(continued...)

common commitments, since that is a sufficient basis for the conclusion that ID is not science but religion. However, it is important to note at the outset, and keep in mind throughout, that all the characteristic young earth creation science claims would be brought into the classroom under the general heading of intelligent design, in the following manner.

The ID movement attempts to unite various creationist factions against their common enemy under a banner of “mere creation” or “design” by temporarily setting aside internal differences. As Johnson told *Christianity Today*, “People of differing theological views should learn who’s close to them, form alliances and put aside divisive issues ‘til later.” Aiming to quell the battle between young and old-earthers to redirect their energies in tandem against evolutionists, he continued: “I say after we’ve settled the issue of a Creator, we’ll have a wonderful time arguing about the age of the Earth.” (Quoted in (Walker 1998))

---

(continued...)

‘Creationism’ means belief in creation in a... general sense. Persons ... are ‘creationists’ if they believe that a supernatural Creator not only initiated this process but in some meaningful sense *controls* it in furtherance of a purpose. Johnson, P. E. (1991). Darwin on Trial. Washington, D.C., Regnery Gateway. This is just what ID holds. William Dembski, in a section he devotes to getting the terminology straight, writes:

The only thing one can say for certain is that to reject fully naturalistic evolution is to accept some form of creationism broadly construed, i.e., the belief that God or some intelligent agent has produced life with a purpose in mind. Young earth creationism certainly falls under such a broad construal of creationism, but is hardly coextensive with creationism in this broad sense. Dembski, W. A. (1995). "What Every Theologian Should Know about Creation, Evolution, and Design." Center for Interdisciplinary Studies Transactions 3(2): 1-8.

ID theorists have at times explicitly referred to each other as creationists. I will use intelligent design (ID) and intelligent design creationism (IDC) interchangeably.

It is also important to be clear that not all religions are creationist. Many religions and theological traditions accept the scientific understanding of evolution and so are not forms of creationism. The Catholic Church and most mainline Protestant denominations, for instance, do not take evolution to be in conflict with Christian faith, holding that God could have ordained the evolutionary mechanism as the process for creating the biological world. These views are not creationist, but rather are forms of theistic evolution. As noted, ID explicitly rejects theistic evolution.

The critical point with regard to “teaching the controversy” in the schools is that, when Intelligent Design Creationists (“IDCs”) differ, they believe that their differences may not be excluded from the curriculum. Since IDC includes young-earthers, this means that all the standard young-earth creation science arguments are to be included under the ID heading. I will illustrate this briefly with the example of how they handle *common descent*, which refers to the basic fact of evolution, namely that all organisms have descended with modification from common ancestors, forming a great “tree of life”.

In public settings, IDCs will often make it sound as if they object only to the Darwinian evolutionary mechanism, and otherwise accept that evolution occurred. Michael Behe wrote recently in the *New York Times* “Intelligent design proponents do question whether random mutation and natural selection completely explain the deep structure of life. But they do not doubt that evolution occurred.” (Behe 2005) However, Dean Kenyon and Percival Davies, the authors of *Pandas*, explicitly reject common descent, as do other core ID leaders such as Paul Nelson. William Dembski allows that organisms have undergone some change through natural history, but like proponents of creation science says this occurred only within strict limits, and holds that human beings were specially created. (Dembski 1995) Indeed, Behe is the only ID leader who gets mentioned as not necessarily rejecting common descent. Dembski acknowledges this disagreement within the big tent and then says that their disputes should be included in the schools.

**Design theorists themselves are divided on [the question of common descent].** Dean Kenyon and Percival Davis, for instance, argue against common descent... Michael Behe provisionally accepts common descent. Nonetheless design theorists agree that **discussion of this question must not be shut down simply because a majority of biologists happen to embrace common descent.** The limits of evolutionary change form a legitimate topic of scientific inquiry. **It is therefore illegitimate to exclude this topic from public school science curricula.** (Dembski 1999, p. 250)

In *Pandas* the authors actually go further *and explicitly contrast intelligent design with common descent* (what they call “natural descent”) claiming, for instance, that homologous structures found in different organisms do not indicate common ancestry. Rather they assert that living things are a “mosaic” of fixed patterns that have been “assembled in various patterns, not unlike subroutines in a computer program.” (Davis and Kenyon 1993, p. 33)

The IDC big tent principle of inclusion means that any of the standard creation science claims may be taught in the public schools under the ID banner as a “legitimate topic of scientific inquiry” no matter how at odds it is with the settled findings of science. Besides being divided on the issue of common descent, IDC’s are similarly divided on whether the earth is billions of years old or only six to ten thousand years old and whether or not there was a global, catastrophic flood. *Pandas* author Percival Davis rejects the accepted geological age of the earth in favor of the young earth view. He rejects plate tectonics. He argues that a global, catastrophic flood caused the major geographical features of the planet. (Frair and Davis 1983) These and other such claims are basic creation science views and many are shared by Paul Nelson and other young-earthers in the ID movement. Allowing ID into the schools thus allows all these views perforce.

Anecdotally, this appears to be what happens in practice. In recent cases I have dealt with in two school districts in Michigan, three individual teachers taught intelligent design in their science classes on their own, and included such standard creation science views and materials under that heading.

