Reading for Discussion CR WS 8-1, Tuesday , May 17: Topic: What kind of Theory is Intelligent Design: Conceptual or Empirical or what? Is it any good?

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I.   Intelligent Design: What is it ?

http://www.intelligentdesign.org/whatisid.php   **Discovery Institute " definition"**

What is intelligent design?

Intelligent design refers to a scientific research program as well as a community of scientists, philosophers and other scholars who seek evidence of design in nature. The theory of intelligent design holds that certain features of the universe and of living things are best explained by an intelligent cause, not an undirected process such as natural selection. Through the study and analysis of a system's components, a design theorist is able to determine whether various natural structures are the product of chance, natural law, intelligent design, or some combination thereof. Such research by observing the types of information produced when intelligent agents act. Scientists then seek to find objects which have those same types of informational properties which we commonly know come from intelligence. Intelligent design has applied these scientific methods to detect design in irreducibly complex biological structures, the complex and specified information content in DNA, the life-sustaining physical architecture of the universe, and the geologically rapid origin of biological diversity in the fossil record during the Cambrian explosion approximately 530 million years ago.

Is intelligent design the same as creationism?

No. The theory of intelligent design is simply an effort to empirically detect whether the "apparent design" in nature acknowledged by virtually all biologists is genuine design (the product of an intelligent cause) or is simply the product of an undirected process such as natural selection acting on random variations. Creationism typically starts with a religious text and tries to see how the findings of science can be reconciled to it. Intelligent design starts with the empirical evidence of nature and seeks to ascertain what inferences can be drawn from that evidence. Unlike creationism, the scientific theory of intelligent design does not claim that modern biology can identify whether the intelligent cause detected through science is supernatural. Honest critics of intelligent design acknowledge the difference between intelligent design and creationism. University of Wisconsin historian of science Ronald Numbers is critical of intelligent design, yet according to the Associated Press, he "agrees the creationist label is inaccurate when it comes to the ID [intelligent design] movement." Why, then, do some Darwinists keep trying to conflate intelligent design with creationism? According to Dr. Numbers, it is because they think such claims are "the easiest way to discredit intelligent design." In other words, the charge that intelligent design is "creationism" is a rhetorical strategy on the part of Darwinists who wish to delegitimize design theory without actually addressing the merits of its case.

Is intelligent design a scientific theory?

Yes. The scientific method is commonly described as a four-step process involving observations, hypothesis, experiments, and conclusion. Intelligent design begins with the observation that intelligent agents produce complex and specified information (CSI). Design theorists hypothesize that if a natural object was designed, it will contain high levels of CSI. Scientists then perform experimental tests upon natural objects to determine if they contain complex and specified information. One easily testable form of CSI is irreducible complexity, which can be discovered by experimentally reverse-engineering biological structures to see if they require all of their parts to function. When ID researchers find irreducible complexity in biology, they conclude that such structures were designed.

II.   Intelligent Design: Pro and Con

Intelligent Design? Special Report from *Natural History*

The theory of evolution by natural selection, proposed by Charles Darwin and Alfred Russel Wallace to account for the diversity of species on Earth, has been refined and expanded during nearly a century and half of research into genetics and other biological sciences. Nevertheless, the teaching of evolution remains a source of contention in the United States, where it conflicts with certain religious views. In recent years, some opponents of Darwinism have championed "Intelligent

Design" as an alternative scientific theory. Because this remains a hot political issue, we reproduce here the special forum that **Natural History** *first published in April 2002.*

The idea that an organism's complexity is evidence for the existence of a cosmic designer was advanced centuries before Charles Darwin was born. Its best-known exponent was English theologian William Paley, creator of the famous watchmaker analogy. If we find a pocket watch in a field, Paley wrote in 1802, we immediately infer that it was produced not by natural processes acting blindly but by a designing human intellect. Likewise, he reasoned, the natural world contains abundant evidence of a supernatural creator. The argument from design, as it is known, prevailed as an explanation of the natural world until the publication of the *Origin of Species* in 1859. The weight of the evidence that Darwin had patiently gathered swiftly convinced scientists that evolution by natural selection better explained life's complexity and diversity. "I cannot possibly believe," wrote Darwin in 1868, "that a false theory would explain so many classes of facts."

In some circles, however, opposition to the concept of evolution has persisted to the present. The argument from design has recently been revived by a number of academics with scientific credentials, who maintain that their version of the idea (unlike Paley's) is soundly supported by both microbiology and mathematics. These antievolutionists differ from fundamentalist creationists in that they accept that some species do change (but not much) and that Earth is much more than 6,000 years old. Like their predecessors, however, they reject the idea that evolution accounts for the array of species we see today, and they seek to have their concept--known as intelligent design--included in the science curriculum of schools.

Most biologists have concluded that the proponents of intelligent design display either ignorance or deliberate misrepresentation of evolutionary science. Yet their proposals are getting a hearing in some political and educational circles and are currently the subject of a debate within the Ohio Board of Education. Although *Natural History* does not fully present and analyze the intelligent-design phenomenon in the pages that follow, we offer, for the reader's information, brief position statements by three leading proponents of the theory, along with three responses. The section concludes with an overview of the intelligent-design movement by a philosopher and cultural historian who has monitored its history for more than a decade.

INTELLIGENT DESIGN; position statement 1 By Michael J. Behe
The Challenge of Irreducible Complexity
Every living cell contains many ultrasophisticated molecular machines

Scientists use the term "black box" for a system whose inner workings are unknown. To Charles Darwin and his contemporaries, the living cell was a black box because its fundamental mechanisms were completely obscure. We now know that, far from being formed from a kind of simple, uniform protoplasm (as many nineteenth-century scientists believed), every living cell contains many ultrasophisticated molecular machines.

How can we decide whether Darwinian natural selection can account for the amazing complexity that exists at the molecular level? Darwin himself set the standard when he acknowledged, "If it could be demonstrated that any complex organ existed which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down."

