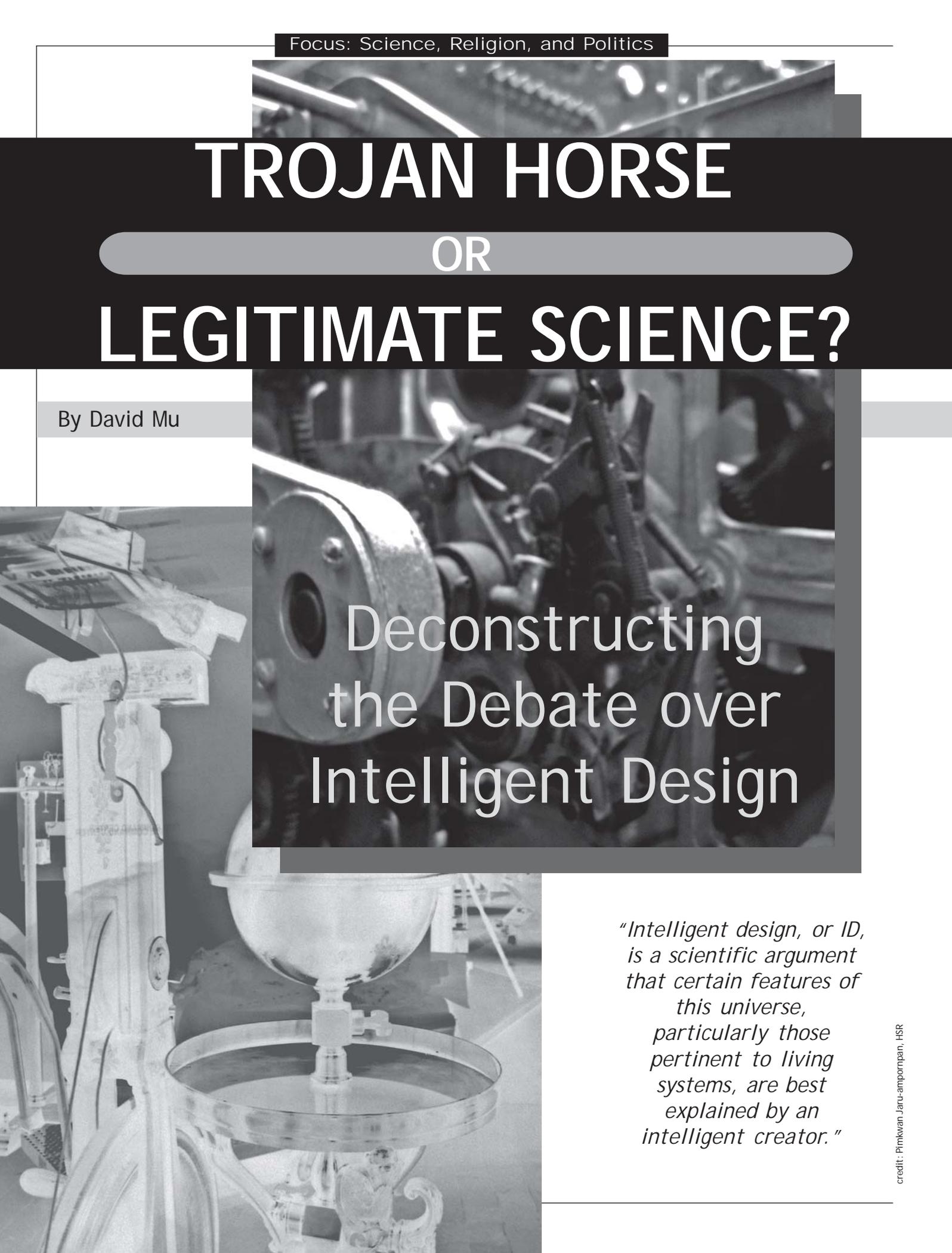


TROJAN HORSE OR LEGITIMATE SCIENCE?

By David Mu



Deconstructing
the Debate over
Intelligent Design

"Intelligent design, or ID, is a scientific argument that certain features of this universe, particularly those pertinent to living systems, are best explained by an intelligent creator."