Returning now to their central assertions, the basic commitment of ID theory is its rejection of naturalism. IDCs assert that natural processes are in principle incapable of explaining the complexity of the biological world. As Dembski puts it:

The fundamental claim of intelligent design is straightforward and easily intelligible, namely, **there are natural systems that are in principle incapable of being explained in terms of natural causes** and that exhibit features that in any other circumstance we would attribute to intelligence. (Dembski 2004)

According to ID theory, no natural causes—neither natural law nor chance nor any combination thereof—can produce complex functional systems, which they claim are cases of “irreducible complexity” or “complex specified information.” Dembski insists that only an immaterial intelligent cause can create such complexity “*ex nihilo*.” (Dembski 2002, 162) Since ID holds that the world does exhibit such biological complexity, **they are fundamentally committed to supernatural creation *ex nihilo***. In line with their defining commitment to theistic realism, their speeches and writings always try to focus attention on this issue of naturalism. Asked what are the major issues in the debate over naturalism, Phillip Johnson explained:

The most important question is whether God is real or imaginary. Did God create man or did man create God? The latter is the teaching of evolutionary naturalism, and even many Christian thinkers tacitly assume that position. (Christianbook.com 2000)

IDCs reject what they call sciences “naturalistic creation story”. Johnson elsewhere points out the importance of this:

If you have a biblical creation story, then getting the right relationship with God and getting to heaven are the most important things. If you throw that overboard and you have a naturalistic creation story, those things become unimportant and what becomes important is how we apply scientific knowledge to make a heaven here on earth. (Quoted in (Goode 1999))

#### **IV. ID is not science**

*Although IDCs, like creation scientists, use the term science to describe their view, their “alternative theory” is fundamentally at odds with what is currently understood as the nature of science. As noted above, their defining commitment is to explanation in terms of immaterial,*

*supernatural agents. In proposing this, IDCs are departing from what they themselves acknowledge are “the ground rules of science.” Their self-proclaimed revolutionary theistic science aims to overturn the way that science has been practiced in modern times and to “fundamentally change our conception” of science.*

#### **4.1. ID rejects basic methodological constraints of science**

If science is understood as its set of conclusions, then ID theory clearly does not count as science, because it rejects central elements of evolutionary theory that are well established and fundamental. But even more important than specific conclusions (which in science are open to revision on the basis of new evidence), are the methods of science. IDC’s so-called “theistic science” rejects science’s methodology and therefore does not belong within the subject. ID theory, like creation science, abrupt appearance theory, and so on are attempts to put a scientific veneer on a narrow religious view to try to garner the prestige of science and the forum of the science classroom. (Pennock 2002)

As we have seen, the defining element of IDC is its essential reliance upon supernatural beings and powers—entities that are unconstrained by either lawful necessity or chance processes. The ID movement thus rejects a basic element of scientific empirical evidence, namely that explanations appeal only to natural causal processes. Scientific explanations need not cite a specific law of nature, but they are always understood to be restricted to the physical realm of law-bound cause and effect relations. In science this is a principle of method, not a

metaphysical dogma. This is typically spoken of as *methodological naturalism* in contrast to metaphysical naturalism (also sometimes referred to as ontological or philosophical naturalism).<sup>3</sup>

Historically, people did appeal to the supernatural. Epilepsy was a “sacred disease” and said to result from possession. Lightning bolts were thrown by Zeus. Sick livestock were explained by a hex. Even Newton posited that God nudged the planets to keep them from falling into the sun. However, it has been many centuries since science took such “explanations” seriously. Supernaturalism is not allowed, as will be discussed in more detail below, because it is not testable. Methodological naturalism is not unique to evolutionary biology, but holds throughout all contemporary sciences.<sup>4</sup>

Moreover, there is no sign that science is about to redefine itself or return to a pre-modern view. I did a database search to see if I could find cases where science might be reintroducing appeal to the supernatural. Several journals did include studies that examined peoples’ *beliefs* in the supernatural—such as people in KwaZulu/Natal, South Africa, who attributed certain forms of diarrhea to supernatural causation, or in Gabon, who blamed certain fevers on the supernatural design of malicious spirits or witches—but these studies considered these beliefs only insofar as they affected quality of medical care, for instance. I did find one case, albeit in a journal devoted to alternative medicine, in which the author proposed a

---

<sup>3</sup> ID theorists regularly conflate methodological and metaphysical naturalism and charge science with itself being a religion. This is a mistake. Since this is a principle of method only, science is neutral with regard to the metaphysical existence of God.

<sup>4</sup> Indeed, this principle in science is no different from modern understanding of legal reasoning. A supernatural theistic science is no more reasonable than a supernatural theistic legal system. (Pennock 1999). The fact that courts prosecuted witchcraft in the past does not mean that such claims would or should be countenanced today. Courts do not take seriously any claims or defenses based on supernatural intervention, nor should they. If, as IDCs propose, science should be redefined to allow in the supernatural, then the law would have to be redefined as well.

supernatural explanation for the assumed healing effects of prayer. Yet even this was significant in that the author explicitly granted that such a possibility was unprovable scientifically.

[N]onlocal effects can be conceived of as naturalistic; that is, they are explained by physical laws that may be unbelievable or unfamiliar to most physicians but that are nonetheless becoming recognized as operant laws of the natural universe. The concept of the supernatural, however, is something altogether different, and is, by definition, outside of or beyond nature. Herein may reside an either wholly or partly transcendent Creator-God who is believed by many to heal through means that transcend the laws of the created universe, both its local and nonlocal elements, and that are thus inherently inaccessible to and unknowable by science. (Levin 1996)

The authors of *Pandas* recognize this as well:

Archaeology has pioneered the development of methods for distinguishing the effects of natural and intelligent causes. We should recognize, however, that if we go further, and conclude that the intelligence responsible for biological origins is outside the universe (supernatural) or within it, we do so without the help of science. (Davis and Kenyon 1993)

#### 4.2. **IDCs themselves recognize that their view is not science.**

The ID movement itself recognizes that their view stands in opposition to science. One finds this not only in the leaked Discovery Institute “Wedge” document, which discusses overturning what they see as the anti-theistic assumptions of modernism, but throughout ID writings. I’ll just give a few examples. William Dembski writes:

**The scientific picture of the world championed since the Enlightenment is not just wrong but massively wrong.** Indeed entire fields of inquiry, especially in the human sciences... need to be rethought from the ground up in terms of intelligent design. (Dembski 1999, p. 224)

Another ID theorist, J. P. Moreland expressed the conviction that ID is not science by coining a new term:

If (naturalists) want to define science in naturalistic terms, then **we can define a new term, creascience, that allows for the recognition of discontinuities in nature that indicate the intentional, immediate intervention of a first cause that resembles a person.** Note, if God does not exist, or if he has never intervened in the world through primary causality, then science and creascience are empirically equivalent and equally

adequate approaches to the study of nature. The main difference between science and creascience is that the latter allows for the possibility that primary causality has occurred and can be recognized. (Moreland 1989)

Here we see another conceptual link to creation science even in Moreland's choice for the roots of his coined word. Whatever one calls it, IDCs themselves recognize that it is not science.

Philip Johnson made the same point in a criticism of Michael Denton, who was an inspiration for early IDCs but who had backed away from his rejection of common descent. Denton still rejects the Darwinian mechanism but thinks that purposeful complexity can be seen as the result of natural laws. Johnson said that "the restrictions of naturalism" would force Denton out of his view:

The problem is, there is no non-Darwinian natural mechanism available to do the work of building biological complexity. There's no alternative science to be done using Denton's approach. So, if one asks, what are scientists actually going to do with Denton's ideas?—well, **I don't think there is any prospect for their success as science...** There is no intellectually viable midpoint between naturalism and intelligent design. (Nelson, Behe et al. 1999)

In his latest book, Dembski says that intelligent design is a revolutionary doctrine "that **will fundamentally change our conception of science** and the world". He emphasizes this key point again a moment later, writing that:

...there is good reason to think intelligent design fits the bill as a genuine scientific revolution. Indeed, it is challenging not merely the grand idol of evolutionary biology (Darwinism) but **it is also changing the ground rules by which the natural sciences are conducted**. Ever since Darwin, the natural sciences have rejected the idea that intelligent causes could play a substantive, empirically significant role in the natural world. Intelligent causes might emerge out of a blind evolutionary process but were in no way fundamental to the operation of the world. Intelligent design challenges this exclusion of design from the natural sciences. In so doing, **it promises to remake science and the world**. (Dembski 2004, p. 19)

### 4.3. IDCs define key terms in unscientific ways

According to Dembski, “Naturalistic explanations by definition exclude appeals to intelligent agency.” (Dembski 2002, p. 162) Again, this would not be so if design is used in ordinary scientific sense, for example, as when archeologists identify something as an artifact—pottery, for instance—from an ancient people. Science understands people as being a part of the natural causal order. IDC rules out any such natural notion. In Dembski’s discussion of what he calls his “explanatory filter” he provides the technical definition upon which his “design inference” rests: Design is just “the set-theoretic complement of necessity and/or chance.” (Dembski 1998) That is to say, design is defined by negation in ID theory, as whatever is not constrained by any natural law (“necessity”) or chance process. As they sometimes put it, design just means “transcending natural causes.” To be accurate, IDCs should just say non-natural or supernatural and leave it at that.<sup>5</sup>

According to ID theory, not even extra-terrestrial or human intelligences are actually natural, but rather are supernatural, immaterial intelligences that are somehow “embodied”. Remember, the basic ID claim is that material processes cannot in principle produce novel functional complexity. No bodies or brains, or natural forces of any kind can do this, they argue, so intelligence cannot be even a supervenient or an emergent property of matter.<sup>6</sup> Thus, if human beings were natural beings we could not truly be intelligent designers in their sense of the term. Under the assumption that we can produce complex information, as they hold, it can only

---

<sup>5</sup> Again, it is important to recognize that the supernatural does not mean what “outside” the universe, which might still be a part of nature and covered by physical law, but rather what is unconstrained by the lawful causal structure of nature. Supernatural spirits are believed to operate “inside” the universe as well.

<sup>6</sup> Put simply, these are properties that arise at higher levels of organization.

be because our true selves are immaterial spirits that somehow inhabit a body. Dembski, for instance, claims that human intellect can never be explained in natural, scientific terms.

[T]he facts point resoundingly to a very imperfect understanding of man in purely scientific categories; that sound philosophy is consistent with this finding, indicating that scientific categories may well be inadequate for a complete understanding of man; and the historic Judeo-Christian theology, by looking to transcendence in both man and God, affirms that this state of affairs will continue. (Dembski 1990)

He explains what he calls “the historical Judeo-Christian position on mind and body” as holding that “the human being unites physical body and immaterial spirit into a living soul” and emphasizes that “this position demands an expanded ontology: unlike semi-materialism with its commitment to supervenience, the historic position does not see spirit as a derivative of the complex physical system that makes up the human body.” (Dembski 1990) Dembski cites *Genesis* as well as the Gospels as the basis of this view.<sup>7</sup> The term “design” in the ID vocabulary refers to the supposed third ontological (metaphysical) category.