Some systems seem very difficult to form by such successive modifications—I call them irreducibly complex. An everyday example of an irreducibly complex system is the humble mousetrap. It consists of (1) a flat wooden platform or base; (2) a metal hammer, which crushes the mouse; (3) a spring with extended ends to power the hammer; (4) a catch that releases the spring; and (5) a metal bar that connects to the catch and holds the hammer back. You can't catch a mouse with just a platform, then add a spring and catch a few more mice, then add a holding bar and catch a few more. All the pieces have to be in place before you catch any mice.

Irreducibly complex systems appear very unlikely to be produced by numerous, successive, slight modifications of prior systems, because any precursor that was missing a crucial part could not function. Natural selection can only choose among systems that are already working, so the existence in nature of irreducibly complex biological systems poses a powerful challenge to Darwinian theory. We frequently observe such systems in cell organelles, in which the removal of one element would cause the whole system to cease functioning. The flagella of bacteria are a good example. They are outboard motors that bacterial cells can use for self-propulsion. They have a long, whiplike propeller that is rotated by a molecular motor. The propeller is attached to the motor by a universal joint. The motor is held in place by proteins that act as a stator. Other proteins act as bushing material to allow the driveshaft to penetrate the bacterial membrane. Dozens of different kinds of proteins are necessary for a working flagellum. In the absence of almost any of them, the flagellum does not work or cannot even be built by the cell.

Another example of irreducible complexity is the system that allows proteins to reach the appropriate subcellular compartments. In the eukaryotic cell there are a number of places where specialized tasks, such as digestion of nutrients and excretion of wastes, take place. Proteins are synthesized outside these compartments and can reach their proper destinations only with the help of "signal" chemicals that turn other reactions on and off at the appropriate times. This constant, regulated traffic flow in the cell comprises another remarkably complex, irreducible system. All parts must function in synchrony or the system breaks down. Still another example is the exquisitely coordinated mechanism that causes blood to clot.

Biochemistry textbooks and journal articles describe the workings of some of the many living molecular machines within our cells, but they offer very little information about how these systems supposedly evolved by natural selection. Many scientists frankly admit their bewilderment about how they may have originated, but refuse to entertain the obvious hypothesis: that perhaps molecular machines appear to look designed because they really *are* designed

I am hopeful that the scientific community will eventually admit the possibility of intelligent design, even if that acceptance is discreet and muted. My reason for optimism is the advance of science itself, which almost every day uncovers new intricacies in nature, fresh reasons for recognizing the design inherent in life and the universe.

Michael J. Behe, who received his Ph.D. in biochemistry from the University of Pennsylvania in 1978, is a professor of biological sciences at Pennsylvania's Lehigh University. His current research involves the roles of design and natural selection in building protein structure. His book Darwin's Black Box: The Biochemical Challenge to Evolution *is available in paperback (Touchstone Books, 1998).*

EVOLUTION: response to Michael J. Behe By Kenneth R. Miller
The Flaw in the Mousetrap
Intelligent design fails the biochemistry test.

To understand why the scientific community has been unimpressed by attempts to resurrect the so-called argument from design, one need look no further than Michael J. Behe's own essay. He argues that complex biochemical systems could not possibly have been produced by evolution because they possess a quality he calls irreducible complexity. Just like mousetraps, these systems cannot function unless each of their parts is in place. Since "natural selection can only choose among systems that are already working," there is no way that Darwinian mechanisms could have fashioned the complex systems found in living cells. And if such systems could not have evolved, the must have been designed. That is the totality of the biochemical "evidence" for intelligent design.

Ironically, Behe's own example, the mousetrap, shows what's wrong with this idea. Take away two parts (the catch and the metal bar), and you may not have a mousetrap but you do have a three-part machine that makes a fully functional tie clip or paper clip. Take away the spring, and you have a two-part key chain. The catch of some mousetraps could be used as a fishhook, and the wooden base as a paperweight; useful applications of other parts include everything from toothpicks to nutcrackers and clipboard holders. The point, which science has long understood, is that bits and pieces of supposedly irreducibly complex machines may have different—but still useful—functions. Behe's contention that each and every piece of a machine, mechanical or biochemical, must be assembled in its final form before *anything* useful can emerge is just plain wrong. Evolution produces complex biochemical machines by copying, modifying, and combining proteins previously used for other functions. Looking for examples? The systems in Behe's essay will do just fine. He writes that in the absence of "almost any" of its parts, the bacterial flagellum "does not work." But guess what? A small group of proteins from the flagellum *does* work without the rest of the machine—it's used by many bacteria as a device for injecting poisons into other cells. Although the function performed by this small part when working alone is different, it nonetheless can be favored by natural selection.

The key proteins that clot blood fit this pattern, too. They're actually modified versions of proteins used in the digestive system. The elegant work of Russell Doolittle has shown how evolution duplicated, retargeted, and modified these proteins to produce the vertebrate blood-clotting system.

And Behe may throw up his hands and say that *he* cannot imagine how the components that move proteins between subcellular compartments could have evolved, but scientists actually working on such systems completely disagree. In a 1998 article in the journal *Cell,* a group led by James Rothman, of the Sloan-Kettering Institute, described the remarkable simplicity and uniformity of these mechanisms. They also noted that these mechanisms "suggest in a natural way how the many and diverse compartments in eukaryotic cells could have evolved in the first place." Working researchers, it seems, see something very different from what Behe sees in these systems—they see evolution.

If Behe wishes to suggest that the intricacies of nature, life, and the universe reveal a world of meaning and purpose consistent with a divine intelligence, his point is philosophical, not scientific. It is a philosophical point of view, incidentally, that I share. However, to support that view, one should not find it necessary to pretend that we know less than we really do about the evolution of living systems. In the final analysis, the biochemical hypothesis of intelligent design fails not because the scientific community is closed to it but rather for the most basic of reasons—because it is overwhelmingly contradicted by the scientific evidence.