Think back to your ninth grade biology class. You enter the spacious class room doubling up as a makeshift laboratory, clumsily wedge your way through the masses gathered at the door, and take your seat opposite the hanging skeleton by the back window. You steal a glance at the girl several rows ahead of you—your lab partner and the latest object of your youthful infatuation—before returning your gaze back to your biology teacher. As the familiar ring of the one o'clock bell pierces the room, signaling the start of class, your teacher gestures weakly for the remaining students to take their seats. And then, on cue, his voice permeates the room. You catch bits and pieces of his opening monologue. “Evolution by natural selection...Darwin’s theory not a fact...inexplicable gaps...can be explained by intelligent design...”

You blink twice and snap out of your daydream. You were not back in your ninth grade class after all. You are in present-day Dover, Pennsylvania—the unlikely epicenter of a tumultuous debate raging over the legitimacy of intelligent design as a competing theory to natural selection in explaining the world’s biodiversity.

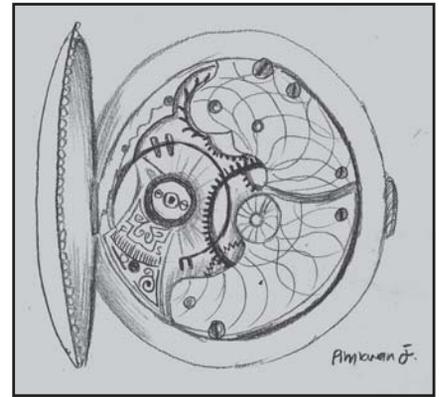
A Complicated Question

So what exactly is intelligent design? The answer depends on whom you ask. For proponents of the theory, intelligent design (ID) is a scientific argument that certain features of this universe, particularly those pertinent to living systems, are best explained by an intelligent creator (1), and not by natural processes such as evolution through natural selection. Central to their thesis, ID advocates maintain that their theory is scientifically credible, likening ID to other scientific fields of “design detection” (2), such as forensics or the search for extraterrestrial intelligence (SETI).

In sharp contrast, for most members of the mainstream scientific community, ID is not a scientific theory, but a creationist pseudoscience. The National Academy of Sciences, a corporation that advises the government on questions of science, engineering and medicine, has as recently as 1999 declared that intelligent design is not a true scientific theory because the claims of ID cannot be experimentally tested (3). Yet more than five years after this declaration, the issue of ID is back in the media spotlight, prompted by a small Pennsylvania school district’s decision to preempt every biology class where evolution would be taught with a statement that Darwin’s theory is “not a fact” and has inexplicable “gaps” (4).

Not surprisingly, the controversial policy was challenged in court this past October. The judicial outcome—whatever it may be—is almost certainly only the opening shot in a long legal battle destined for the nation’s highest courts. U.S. courts have dealt with creationist challenges to evolution in the past, spanning from the famous Scopes Monkey trial of 1925, in which Presidential candidate turned head prosecutor William Jennings Bryan successfully defeated Tennessee biology teacher John T. Scope’s right to teach evolution, to the 1987 Supreme Court decision that states cannot mandate schools to balance evolution lessons by teaching creationism. What makes ID different from other creationist challenges in the past? And why has it gained so much traction in recent years?

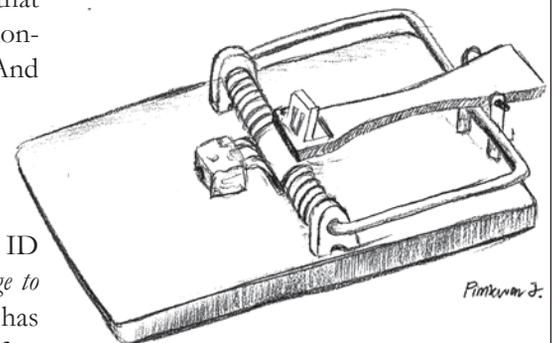
Whereas evolution was once assailed by conservative, religious doctrinaires with little scientific training, the face of intelligent design is comprised of actual chemists and biologists with MDs and PhDs from surprisingly reputable institutions. For instance, William C. Behe, a leading proponent of ID and author of the 1996 bestseller *Darwin’s Black Box: The Biochemical Challenge to Evolution*, has a PhD in biochemistry from the University of Pennsylvania and has served as a postdoctoral fellow at the National Institute for Health and as Professor of Biological Sciences at Lehigh University (5). Fairly or unfairly, a couple of