IDCs also view evolution in a non-scientific manner. In particular, we have already seen how they define evolution as making metaphysical claims, in contrast to the metaphysically neutral way that scientists understand it. Moreover, like creation-scientists, IDCs holds that evolutionary processes can never increase complexity, but can only stay the same or, more likely, lose information. Dembski, for example, writes:

If we see evolution as progressive in the sense that the capacities of organisms get honed and false starts get weeded out by natural selection over time, then it seems implausible that a wise and benevolent designer might want to guide such a process. But if we think of evolution as regressive, as reflecting a distorted moral structure that takes human rebellion against the designer as a starting point, then it’s possible a flawless designer

---

<sup>7</sup> He writes, for example: “The position as I have stated it is but a straightforward restatement of the *Genesis* account of man’s creation: ‘The LORD God formed the man from the dust of the ground [body] and breathed into his nostrils the breath of life [spirit], and the man became a living being [soul].’” Dembski, W. A. (1990). "Converting Matter into Mind: Alchemy and the Philosopher's Stone in Cognitive Science." *Perspectives on Science and Christian Faith* 42(4): 202-226. He also cites Paul and James from the New Testament.

might use a very imperfect evolutionary process as a means of bringing a prodigal universe back to its senses. (Dembski 2004, p. 62)

This notion might better be called devolution than evolution. Needless to say, such notions are not scientific, but are inherently religious in character.

#### **4.4. ID offers no positive evidence, just alleged “problems” with evolution**

For all their protestations that ID is a scientific theory, IDCs seem to be supremely uninterested either in stating specific testable hypotheses or in providing evidence. It is revealing that William Dembski, in a book that purportedly is about “answering the toughest questions about intelligent design”, begins with a motto taken from Blaise Pascal: “People almost invariably arrive at their beliefs not on the basis of proof but on the basis of what they find attractive.” (Dembski 2004) But to accept a belief because one finds it attractive is wishful thinking, not science.

In *Pandas*, the ID textbook recommended in Dover, the authors say outright that the characteristics of the intelligent designer cannot be discovered scientifically and that this must be left to “religion and philosophy.” (Davis and Kenyon 1993, p. 7) This is another sign of how unscientific is the ID notion of design. Under ordinary conditions, scientists can sometimes draw conclusions that a human being created something because we have considerable background information about the causal abilities and motivations of human beings. We have observed them designing and creating artifacts and know a lot about their purposes so that we are in a position to judge the results. However, even within the constraints of methodological naturalism, we would have no such ground for any judgments whatsoever about an unnamed, undescribed and completely nebulous natural designer, let alone the supernatural ones that ID posits.

So, what do creationist “explanations” come down to? *Pandas* is typical in that it declines to offer anything beyond the bare, vague claim that the property in question was designed. For instance:

Is there any alternative explanation for the marsupial bones and pouches other than that they are homologous and therefore evidence for common ancestry? Yes, another theory is that marsupials were all designed with these reproductive structures. (Davis and Kenyon 1993, p. 125)

*Pandas* goes on to admit that they can give no reason for why the intelligent designer would give such structures to one group of animals and not another: “Even if it is assumed that an intelligent designer did indeed have a good reason for every decision that was made, and for including every trait in each organism, it does not follow that such reasons will be obvious to us” (Davis and Kenyon 1993, p. 125). Again, there is no scientific content to this notion of “design”—on their definition the term just means that the cause was supernatural.

Only occasionally do we get a more specific idea of what ID theorists have in mind. Philip Johnson gave the example of the peacock, saying that it is something an “uncaring evolutionary process would never allow to develop” but which is “just the kind of creature that a whimsical Creator might favor.” (Johnson 1991, p. 31) It is hard to see how any such “explanation” in terms of **divine whimsy** could be taken seriously by any science as we understand the notion today.

Besides the specific examples above and similar ones from *Pandas* of purported problems that evolution cannot explain, IDCs make a more general claim about an entire class of systems that they claim evolution cannot explain, specifically ones that involve what they call “specified complexity” (Dembski) and “irreducible complexity” (Behe). These concepts stand at the base of what IDCs claim is how they can detect design, in the same way that they did for

creation science.<sup>8</sup> This design inference supposedly works by means of an “explanatory filter”, whereby one first tries to explain a phenomenon using law and then by chance. If neither of these works, then one should conclude that the phenomenon was the result of design. In the same way that creation scientists proposed to prove creation simply by showing things evolution purportedly cannot explain (what is known as an argument from ignorance), this tries to get a conclusion by default without ever having to present any positive evidence. Dembski seems to think this is not a problem, saying that “An argument from ignorance is still better than a pipe dream in which you’re deluding yourself. I’m at least admitting to ignorance as opposed to pretending that you’ve solved the problem when you haven’t.” (Quoted in (Monastersky 2001))

Among the many flaws with Dembski’s argument, his tripartite classification of necessity, chance and design is neither mutually exclusive nor jointly exhaustive in the ordinary senses of those terms. As noted above, he gives a technical definition of “design” as the “set-theoretic complement” of the other two, but this negative definition certainly does not capture the ordinary content of the concept, which is orthogonal to chance and necessity. That is to say,

---

<sup>8</sup> For instance, all the main elements of Dembski’s argument for design and even some details like the example of Mount Rushmore and the SETI project, were previously made by young-earth creation scientists such as A. E. Wilder-Smith and, especially, Norman Giesler, who was a creationist expert witness at the Arkansas ‘balanced-treatment’ trial. (Pennock 1999). Henry Morris, the young-earth creationist who developed the notion of creation science, has recently chided Dembski for giving arguments that he had previously made but just under a different name.

[I]t is not really a new approach, using basically the same evidence and arguments used for years by scientific creationists but made to appear more sophisticated with complex nomenclature and argumentation....Dembski uses the term “specified complexity” as the main criterion for recognizing design. This has essentially the same meaning as “organized complexity,” which is more meaningful and which I have often used myself. He refers to the Borel number (1 in 10<sup>50</sup>) as what he calls a “universal probability bound,” below which chance is precluded. He himself calculates the total conceivable number of specified events throughout cosmic history to be 10<sup>150</sup> with one chance out of that number as being the limit of chance. In a book written a quarter of a century ago, I had estimated this number to be 10<sup>110</sup>, and had also referred to the Borel number for comparison. His treatment did add the term “universal probability bound” to the rhetoric.” Morris, H. (2005). "The Design Revelation." [Back to Genesis 194a](#).