Kenneth R. Miller is a professor of biology at Brown University. His research work on cell membrane structure and function has been reported in such journals as Nature, Cell, *and the Journal of Cell Biology. Miller is co-author of several widely used high school and college biology textbooks, and in 1999 he published* Finding Darwin's God: A Scientist's Search for Common Ground Between God and Evolution *(Cliff Street Books).*

INTELLIGENT DESIGN: position statement 2   By William A. Dembski
Detecting Design in the Natural Sciences
Intelligence leaves behind a characteristic signature
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In ordinary life, explanations that invoke chance, necessity, or design cover every eventuality. Nevertheless, in the natural sciences one of these modes of explanation is considered superfluous—namely, design. From the perspective of the natural sciences, design, as the action of an intelligent agent, is not a fundamental creative force in nature. Rather, blind natural causes, characterized by chance and necessity and ruled by unbroken laws, are thought sufficient to do all nature's creating. Darwin's theory is a case in point.

But how do we know that nature requires no help from a designing intelligence? Certainly, in special sciences ranging from forensics to archaeology to SETI (the Search for Extraterrestrial Intelligence), appeal to a designing intelligence is indispensable. What's more, within these sciences there are well-developed techniques for identifying intelligence. Essential to all these techniques is the ability to eliminate chance and necessity.

For instance, how do the radio astronomers in *Contact* (the Jodie Foster movie based on Carl Sagan's novel of the same name) infer the presence of extraterrestrial intelligence in the beeps and pauses they monitor from space? The researchers run signals through computers that are programmed to recognize many preset patterns. Signals that do not match any of the patterns pass through the "sieve" and are classified as random. After years of receiving apparently meaningless "random" signals, the researchers discover a pattern of beats and pauses that corresponds to the sequence of all the prime numbers between 2 and 101. (Prime numbers, of course, are those that are divisible only by themselves and by one.) When a sequence begins with 2 beats, then a pause, 3 beats, then a pause . . . and continues all the way to 101 beats, the researchers must infer the presence of an extraterrestrial intelligence.

Here's why. There's nothing in the laws of physics that requires radio signals to take one form or another. The sequence is therefore contingent rather than necessary. Also, it is a long sequence and therefore complex. Note that if the sequence lacked complexity, it could easily have happened by chance. Finally, it was not just complex but also exhibited an independently given pattern or specification (it was not just any old sequence of numbers but a mathematically significant one—the prime numbers).

Intelligence leaves behind a characteristic trademark or signature—what I call "specified complexity." An event exhibits specified complexity if it is contingent and therefore not necessary; if it is complex and therefore not easily repeatable by chance; and if it is specified in the sense of exhibiting an independently given pattern. Note that complexity in the sense of improbability is not sufficient to eliminate chance: flip a coin long enough, and you'll witness a highly complex or improbable event. Even so, you'll have no reason not to attribute it to chance.

The important thing about specifications is that they be objectively given and not just imposed on events after the fact. For instance, if an archer shoots arrows into a wall and we then paint bull's-eyes around them, we impose a pattern after the fact. On the other hand, if the targets are set up in advance ("specified") and then the archer hits them accurately, we know it was by design.In my book *The Design Inference,* I argue that specified complexity reliably detects design. In that book, however, I focus largely on examples from the human rather than the natural sciences. The main criticism of that work to date concerns whether the Darwinian mechanism of natural selection and random variation is not in fact fully capable of generating specified complexity. More recently, in *No Free Lunch,* I show that undirected natural processes like the Darwinian mechanism are incapable of generating the specified complexity that exists in biological organisms. It follows that chance and necessity are insufficient for the natural sciences and that the natural sciences need to leave room for design.

William A. Dembski, who holds Ph.D.'s in mathematics and philosophy, is an associate research professor at Baylor University and a senior fellow with the Discovery Institute in Seattle. His books include The Design Inference: Eliminating Chance Through Small Probabilities *(Cambridge University Press, 1998) and* No Free Lunch: Why Specified Complexity Cannot Be Purchased Without Intelligence *(Rowman and Littlefield, 2001).*

EVOLUTION: response to William A. Dembski   By Robert T. Pennock
Mystery Science Theater
The case of the secret agent

William A. Dembski claims to detect "specified complexity" in living things and argues that it is proof that species have been designed by an intelligent agent. One flaw in his argument is that he wants to define intelligent design negatively, as anything that is not chance or necessity. But the definition is rigged: necessity, chance, and design are not mutually exclusive categories, nor do they exhaust the possibilities. Thus, one cannot detect an intelligent agent by the process of elimination he suggests. Science requires positive evidence. This is so even when attempting to detect the imprint of human intelligence, but it is especially true when assessing the extraordinary claim that biological complexity is intentionally designed.

In this regard, Dembski's archery and SETI analogies are red herrings, for they tacitly depend on prior understanding of human intellect and motivation, as well as of relevant causal processes. A design inference like that in the movie *Contact,* for

instance, would rely on background knowledge about the nature of radio signals and other natural processes, together with the assumption that a sequence of prime numbers is the kind of pattern another scientist might choose to send as a signal. But the odd sequences found within DNA are quite unlike a series of prime numbers. Dembski has no way to show that the genetic patterns are "set up in advance" or "independently given."

Dembski has been promoted as "the Isaac Newton of information theory," and in his writings, which include the books he cites in the essay here, he insists that his "law of conservation of information" proves that natural processes cannot increase biological complexity. He doesn't lay out his case here, and a refutation would require too much space. Suffice it to say that a connection exists between the technical notion of information and that of entropy, so Dembski's argument boils down to a recasting of an old creationist claim that evolution violates the second law of thermodynamics. Put simply, this law states that in the universe, there is a tendency for complexity to decrease. How then, ask the creationists, can evolutionary processes produce more complex life-forms from more primitive ones? But we have long known why this type of argument fails: the second law applies only to closed systems, and biological systems are not closed. In the evolutionary process, an increase in biological complexity does not represent a "free lunch"—it is bought and paid for, because random genetic variation is subjected to natural selection by the environment, which itself is already structured. In fact, researchers are beginning to use Darwinian processes, implemented in computers or in vitro, to evolve complex systems and to provide solutions to design problems in ways that are beyond the power of mere intelligent agents.