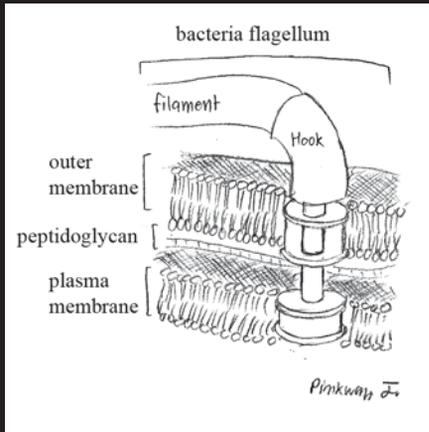
▲ Top: The clock machine can best demonstrate the idea of an irreducibly complex intelligent design. With a lack of only one gear, the clock cannot run.

“An irreducibly complex system is one that is composed of several well-matched, interacting parts that contribute to the basic function, wherein the removal of any one of the parts causes the system to effectively cease functioning”

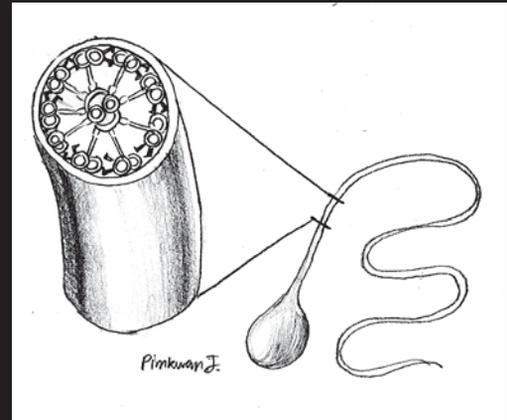
▼ Bottom: Mousetrap. By removing any one of the parts, the mousetrap cannot function



Flagellum's Irreducible Complexity



◀ Left: Bacterial flagellum is composed of flagellin proteins. It is a popular biological system that has been recently exploited by ID proponents to promote their theory.



▶ Right: Eukaryotic flagellum consists of a complex microtubule arrangement.

doctorates and a handful of publications in peer-reviewed journals immediately add credibility and an air of legitimacy to the evolution debate.

The evidence

Perhaps what has proven even more instrumental in mobilizing the ID movement is also what many scientists find decidedly most pernicious about ID: champions of ID do a very clean job of finding biological case studies in which scientific knowledge is admittedly lacking and target these areas as their pillars of support. Hence, precisely because science has not come up with an adequate answer to explain certain phenomena, the ID case can be irresistibly attractive.

As an example, a popular biological system that has been recently exploited by ID proponents to promote their theory is the flagellum (6). A propeller-like structure used for locomotion by many species of bacteria, the flagella is what Behe calls “irreducibly complex,” which he defines as “a single system composed of several well-matched, interacting parts that contribute to the basic function, wherein the removal of any one of the parts causes the system to effectively cease functioning” (6). The argument that Behe and other ID supporters have made is that

because something that is irreducibly complex cannot have come about through natural processes like evolution precisely because the product would not be functional until it has been fully assembled, then the existence of such systems would be proof of the existence of a designer. And, as luck (or God) would have it, the flagellum fits the mold. Comprised of three parts—the biochemical structural equivalent of a paddle, a rotor, and a motor—the flagellum is an irreducibly complex propeller that ID theorists would argue could not have evolved through natural selection because absence of any of the three parts would render the flagellum non-functional and evolutionarily disfavored.