Morris even points out that Behe’s example of the bacterial flagellum was already given by creation scientists.

if design is understood in the ordinary sense, then it is entirely included within chance and necessity, and his design inference thus fails to get off the ground. It is an example of a false dilemma (or here, a false trilemma). Moreover, Dembski's concept of specified complexity or complex specified information (CSI) is not clearly defined or applicable to biological information in the manner he claims. We cannot say whether any real biological pattern exhibits actual CSI. There is no way to assess the probability in any real biological case, and Dembski's notion of after-the-fact specification is similarly problematic. Even the value of universal probability bound, which is essential in Dembski's inference, is an open question; Dembski dismisses out of hand important hypotheses in physics that suggests the possibility of multiple universes that would completely undermine his set figure. Leaving these problems aside, it is simplest to just directly refute the illustrative cases he has specified.<sup>9</sup> For instance, Dembski says that Behe's notion of irreducible complexity is an example of specified complexity. My colleagues and I have demonstrated experimentally that a Darwinian mechanism can discover irreducible complex system(Lenski, Ofria et al. 2003). The basic IDC claim that it is impossible in principle for the natural evolutionary mechanisms to produce irreducible complexity is not persuasive when one can observe evolution do just that.

However, if design is understood in the supernatural sense, then it is not amenable to test. There is no way to have a controlled experiment to test the efficacy of the claimed causal factor. Nor can one infer from what is known of natural designers.

---

<sup>9</sup> I have shown this for several specific cases Dembski and others have given, such as phone numbers (Pennock 1999), Dürer woodprints (Pennock 2001) and so on.

#### 4.5. Testability

Supernaturalism is not included within science because it is untestable. Indeed, introducing the supernatural undermines the very basis for empirical testing. The first and most basic characteristic of supernatural agents and powers is that they are above and beyond the natural world and its agents and powers. Indeed, this is the very definition of the term. They are not constrained by natural laws or chance processes. A second characteristic of the supernatural is that it is inherently mysterious to us. As natural beings, our knowledge all comes via natural laws and processes. If we could apply natural knowledge to understand supernatural powers, then, again by definition, they would not be supernatural. The lawful regularities of our experience do not apply to the supernatural world. If there are other sorts of supernatural “laws” that govern that world, they can be nothing like those that we understand. Occult entities and powers are profoundly mysterious to us. The same point holds about divine beings—we cannot know what they would or would not do in any given case. Scientific models must be judged on natural grounds of evidence, for we have no supernatural ground upon which to stand. A final relevant element of the notion of the supernatural is that supernatural beings and powers are not controllable by humans. If we can control the natural world it is only because the world is governed by physical laws that must be “obeyed” even when we are pulling the strings, whereas the very idea of the supernatural is that it stands above natural laws and thus outside the possibility of our control.

These characteristics of the supernatural show why supernatural explanations are excluded from scientific theorizing. Science operates by empirical principles of observational testing; hypotheses must be confirmed or disconfirmed by reference to intersubjectively accessible empirical data. One supports a hypothesis by showing that certain consequences obtain, which would follow if what is hypothesized were to be so in fact. Darwin spent most of

the *Origin of Species* applying this procedure, demonstrating how a wide variety of biological phenomena could have been produced by (and thus explained by) the simple causal processes he discovered. But supernatural theories can give us no guidance about what follows or does not follow from their supernatural components.

The appeal to supernatural forces is always available for we can cite no necessary constraints upon the powers of supernatural agents. This is just the picture of God that Johnson presents. He says that God could create out of nothing or use evolution if He wanted (Johnson 1991, pp. 14, 113); God is “omnipotent.” (Johnson 1991, p. 113). He says God creates in the “furtherance of a purpose,” (Johnson 1991, p. 4) but that God’s purposes are “inscrutable” (Johnson 1991, p. 71) and “mysterious”(Johnson 1991, p. 67). A god that is all-powerful and whose will is inscrutable can be called upon to “explain” *any* event in any situation, and this is one reason for science’s methodological prohibition against such appeals. Leaving the designer unnamed and undescribed has the same effect. Given this feature, supernatural hypotheses remain immune from disconfirmation or meaningful testing.

Experimentation requires observation and *control* of the variables. We confirm causal laws by performing controlled experiments in which the hypothesized independent variable is made to vary while all other factors are held constant so that we can observe the effect on the dependent variable. But we have no control over supernatural entities or forces; hence these cannot be scientifically studied.

Finally, if we were to allow science to appeal to supernatural powers even though they could not be tested, then the scientist’s task would become just too easy. One would always be able to call upon the gods for quick theoretical assistance in any circumstance. Once such supernatural explanations are permitted they could be used in chemistry and physics as easily as

creationists have used them in biology, geology and linguistics. Indeed, all empirical investigation could cease, for scientists would have a ready-made answer for everything. For example, consider *Pandas* author Davis's alternative creationist explanation of the many general similarities among animals (such as common reactions of humans, rats, and monkeys to drugs). These, he and his co-author Wayne Frair say, "can be explained as originating in basic design given by the Creator. Evolution is not needed to account for the similarities." (Frair and Davis 1983, p. 14) In short the "explanation" does not go beyond claiming that this pattern is so because the Creator designed it so. There is no way to test this kind of one-size-fits-all explanation.<sup>10</sup>