If we really thought that genetic information was like the signal in *Contact,* shouldn't we infer we were designed by extraterrestrials? Intelligent-design theorists do sometimes mention extraterrestrials as possible suspects, but most seem to have their eyes on a designer more highly placed in the heavens. The problem is, science requires a specific model that can be tested. What exactly did the designer do, and when did he do it? Dembski's nebulous hypothesis of design, even if restricted to natural processes, provides precious little that is testable, and once supernatural processes are wedged in, it loses any chance of testability.

Newton found himself stymied by the complex orbits of the planets. He could not think of a natural way to fully account for their order and concluded that God must nudge the planets into place to make the system work. (So perhaps in this one sense, Dembski is the Newton of information theory.) The origin of species once seemed equally mysterious, but Darwin followed the clues given in nature to solve that mystery. One may, of course, retain religious faith in a designer who transcends natural processes, but there is no way to dust for his fingerprints.

Robert T. Pennock is an associate professor of science and technology studies and associate professor of philosophy in Michigan State University's Lyman Briggs School and department of philosophy. He is the author of Tower of Babel: The Evidence Against the New Creationism *(MIT Press, 1999) and editor of* Intelligent Design Creationism and Its Critics: Philosophical, Theological, and Scientific Perspectives *(MIT Press, 2001).*

OVERVIEW By Barbara Forrest

The infamous August 1999 decision by the Kansas Board of Education to delete references to evolution from Kansas science standards was heavily influenced by advocates of intelligent-design theory. Although William A. Dembski, one of the movement's leading figures, asserts that "the empirical detectability of intelligent causes renders intelligent design a fully scientific theory," its proponents invest most of their efforts in swaying politicians and the public, not the scientific community.

Launched by Phillip E. Johnson's book *Darwin on Trial* (1991), the intelligent-design movement crystallized in 1996 as the Center for the Renewal of Science and Culture (CRSC), sponsored by the Discovery Institute, a conservative Seattle think tank. Johnson, a law professor whose religious conversion catalyzed his antievolution efforts, assembled a group of supporters who promote design theory through their writings, financed by CRSC fellowships. According to an early mission statement, the CRSC seeks "nothing less than the overthrow of materialism and its damning cultural legacies."

Johnson refers to the CRSC members and their strategy as the Wedge, analogous to a wedge that splits a log—meaning that intelligent design will liberate science from the grip of "atheistic naturalism." Ten years of Wedge history reveal its most salient features: Wedge scientists have no empirical research program and, consequently, have published no data in peer-reviewed journals (or elsewhere) to support their intelligent-design claims. But they do have an aggressive public relations program, which includes conferences that they or their supporters organize, popular books and articles, recruitment of students through university lectures sponsored by campus ministries, and cultivation of alliances with conservative Christians and influential political figures.

The Wedge aims to "renew" American culture by grounding society's major institutions, especially education, in evangelical religion. In 1996, Johnson declared: "This isn't really, and never has been, a debate about science. It's about religion and philosophy." According to Dembski, intelligent design "is just the Logos of John's Gospel restated in the idiom of information theory." Wedge strategists seek to unify Christians through a shared belief in "mere" creation, aiming—in Dembski's words—"at defeating naturalism and its consequences." This enables intelligent-design proponents to coexist in a big tent with other creationists who explicitly base their beliefs on a literal interpretation of Genesis.

"As Christians," writes Dembski, "we know naturalism is false. Nature is not self-sufficient. . . . Nonetheless neither theology nor philosophy can answer the evidential question whether God's interaction with the world is empirically detectable.

To answer this question we must look to science." Jonathan Wells, a biologist, and Michael J. Behe, a biochemist, seem just the CRSC fellows to give intelligent design the ticket to credibility. Yet neither has actually done research to test the theory, much less produced data that challenges the massive evidence accumulated by biologists, geologists, and other evolutionary scientists. Wells, influenced in part by Unification Church leader Sun Myung Moon, earned Ph.D.'s in religious studies and biology specifically "to devote my life to destroying Darwinism." Behe sees the relevant question as whether "science can make room for religion." At heart, proponents of intelligent design are not motivated to improve science but to transform it into a theistic enterprise that supports religious faith.

Wedge supporters are at present trying to insert intelligent design into Ohio public-school science standards through state legislation. Earlier the CRSC advertised its science education site by assuring teachers that its "Web curriculum can be appropriated without textbook adoption wars"—in effect encouraging teachers to do an end run around standard procedures. Anticipating a test case, the Wedge published in the *Utah Law Review* a legal strategy for winning judicial sanction. Recently the group almost succeeded in inserting into the federal No Child Left Behind Act of 2001 a "sense of the Senate" that supported the teaching of intelligent design. So the movement is advancing, but its tactics are no substitute for real science.

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III.   Intelligent Design: Dembski extended comments

http://www.designinference.com/documents/2003.08.Encyc_of_Relig.htm

Intelligent design begins with a seemingly innocuous question: Can objects, even if nothing is known about how they arose, exhibit features that reliably signal the action of an intelligent cause? To see what's at stake, consider Mount Rushmore. The evidence for Mount Rushmore's design is direct—eyewitnesses saw the sculptor Gutzon Borglum spend the better part of his life designing and building this structure. But what if there were no direct evidence for Mount Rushmore's design? What if humans went extinct and aliens, visiting the earth, discovered Mount Rushmore in substantially the same condition as it is now?

In that case, what about this rock formation would provide convincing circumstantial evidence that it was due to a designing intelligence and not merely to wind and erosion? Designed objects like Mount Rushmore exhibit characteristic features or patterns that point to an intelligence. Such features or patterns constitute signs of intelligence. Proponents of intelligent design, known as design theorists, purport to study such signs formally, rigorously, and scientifically. Intelligent design may therefore be defined as the science that studies signs of intelligence.

Because a sign is not the thing signified, intelligent design does not presume to identify the purposes of a designer. Intelligent design focuses not on the designer's purposes (the thing signified) but on the artifacts resulting from a designer's purposes (the sign). What a designer intends or purposes is, to be sure, an interesting question, and one may be able to infer something about a designer's purposes from the designed objects that a designer produces. Nevertheless, the purposes of a designer lie outside the scope of intelligent design. As a scientific research program, intelligent design investigates the effects of intelligence and not intelligence as such.