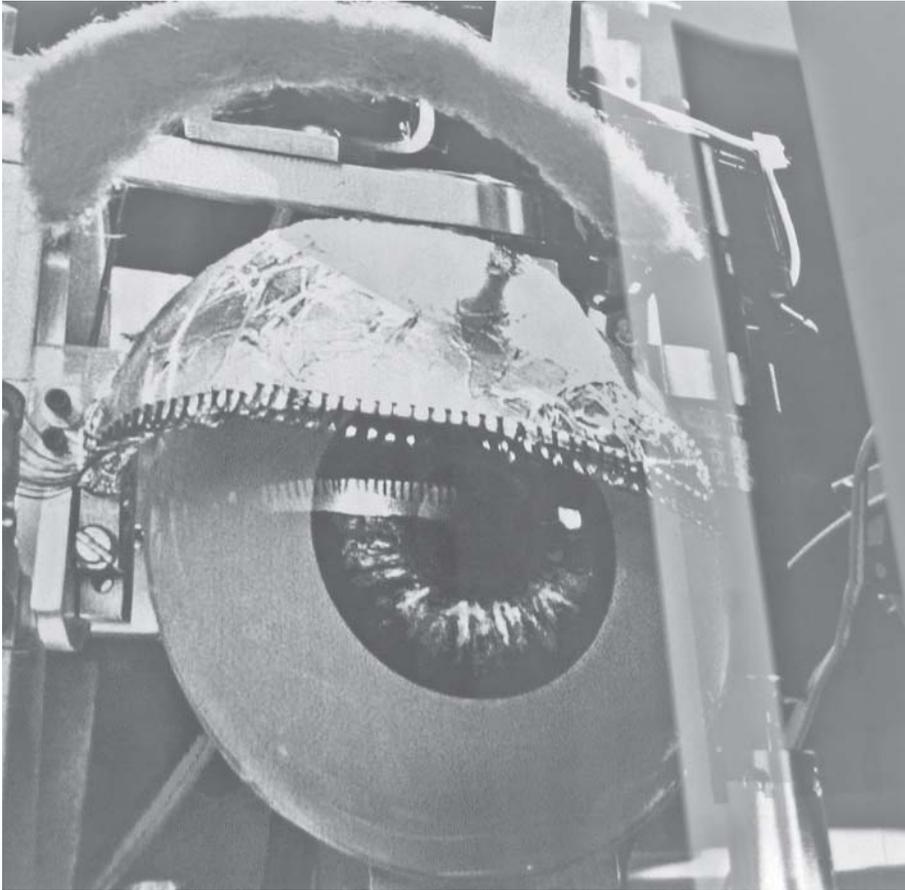
This type of teleological argument against natural selection is hardly new. The renowned 18th century English philosopher William Paley made essentially the same argument when likening the complexities of the biological world to that of a watch (7). According to the famous watchmaker analogy, if one were to find a watch while walking along a beach, the mere complexity of the watch, with its spectacular array of gears and springs, would be enough to convince the passerby that the watch was not the product of random, natural events, but was designed by an in-

telligent creator. Pertinent to our discussion, when one observes the extraordinary complexity in the maintenance of biological systems, one should reach the likewise conclusion of an ultimate designer. The only true distinction between Paley and present day ID advocates is that Paley plainly gives a name to that ultimate designer—the Christian God. For reasons of constitutionality, ID champions do not identify the agent of creation.

The argument from design for the irreducible complexity of biological systems sounds familiar because it is. Not too long ago, the vertebrate eye, instead of the flagellum, was the “poster child” for anti-evolutionary thinking. Just as growing phylogenetic evidence citing as many as 40 independent origins of evolution of the eye (8) has collapsed the irreducible complexity of the visual organ, there is a growing body of literature in support of flagellum precursors that had functional uses as, among other possibilities, a delivery system for virulent toxins (9). If indeed these theories turn out to be correct, then the status of the flagellum as irreducibly complex would be in grave jeopardy.

Responses to ID

Since its birth in the late 1980s and early



An eye is another example of an irreducible system, cited as evidence for intelligent design.