Regarding the charge that ID theory is not testable, *Pandas* first tries to shrug off the problem, saying that ID theory is "not unique in its flexibility" but then it tries to claim that ID is falsifiable in one way:

[T]he concept of ID predicts that complex information ... never arises from purely chemical or physical antecedents... Experience will show that only intelligent agency gives rise to functional information. All that is necessary to falsify the hypothesis of ID is to show confirmed instances of purely physical or chemical antecedents producing such information. (Davis and Kenyon 1993, p. 160)

IDCs repeat this single example whenever challenged, but it shows just how hollow and far-removed from science the IDC view is. Once again, it makes clear that "design" is not being used in the ordinary sense, for it does not follow as a prediction from the hypothesis (or even the fact) that something was created by design that purely chemical and physical antecedents could not also do so. Moreover, even if we grant the conditional using ID theorists' supernatural notion of design, an example of the sort mentioned hardly functions as a test. If it did, then we could as easily say we have tested hypotheses such as "Complex information never arises

---

<sup>10</sup> The above summary is excerpted from a more detailed discussion of testability in (Pennock 1999, Ch. 6).

without the help of elves” or “Lightning bolts never form unless Zeus throws them” or “You can never be in good health unless your chakras are aligned” by showing natural processes that account for lightning and good health. For the same reasons noted above, all such supernatural hypotheses are untouched by any possible observation. The electrical experiments that demonstrate electromagnetic theory (under the normal constraints of methodological naturalism) tell us nothing about whether Zeus was or was not pitching from beyond the natural realm. A person could be in good health or bad health with charkas aligned or misaligned for all anyone can tell. If we do point to cases of functional information arising through natural processes (as I and others have already done), can we really be sure that the elves were not secretly helping?

Again, the point here is that the scientific methodological principle of restricting appeals to natural causal processes is perfectly reasonable. Allowing appeals to the supernatural undermines the very notion of an empirical test.

Do IDCs have any other method to offer? It is hard to tell whether Philip Johnson is serious about a couple of suggestions he has made:

Science is committed by definition to... find[ing] truth by observation, experiment, and calculation rather than by studying sacred books or achieving mystical states of mind. It may well be, however, that there are certain questions... that cannot be answered by the methods available to our science. These may include not only broad philosophical issues such as whether the universe has a purpose, but also questions we have become accustomed to think of as empirical, such as how life first began or how complex biological systems were put together.

It is unclear why we should think that sacred books and mystical states of mind may be able to answer such questions. If IDCs are serious about such “methods”, they do not say how this may be done, so there seems to be no good reason to join their revolution to overturn natural science.

#### 4.6. Calling ID a science does not make it one

A famous philosopher posed the following question: If you call a tail a leg, how many legs does a dog have? The answer, he said, is *Four*; calling a tail a leg doesn't make it one. Calling intelligent design creationism an "alternative scientific theory" and using scientific-sounding terminology does not make it a science now any more than it did for creation science. ID theory rejects both fundamental conclusions and basic methodological constraints of science. It posits an unnamed and undescribed supernatural designer as its sole explanatory principle. It provides no positive evidence for its extraordinary claims. And because it cannot stand on the evidential ground that science requires it tries to change the ground rules of science. Even by its own lights, ID theory is not science.

#### V. ID is religion

*The ID movement is not just a religious view in a general, non-denominational sense, but also in a sectarian sense. Just as creation-science took Old Testament claims as fundamental, the ID movement takes New Testament claims as the basis for its "theistic science." Its advocates claim that design theory puts Christianity into the realm of objective fact. Nor is this even a mainstream version of Christianity, but rather a specific theological view that explicitly rules out various other religions as well as other standard Christian views. To admit ID into the public schools would be to advance one particular religious view over others. However, even if ID was not based on a particular sectarian view and even if it did not explicitly mention God, it would still be religious simply because of its base reliance upon supernatural beings.*

When speaking to a small audience of apparent supporters, IDCs can be straightforward in describing their theory as religious. In a talk I heard him give to a campus evangelical Christian group, ID leader Walter Bradley got a good laugh when he said that intelligent design

is “the politically correct way to say God.” In a talk I heard William Dembski give, he too seemed to recommend this political advantage of ID, pointing out at the end how he had been able to explain their ideas—for instance, how the designer doesn’t create the world like a watchmaker and let it run on its own like a watch, but plays it like a violinist—”without using the G-word.” In the public square, however, IDCs will deny that their view is religious. Michael Behe, for instance, recently wrote: “The theory of intelligent design is not a religiously based idea, even though devout people opposed to the teaching of evolution cite it in their arguments. ...[I]ntelligent design itself says nothing about the religious concept of a creator.” (Behe 2005) However, as we have already seen in some of the ID literature quoted above, such denials are not credible. In fact, ID does make essential commitments to God, both directly and indirectly.

### **5.1. ID is inherently theistic**

Behe himself, almost immediately after making the above denial, goes on to explain irreducible complexity as an example of William Paley’s design argument, which is classical argument for the existence of God. Stephen Meyer, one of the authors of the appendix in *Pandas*, explains ID as being “the return of the god hypothesis” in one of his articles. (Meyer 1999) William Dembski writes that “The crucial breakthrough of the intelligent design movement has been to show that this great theological truth—that God acts in the world by dispersing information—also has scientific content.” (Dembski, 1999, pp. 233) Phillip Johnson has revealed the theistic nature of intelligent design in many places, including a recent interview on the American Family Radio:

Our strategy has been to change the subject a bit so that we can get the issue of intelligent design, which really means the reality of God, before the academic world and into the schools. (Phillip Johnson, American Family Radio, Jan 10, 2003 broadcast)

Elsewhere he explains how the ID movement's defining concept of theistic realism "assumes that the universe and all its creatures were brought into existence for a purpose by God. Theistic realists expect this 'fact' of creation to have empirical, observable consequences that are different from the consequences one would observe if the universe were the product of nonrational causes..." (Johnson 1995, p. 208-209)

Indeed, IDCs regularly claim that accepting evolution and naturalism takes more faith than religion and that such thinking is superstitious and irrational. For instance, Johnson writes: "I've had an opportunity to see how influential naturalistic thinking is, I want to show people how to identify it and contrast it with genuinely theistic reasoning." (Johnson 1995) According to Johnson, "[R]ational thinking is God-based thinking." (Johnson 1995) This, purportedly, is what intelligent design provides.