Intelligent design is controversial because it purports to find signs of intelligence in nature, and specifically in biological systems. According to the evolutionary biologist Francisco Ayala, Darwin's greatest achievement was to show how the organized complexity of organisms could be attained apart from a designing intelligence. Intelligent design therefore directly challenges Darwinism and other naturalistic approaches to the origin and evolution of life.

The idea that an intrinsic intelligence or teleology inheres in and is expressed through nature has a long history and is embraced by many religious traditions. The main difficulty with this idea since Darwin's day, however, has been to discover a conceptually powerful formulation of design that can fruitfully advance science. What has kept design outside the scientific mainstream since the rise of Darwinism has been the lack of precise methods for distinguishing intelligently caused objects from unintelligently caused ones.

For design to be a fruitful scientific concept, scientists have to be sure that they can reliably determine whether something is designed. Johannes Kepler, for instance, thought the craters on the moon were intelligently designed by moon dwellers. We now know that the craters were formed by purely material factors (like meteor impacts). This fear of falsely attributing something to design, only to have it overturned later, has hindered design from entering the scientific mainstream. But design theorists argue that they now have formulated precise methods for discriminating designed from undesigned objects. These methods, they contend, enable them to avoid Kepler's mistake and reliably locate design in biological systems.

As a theory of biological origins and development, intelligent design's central claim is that only intelligent causes adequately explain the complex, information-rich structures of biology and that these causes are empirically detectable. To say intelligent causes are empirically detectable is to say there exist well-defined methods that, based on observable features of the world, can reliably distinguish intelligent causes from undirected natural causes. Many special sciences have

already developed such methods for drawing this distinction—notably forensic science, cryptography, archeology, and the search for extraterrestrial intelligence (SETI). Essential to all these methods is the ability to eliminate chance and necessity.

Astronomer Carl Sagan wrote a novel about SETI called Contact, which was later made into a movie. The plot and the extraterrestrials were fictional, but Sagan based the SETI astronomers' methods of design detection squarely on scientific practice. Real-life SETI researchers have thus far failed to conclusively detect designed signals from distant space, but if they encountered such a signal, as the film's astronomers' did, they too would infer design. Why did the radio astronomers in Contact draw such a design inference from the signals they monitored from space? SETI researchers run signals collected from distant space through computers programmed to recognize preset patterns. These patterns serve as a sieve. Signals that do not match any of the patterns pass through the sieve and are classified as random.

After years of receiving apparently meaningless, random signals, the Contact researchers discovered a pattern of beats and pauses that corresponded to the sequence of all the prime numbers between two and one-hundred and one. (Prime numbers are divisible only by themselves and by one.) That startled the astronomers, and they immediately inferred an intelligent cause. When a sequence begins with two beats and then a pause, three beats and then a pause, and continues through each prime number all the way to one-hundred and one beats, researchers must infer the presence of an extraterrestrial intelligence.

Here's the rationale for this inference: Nothing in the laws of physics requires radio signals to take one form or another. The prime sequence is therefore contingent rather than necessary. Also, the prime sequence is long and hence complex. Note that if the sequence were extremely short and therefore lacked complexity, it could easily have happened by chance. Finally, the sequence was not merely complex but also exhibited an independently given pattern or specification (it was not just any old sequence of numbers but a mathematically significant one—the prime numbers).

Intelligence leaves behind a characteristic trademark or signature—what within the intelligent design community is now called specified complexity. An event exhibits specified complexity if it is contingent and therefore not necessary; if it is complex and therefore not readily repeatable by chance; and if it is specified in the sense of exhibiting an independently given pattern. Note that a merely improbable event is not sufficient to eliminate chance—by flipping a coin long enough, one will witness a highly complex or improbable event. Even so, one will have no reason to attribute it to anything other than chance.

The important thing about specifications is that they be objectively given and not arbitrarily imposed on events after the fact. For instance, if an archer fires arrows at a wall and then paints bull's-eyes around them, the archer imposes a pattern after the fact. On the other hand, if the targets are set up in advance ("specified"), and then the archer hits them accurately, one legitimately concludes that it was by design.

The combination of complexity and specification convincingly pointed the radio astronomers in the movie Contact to an extraterrestrial intelligence. Note that the evidence was purely circumstantial—the radio astronomers knew nothing about the aliens responsible for the signal or how they transmitted it. Design theorists contend that specified complexity provides compelling circumstantial evidence for intelligence. Accordingly, specified complexity is a reliable empirical marker of intelligence in the same way that fingerprints are a reliable empirical marker of an individual's presence. Moreover, design theorists argue that purely material factors cannot adequately account for specified complexity.

In determining whether biological organisms exhibit specified complexity, design theorists focus on identifiable systems (e.g., individual enzymes, metabolic pathways, and molecular machines). These systems are not only specified by their independent functional requirements but also exhibit a high degree of complexity.

In Darwin's Black Box, biochemist Michael Behe connects specified complexity to biological design through his concept of irreducible complexity. Behe defines a system as irreducibly complex if it consists of several interrelated parts for which removing even one part renders the system's basic function unrecoverable. For Behe, irreducible complexity is a sure indicator of design. One irreducibly complex biochemical system that Behe considers is the bacterial flagellum. The flagellum is an acid-powered rotary motor with a whip-like tail that spins at twenty-thousand revolutions per minute and whose rotating motion enables a bacterium to navigate through its watery environment.

Behe shows that the intricate machinery in this molecular motor—including a rotor, a stator, O-rings, bushings, and a drive shaft—requires the coordinated interaction of approximately forty complex proteins and that the absence of any one of these proteins would result in the complete loss of motor function. Behe argues that the Darwinian mechanism faces grave obstacles in trying to account for such irreducibly complex systems. In No Free Lunch, William Dembski shows how Behe's notion of irreducible complexity constitutes a particular instance of specified complexity.