1990s, ID has provoked a hostile response from the scientific community. Recent research, as exemplified by the gradual reconstruction of the evolutionary history of the flagellum, is already beginning to debunk some of the original proposed systems of irreducible complexity. Nevertheless, even as scientific knowledge accumulates, more questions of even greater complexity will be raised. Scientific knowledge will never be complete, and as long as there is some aspect of the physical world that is not completely understood, ID theorists will have something to cling to, some gaps in scientific knowledge with which to fill with the specter of a designer. It is not difficult to see how damaging this trend can be for the advancement of science. Yet paradoxically, ID theory may prove to do an even greater disservice for religion. If you base your evidence for a Creator on systems of irreducible complexity, then does the

evidence for that Creator not wane with the reduction of every irreducibly complex system? What happens to the grand designer if one of his designs of irreducible complexity was suddenly discovered to have a naturalistic origin?

A recent trend in the ID movement has been the so-called “Teach the Controversy” campaign (10). Aimed at bringing ID discussions into public school classrooms, the political-action campaign has strong support at all levels of government, most prominently including President George W. Bush (11). Some critics of ID believe the prospect of a science curriculum with evolutionary theory on one side and ID on the other is not only constitutionally dubious—for that many claim ID is a clear violation of separation of church and state—but that elevation of ID to the level of evolutionary theory unfairly casts false doubt upon a theory that has more than met its burden of proof.

Skirting the question of constitution-

ality, which is an entirely different matter within itself, given the current state of affairs in Dover, it may be appropriate to introduce ID alongside evolution. As long as both “theories” are examined with the utmost scrutiny under the scientific method, evolution has nothing to fear from ID, as Darwin’s theory has and will continue to stand under the weight of its own scrutiny. The danger of the status quo, as pertinent to the Dover school district, is that students are implanted with a seed of doubt before every class on evolution, and then blindly referred to an ID textbook for further exploration outside of class (12). Without the necessary scientific balance that can only be provided by a teacher knowledgeable in the biological sciences, not teaching ID might be the most pernicious policy of all. **H**

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References

1. Intelligent Design Network. Last Updated: 15 Oct. 2005. Last Viewed: 15 Oct. 2005. <<http://www.intelligentdesignnetwork.org/>>
2. Stephen C. Meyer, 2005. The Scientific Status of Intelligent Design: The Methodological Equivalence of Naturalistic and Non-Naturalistic Origins Theories. Ignatius Press.
3. “Creationism, intelligent design, and other claims of supernatural intervention in the origin of life or of species are not science” 1999. Science and Creationism: A View from the National Academy of Sciences, Second Edition National Academy of Sciences.
4. Dover District Statement Read to Students Prior to Teaching of Evolution. Last Updated: 15 Oct. 2005. Last Viewed: 15 Oct. 2005. <<http://www.dover.k12.pa.us/doversd/site/default.asp>>
5. Michael Behe. Wikipedia encyclopedia. Last Updated: 6 Nov. 2005. Last Viewed: 6 Nov. 2005. <http://en.wikipedia.org/wiki/Michael_Behe>
6. Behe, Michael. 1996. Darwin’s Black Box: The Biochemical Challenge to Evolution. New York, New York: Touchstone.
7. William Paley. 1809. Natural Theology; or, Evidences of the Existence and Attributes of the Deity, 12th edition. London: J. Faulder.
8. Dawkins, Richard. 2004. The ancestor’s tale: a pilgrimage to the dawn of evolution. Boston, Massachusetts: Houghton Mifflin Company.
9. Aizawa, S.-I., 2001. Bacterial flagella and type III secretion systems, FEMS Microbiology Letters 202: 157-164.
10. Chris Mooney. 2002. Survival of the Slickest: How anti-evolutionists are mutating their message. The American Prospect.
11. ‘Bush: Schools should teach ‘intelligent design’ CNN.com. Last Updated: 2 Aug. 2005. Last Viewed: 15 Oct. 2005 <<http://www.cnn.com/2005/POLITICS/08/02/bush.education.ap/>>
12. Davis, Percival. 1989. Of Pandas and People: The Central Question of Biological Origins. Richardson, Texas: Foundation for Thought and Ethics.