## **5.2. ID is not just general theism, but sectarian religion**

We have already noted how Dembski explains that "Intelligent design is the Logos of John's Gospel restated in the idiom of information theory." (William Dembski, Jul/Aug 1999, Touchstone, p. 84) He elsewhere advances a "Law of Priority in Creation" and explains it this way:

The creator is always strictly greater than the creature. It is not possible for the creature to equal the creator, much less surpass the creator. The Law of Priority in Creation is a conservation law. It states in the clearest possible terms that you can't get something for nothing. There are no free lunches. (Dembski 1990, 222)

Dembski writes that he would like to see this law elevated to a status comparable with the laws of thermodynamics, but says that he cannot take credit for the law:

The law is not new with me. It is found in Scripture: 'Jesus has been found worthy of greater honor than Moses, just as the builder of a house has greater honor than the house itself.'" (Dembski 1990, 222)

In his later writings for secular audience he again puts this in “the idiom of information theory” and renames it the “Law of Conservation of Information”, claiming that it is a “4<sup>th</sup> Law” of Thermodynamics.

Johnson also emphasizes the New Testament basis of intelligent design. Here is how one sympathetic writer reported about an intelligent design event:

A conference on “Mere Creation” at Biola University in suburban Los Angeles brought together an unprecedented cross-disciplinary gathering of 200 men and women—mostly academics and mostly Christians—interested in building a credible origins model based on “theistic design.”

“This isn’t really, and never has been, a debate about science... It’s about religion and philosophy.” Mr. Johnson also insists the real issue in the century-old debate isn’t even about the early chapters of Genesis. “I turn instead to John 1,” says the astute Presbyterian layman, “where we’re told that ‘In the beginning was the word.’” (Belz 1996)

One can easily extend such a list documenting the religious nature of ID. Stephen Meyer, citing Paley, argues that the astonishing functional complexity of the world “could not originate strictly through the blind forces of nature”, and claims that ID theory supports “a Judeo-Christian understanding of Creation.” ID advocate Nancy Pearcey writes, “By uncovering evidence that natural phenomena are best accounted for by Intelligence, Mind, and Purpose, the theory of Intelligent Design reconnects religion to the realm of public knowledge. It takes Christianity out of the sphere of noncognitive value and restores it to the realm of objective fact, so that it can once more take a place at the table of public discourse.” (Pearcey 2004, pp. 72-73) And in his blurb for Pearcey’s book on intelligent design *Total Truth*, Michael Behe is forthright about the religious nature of ID writing: “With marvelous clarity of thought and prose, Pearcey explains how modern science reinforces Christianity—and why more Christians should be aware of it.”

### 5.3. ID explicitly rejects other theological views

To allow intelligent design in the public schools would be to privilege a narrow theological view over other religious beliefs. Most significantly, ID theory explicitly rejects theistic evolution, a theologically mainstream view that takes evolution and belief in God to be compatible. In the Introduction to the ID anthology *Mere Creation*, Dembski writes:

Intelligent design is logically compatible with everything from utterly discontinuous creations (e.g., God intervening at every conceivable point to create new species) to the most far-ranging evolution (e.g., God seamlessly melding all organisms together into one great tree of life). (Dembski 1998)

However, in his next breath, he says,

That said, intelligent design is incompatible with what typically is meant by theistic evolution....theistic evolution is no different from atheistic evolution. (Dembski 1998)

Elsewhere Dembski has written:

*Design theorists are no friends of theistic evolution.* As far as design theorists are concerned, theistic evolution is American evangelicalism's ill-conceived accommodation to Darwinism. [Emphasis in original] (Dembski 1995, p. 3)

Philip Johnson is equally blunt, saying that theistic evolution is a “disastrous accommodation” to Darwinism that provides “a veneer of biblical and Christian interpretation... to camouflage a fundamentally naturalistic creation story.” (Johnson 2002, p. 137) He elsewhere said that theistic evolutionary views are “bogus intellectual systems” that read the Bible “figuratively rather than literally” (Johnson 1997, p. 111).

ID also explicitly rejects deistic and various other religious views. For instance, Dembski says that Deism is only a “logical possibility” but that ID rejects it because “there is no evidence for it” and interactive design is a better fit with the fact that “information tends to appear discretely at particular times and places.... [Deism] restricts design to structuring the laws of nature and thereby precludes design from violating those laws and thus violating nature's causal structure.” (Dembski 2002, pp. 344-347). He dismisses Hinduism as “religious naturalism”,

writing that “There can be no transcendent God within such a framework. These gods of the Vedas are not prior to nature but intrinsic to it.” Dembski says that both the Hindu and the Greek gods “are pathetic because nature’s fundamental laws can always overrule them.” (Dembski 1999, pp. 101-102)

## **VI. Conclusion**

ID’s claims that it isn’t religious are not credible. Standard definitions of religion focus on belief in the supernatural and in some transcendent realm. God need not be mentioned explicitly. Thus, even if ID were taught “without mentioning the G-word” it would still be religious. ID’s defining element of theistic realism, its basic inclusion of transcendent entities and powers, and its explicit rejection of even the possibility of theistic evolution all make explicitly religious commitments, as do many other of its claims.