Once an essential constituent of an organism exhibits specified complexity, any design attributable to that constituent carries over to the organism as a whole. To attribute design to an organism one need not demonstrate that every aspect of the organism was designed. Organisms, like all material objects, are products of history and thus subject to the buffeting of purely material factors. Automobiles, for instance, get old and exhibit the effects of corrosion, hail, and frictional forces. But that doesn't make them any less designed. Likewise design theorists argue that organisms, though exhibiting the effects of history (and that includes Darwinian factors such as genetic mutations and natural selection), also include an ineliminable core that is designed.

Intelligent design's main tie to religion is through the design argument. Perhaps the best-known design argument is William Paley's. Paley published his argument in 1802 in a book titled Natural Theology. The subtitle of that book is

revealing: <u>Evidences of the Existence and Attributes of the Deity, Collected from the Appearances of Nature</u>. Paley's project was to examine features of the natural world (what he called "appearances of nature") and from there draw conclusions about the existence and attributes of a designing intelligence responsible for those features (whom Paley identified with the God of Christianity).

According to Paley, if one finds a watch in a field (and thus lacks all knowledge of how the watch arose), the adaptation of the watch's parts to telling time ensures that it is the product of an intelligence. So too, according to Paley, the marvelous adaptations of means to ends in organisms (like the intricacy of the human eye with its capacity for vision) ensure that organisms are the product of an intelligence. The theory of intelligent design updates Paley's watchmaker argument in light of contemporary information theory and molecular biology, purporting to bring this argument squarely within science.

In arguing for the design of natural systems, intelligent design is more modest than the design arguments of natural theology. For natural theologians like Paley, the validity of the design argument did not depend on the fruitfulness of design-theoretic ideas for science but on the metaphysical and theological mileage one could get out of design. A natural theologian might point to nature and say, "Clearly, the designer of this ecosystem prized variety over neatness." A design theorist attempting to do actual design-theoretic research on that ecosystem might reply, "Although that's an intriguing theological possibility, as a design theorist I need to keep focused on the informational pathways capable of producing that variety."

In his <u>Critique of Pure Reason</u>, Immanuel Kant claimed that the most the design argument can establish is "an architect of the world who is constrained by the adaptability of the material in which he works, not a <u>creator</u> of the world to whose idea everything is subject." Far from rejecting the design argument, Kant objected to overextending it. For Kant, the design argument legitimately establishes an architect (that is, an intelligent cause whose contrivances are constrained by the materials that make up the world), but it can never establish a creator who originates the very materials that the architect then fashions.

Intelligent design is entirely consonant with this observation by Kant. Creation is always about the source of being of the world. Intelligent design, as the science that studies signs of intelligence, is about arrangements of preexisting materials that point to a designing intelligence. Creation and intelligent design are therefore quite different. One can have creation without intelligent design and intelligent design without creation. For instance, one can have a doctrine of creation in which God creates the world in such a way that nothing about the world points to design. The evolutionary biologist Richard Dawkins wrote a book titled <u>The Blind Watchmaker: Why the Evidence of Evolution Reveals a Universe without Design</u>. Even if Dawkins is right about the universe revealing no evidence of design, it would not logically follow that it was not created. It is logically possible that God created a world that provides no evidence of design. On the other hand, it is logically possible that the world is full of signs of intelligence but was not created. This was the ancient Stoic view, in which the world was eternal and uncreated, and yet a rational principle pervaded the world and produced marks of intelligence in it.

The implications of intelligent design for religious belief are profound. The rise of modern science led to a vigorous attack on all religions that treat purpose, intelligence, and wisdom as fundamental and irreducible features of reality. The high point of this attack came with Darwin's theory of evolution. The central claim of Darwin's theory is that an unguided material process (random variation and natural selection) could account for the emergence of all biological complexity and order. In other words, Darwin appeared to show that the design in biology (and, by implication, in nature generally) was dispensable. By showing that design is indispensable to the scientific understanding of the natural world, intelligent design is reinvigorating the design argument and at the same time overturning the widespread misconception that the only tenable form of religious belief is one that treats purpose, intelligence, and wisdom as byproducts of unintelligent material processes.

IV.   Intelligent Design: Historical Roots

William Paley's formulation of the teleological argument (Argument from Design

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CHAPTER ONE: "STATE OF THE ARGUMENT"

In crossing a heath, suppose I pitched my foot against a *stone* and were asked how the stone came to be there, I might possibly answer that for anything I knew to the contrary it had lain there forever; nor would it, perhaps, be very easy to show the absurdity of this answer. But suppose I had found a *watch* upon the ground, and it should be

inquired how the watch happened to be in that place, I should hardly think of the answer which I had before given, that for anything I knew the watch might have always been there. Yet why should not this answer serve for the watch as well as for the stone? Why is it not as admissible in the second case as in the first? For this reason, and for no other, namely, that when we come to inspect the watch, we perceive -- what we could not discover in the stone -- that its several parts are framed and put together for a purpose, e.g., that they are so formed and adjusted as to produce motion, and that motion so regulated as to point out the hour of the day; that if the different parts had been differently shaped from what they are, of a different size from what they are, or placed after any other manner or in any other order than that in which they are placed, either no motion at all would have been carried on in the machine, or none which would have answered the use that is now served by it. To reckon up a few of the plainest of these parts and of their offices, all tending to one result; we see a cylindrical box containing a coiled elastic spring, which, by its endeavor to relax itself, turns round the box. We next observe a flexible chain -- artificially wrought for the sake of flexure -- communicating the action of the spring from the box to the fusee. We then find a series of wheels, the teeth of which catch in and apply to each other, conducting the motion from the fusee to the balance and from the balance to the pointer, and at the same time, by the size and shape of those wheels, so regulating that motion as to terminate in causing an index, by an equable and measured progression, to pass over a given space in a given time. We take notice that the wheels are made of brass, in order to keep them from rust; the springs of steel, no other metal being so elastic; that over the face of the watch there is placed a glass, a material employed in no other part of the work, but in the room of which, if there had been any other than a transparent substance, the hour could not be seen without opening the case. This mechanism being observed -- it requires indeed an examination of the instrument, and perhaps some previous knowledge of the subject, to perceive and understand it; but being once, as we have said, observed and understood -- the inference we think is inevitable, that the watch must have had a maker-that there must have existed, at some time and at some place or other, an artificer or artificers who formed it for the purpose which we find it actually to answer, who comprehended its construction and designed its use.

I. Nor would it, I apprehend, weaken the conclusion, that we had never seen a watch made -- that we had never known an artist capable of making one -- that we were altogether incapable of executing such a piece of workmanship ourselves, or of understanding in what manner it was performed; all this being no more than what is true of some exquisite remains of ancient art, of some lost arts, and, to the generality of mankind, of the more curious productions of modern manufacture. Does one man in a million know how oval frames are turned? Ignorance of this kind exalts our opinion of the unseen and unknown artist's skiff, if he be unseen and unknown, but raises no doubt in our minds of the existence and agency of such an artist, at some former time and in some place or other. Nor can I perceive that it varies at all the inference, whether the question arise concerning a human agent or concerning an agent of a different species, or an agent possessing in some respects a different nature.

II. Neither, secondly, would it invalidate our conclusion, that the watch sometimes went wrong or that it seldom went exactly right. The purpose of the machinery, the design, and the designer might be evident, and in the case supposed, would be evident, in whatever way we accounted for the irregularity of the movement, or whether we could account for it or not. It is not necessary that a machine be perfect in order to show with what design it was made: still less necessary, where the only question is whether it were made with any de- sign at all.

III. Nor, thirdly, would it bring any uncertainty into the argument, if there were a few parts of the watch,, concerning which we could not discover or had not yet discovered in what manner they conduced to the general effect; or even some parts, concerning which we could not ascertain whether they conduced to that effect in any manner whatever. For, as to the first branch of the case, if by the loss, or disorder, or decay of the parts in question, the movement of the watch were found in fact to be stopped, or disturbed, or retarded, no doubt would remain in our minds as to the utility or intention of these parts, although we should be unable to investigate the manner according to which, or the connection by which, the ultimate effect depended upon their action or assistance; and the more complex is the machine, the more likely is this obscurity to arise. Then, as to the second thing supposed, namely, that there were parts which might be spared without prejudice to the movement of the watch, and that we had proved this by experiment, these superfluous parts, even if we were completely assured that they were such, would not vacate the reasoning which we had instituted concerning other parts. The indication of contrivance remained, with respect to them, nearly as it was before.

IV. Nor, fourthly, would any man in his senses think the existence of the watch with its various machinery accounted for, by being told that it was one out of possible combinations of material forms; that whatever he had found in the place where he found the watch, must have contained some internal configuration or other; and that this configuration might be the structure now exhibited, namely, of the works of a watch, as well as a different structure.

V. Nor, fifthly, would it yield his inquiry more satisfaction, to be answered that there existed in things a principle of order, which had disposed the parts of the watch into their present form and situation. He never knew a watch made by the principle of order; nor can he even form to himself an idea of what is meant by a principle of order distinct from the intelligence of the watchmaker.

VI. Sixthly, he would be surprised to hear that the mechanism of the watch was no proof of contrivance, only a motive to induce the mind to think so:

VII. And not less surprised to be informed that the watch in his hand was nothing more than the result of the laws of *metallic* nature. It is a perversion of language to assign any law as the efficient, operative cause of any thing. A law presupposes an agent, for it is only the mode according to which an agent proceeds: it implies a power, for it is the order according to which that power acts. Without this agent, without this power, which are both distinct from itself, the *law* does nothing, is nothing. The expression, "the law of metallic nature," may sound strange and harsh to a philosophic ear; but it seems quite as justifiable as some others which are more familiar to him, such as "the law of vegetable nature," "the law of animal nature," or, indeed, as "the law of nature" in general, when assigned as the cause of phenomena, in exclusion of agency and power, or when it is substituted into the place of these.

VIII. Neither, lastly, would our observer be driven out of his conclusion or from his confidence in its truth by being told that he knew nothing at all about the matter. He knows enough for his argument; he knows the utility of the end; he knows the subserviency and adaptation of the means to the end. These points being known, his ignorance of other points, his doubts concerning other points affect not the certainty of his reasoning. The consciousness of knowing little need not beget a distrust of that which he does know.

CHAPTER TWO: "STATE OF THE ARGUMENT CONTINUED"

Suppose, in the next place, that the person who found the watch should after some time discover that, in addition to all the properties which he had hitherto observed in it, it possessed the unexpected property of producing in the course of its movement another watch like itself -- the thing is conceivable; that it contained within it a mechanism, a system of parts -- a mold, for instance, or a complex adjustment of lathes, baffles, and other tools -- evidently and separately calculated for this purpose; let us inquire what effect ought such a discovery to have upon his former conclusion.

I. The first effect would be to increase his admiration of the contrivance, and his conviction of the consummate skill of the contriver. Whether he regarded the object of the contrivance, the distinct apparatus, the intricate, yet in many parts intelligible mechanism by which it was carried on, he would perceive in this new observation nothing but an additional reason for doing what he had already done -- for referring the construction of the watch to design and to supreme art. If that construction *without* this property, or, which is the same thing, before this property had been noticed, proved intention and art to have been employed about it, still more strong would the proof appear when he came to the knowledge of this further property, the crown and perfection of all the rest.