Science, on the other hand, is neutral and non-dogmatic with regard to metaphysical possibilities. As I have noted, naturalism in science is a methodological view, not a metaphysical dogma. Science takes no stand with regard to the metaphysical possibility of supernatural entities or powers. Neither evolution nor any other science affirms or denies the possible existence of God or other transcendent beings. If someone were to find a way to empirically confirm the existence of an immaterial designer or any other supernatural being, science should change its methodology. However, there is no evidence in the scientific literature that supernatural hypotheses are being considered and it is hard to imagine how that could possibly change without undermining the very notion of empirical evidence. ID and other creationist views want to appeal to transcendent beings, but have not provided an acceptable alternative method to test such appeals. ID remains at base inherently supernaturalistic. By virtue of that fact alone it is not science, but religion.

## References

- Behe, M. (2005). Design for Living. The New York Times. New York.
- Belz, J. (1996). Witnesses for the Prosecution: Darwin on Trial author brings together anti-Darwin coalition to bring down evolution. World Magazine. **11**: 18.
- Christianbook.com (2000). Interview: Phillip Johnson.
- Davis, P. and D. H. Kenyon (1993). Of Pandas and People. Dallas, Texas, Haughton Publishing Co.
- Dembski, W. A. (1990). "Converting Matter into Mind: Alchemy and the Philosopher's Stone in Cognitive Science." Perspectives on Science and Christian Faith **42**(4): 202-226.
- Dembski, W. A. (1995). "What Every Theologian Should Know about Creation, Evolution, and Design." Center for Interdisciplinary Studies Transactions **3**(2): 1-8.
- Dembski, W. A. (1998). The Design Inference: Eliminating Chance through Small Probabilities. Cambridge; New York, Cambridge University Press.
- Dembski, W. A. (1998). Mere creation : science, faith & intelligent design. Downers Grove, Ill., InterVarsity Press.
- Dembski, W. A. (1999). Intelligent Design: The Bridge Between Science & Theology. Downers Grove, InterVarsity Press.
- Dembski, W. A. (1999). "Signs of Intelligence: A Primer on the Discernment of Intelligent Design." Touchstone **12**(4): 76-84.
- Dembski, W. A. (2002). No Free Lunch: Why Specified Complexity Cannot Be Purchased without Intelligence. Lanham, Rowman & Littlefield Publishers, Inc.
- Dembski, W. A. (2004). The Design Revolution: Answering The Toughest Questions About

- Intelligent Design. Downers Grove, IL, InterVarsity Press.
- Frair, W. and P. Davis (1983). A Case for Creation. Chicago, Moody Press.
- Goode, S. (1999). Johnson Challenges Advocates of Evolution. Insight.
- Johnson, P. (1995). "Reason in the Balance: An Interview with Phil Johnson about His Forthcoming Book." The Real Issue.
- Johnson, P. E. (1991). Darwin on Trial. Washington, D.C., Regnery Gateway.
- Johnson, P. E. (1995). Reason in the Balance: The Case Against Naturalism in Science, Law & Education. Downers Grove, IL, InterVarsity Press.
- Johnson, P. E. (1996). Starting a Conversation about Evolution: A review of *The Battle of the Beginnings: Why Neither Side is Winning the Creation-Evolution Debate* by Del Ratzsch. Access Research Network.
- Johnson, P. E. (1997). Defeating Darwinism. Downers Grove, IL, InterVarsity Press.
- Johnson, P. E. (2002). Recognizing the Power of Religion. Touchstone. **15**: 12.
- Johnson, P. E. (2002). The Right Questions: Truth, Meaning and Public Debate. Downers Grove, IL, Intervarsity Press.
- Lenski, R. E., C. Ofria, R. Pennock, C. Adami. (2003). "The evolutionary origin of complex features." *Nature* **423**: 139-144.
- Levin, J. S. (1996). "How prayer heals: a theoretical model." Altern Ther Health Med **2**(1): 66-73.
- Meyer, S. C. (1999). "The return of the god hypothesis." Journal of Interdisciplinary Studies **XI**(1/2): 1-38.
- Monastersky, R. (2001). "Seeking Deity in the Details." Chronicle of Higher Education **48**(17).
- Moreland, J. P. (1989). Christianity and the Nature of Science: A Philosophical Investigation.

Grand Rapids, MI, Baker Book House.

Morris, H. (2005). "The Design Revelation." Back to Genesis **194a**.

Nelson, P., M. Behe, et al. (1999). "A Roundtable on Nature's Destiny." Origins & Design **19:2(37):** 1-11.

Pearcey, N. R. (2004). Darwin Meets the Barenstain Bears: Evolution as a Total Worldview. Uncommon Dissent: Intellectuals Who Find Darwinism Unconvincing. W. A. Dembski. Wilmington, DE, ISI Books: 53-73.

Pennock, R. T. (1999). Tower of Babel: The Evidence against the New Creationism. Cambridge, MA, The MIT Press.

Pennock, R. T. (2001). The Wizards of ID: reply to Dembski. Intelligent Design Creationism and Its Critics: Philosophical, Theological and Scientific Perspectives. R. T. Pennock. Cambridge MA, The MIT Press: 645-667.

Pennock, R. T. (2002). "Should creationism be taught in the public schools?" Science & Education **11(2)**.

Walker, K. (1998). Young-earth theory gains advocates. Christianity Today.