II. He would reflect, that though the watch before him were, *in some sense*, the maker of the watch, which, was fabricated in the course of its movements, yet it was in a very different sense from that in which a carpenter, for instance, is the maker of a chair -- the author of its contrivance, the cause of the relation of its parts to their use. With respect to these, the first watch was no cause at all to the second; in no such sense as this was it the author of the constitution and order, either of the arts which the new watch contained, or of the parts by the aid and instrumentality of which it was produced. We might possibly say, but with great latitude of expression, that a stream of water ground corn; but no latitude of expression would allow us to say, no stretch of conjecture could lead us to think that the stream of water built the mill, though it were too ancient for us to know who the builder was. What the stream of water does in the affair is neither more nor less than this: by the application of an unintelligent impulse to a mechanism previously arranged, arranged independently of it and arranged by intelligence, an effect is produced, namely, the corn is ground. But the effect results from the arrangement. The force of the stream cannot be said to be the cause or author of the effect, still less of the arrangement. Understanding and plan in the formation of the mill were not the less necessary for any share which the water has in grinding the corn; yet is this share the same as that which the watch would have contributed to the production of the new watch, upon the supposition assumed in the last section. Therefore,

III. Though it be now no longer probable that the individual watch which our observer had found was made immediately by the hand of an artificer, yet does not this alteration in anyway affect the inference that an artificer had been originally employed and concerned in the production. The argument from design remains as it was. Marks of design and contrivance are no more accounted for now than they were before. In the same thing, we may ask for the cause of different properties. We may ask for the cause of the color of a body, of its hardness, of its heat; and these causes may be all different. We are now asking for the cause of that subserviency to a use, that relation to an end, which we have remarked in the watch before us. No answer is given to this question by telling us that a preceding watch produced it. There cannot be design without a designer; contrivance without a contriver; order without choice; arrangement without anything capable of arranging; subserviency and relation to a purpose without that which could intend a purpose; means suitable to an end, and executing their office in accomplishing that end, without the end ever having been contemplated or the means accommodated to it. Arrangement, disposition of parts, subserviency of means to an end, relation of instruments to a use imply the presence of intelligence and mind. No one, therefore, can rationally believe that the insensible, inanimate watch, from which the watch before us issued, was the proper cause of the mechanism we so much admire in it -- could be truly said to have constructed the

instrument, disposed its parts, assigned their office, determined their order, action, and mutual dependency, combined their several motions into one result, and that also a result connected with the utilities of other beings. All these properties, therefore, are as much unaccounted for as they were before.

IV. Nor is anything gained by running the difficulty farther back, that is, by supposing the watch before us to have been produced from another watch, that from a former, and so on indefinitely. Our going back ever so far brings us no nearer to the least degree of satisfaction upon the subject. Contrivance is still unaccounted for. We still want a contriver. A designing mind is neither supplied by this supposition nor dispensed with. If the difficulty were diminished the farther we went back, by going back indefinitely we might exhaust it. And this is the only case to which this sort of reasoning applies. Where there is a tendency, or, as we increase the number of terms, a continual approach toward a limit, *there*, by supposing the number of terms to be what is called infinite, we may conceive the limit to be attained; but where there is no such tendency or approach, nothing is effected by lengthening the series. There is no difference as to the point in question, whatever there may be as to many points, between one series and another -- between a series which is finite and a series which is infinite. A chain composed of an infinite number of links, can no more support itself, than a chain composed of a finite number of links. And of this we are assured, though we never *can* have tried the experiment; because, by increasing the number of links, from ten, for instance, to a hundred, from a hundred to a thousand, etc., we make not the smallest approach, we observe not the smallest tendency toward self support. There is no difference in this respect -- yet there may be a great difference in several respects -- between a chain of a greater or less length, between one chain and another, between one that is finite and one that is infinite. This very much resembles the case before us. The machine which we are inspecting demonstrates, by its construction, contrivance and design. Contrivance must have had a contriver, design a designer, whether the machine immediately proceeded from another machine or not. That circumstance alters not the case. That other machine may, in like manner, have proceeded from a former machine: nor does that alter the case; contrivance must have had a contriver. That former one from one preceding it: no alteration still; a contriver is still necessary. No tendency is perceived, no approach toward a diminution of this necessity. It is the same with any and every succession of these machines -- a succession of ten, of a hundred, of a thousand; with one series, as with another -- a series which is finite, as with a series which is infinite. In whatever other respects they may differ, in this they do not. In all equally, contrivance and design are unaccounted for.

The question is not simply, How came the first watch into existence? which question, it may be pretended, is done away by supposing the series of watches thus produced from one another to have been infinite, and consequently to have had no such *first* for which it was necessary to provide a cause. This, perhaps, would have been nearly the state of the question, if nothing had been before us but an unorganized, unmechanized substance, without mark or indication of contrivance. It might be difficult to show that such substance could not have existed from eternity, either in succession -- if it were possible, which I think it is not, for unorganized bodies to spring from one another -- or by individual perpetuity. But that is not the question now. To suppose it to be so is to suppose that it made no difference whether he had found a watch or a stone. As it is, the metaphysics of that question have no place; for, in the watch which we are examining are seen contrivance, design, an end, a purpose, means for the end, adaptation to the purpose. And the question which irresistibly presses upon our thoughts is, whence this contrivance and design? The thing required is the intending mind, the adapting hand, the intelligence by which that hand was directed. This question, this demand is not shaken off by increasing a number or succession of substances destitute of these properties; nor the more, by increasing that number to infinity. If it be said that, upon the supposition of one watch being produced from another in the course of that other's movements and by means of the mechanism within it, we have a cause for the watch in my hand, namely, the watch from which it proceeded; I deny that for the design, the contrivance, the suitableness of means to an end, the adaptation of instruments to a use, all of which we discover in the watch, we have any cause whatever. It is in vain, therefore, to assign a series of such causes or to allege that a series may be carried back to infinity; for I do not admit that we have yet any cause at all for the phenomena, still less any series of causes either finite or infinite. Here is contrivance but no contriver; proofs of de- sign, but no designer.

V. Our observer would further also reflect that the maker of the watch before him was in truth and reality the maker of every watch produced from it: there being no difference, except that the latter manifests a more exquisite skill, between the making of another watch with his own hands, by the mediation of ffles, lathes, chisels, etc., and the disposing, fixing, and inserting of these instruments, or of others equivalent to them, in the body of the watch already made, in such a manner as io form a new watch in the course of the movements which he had given to the old one. It is only working by one set of tools instead of another.

The conclusion which the *first* examination of the watch, of its works, construction, and movement, suggested, was that it must have had, for cause and author of that construction, an artificer who understood its mechanism and designed its use. This conclusion is invincible. A *second* examination presents us with a new discovery. The watch is found, in the course of its movement, to produce another watch similar to itself; and not only so, but we perceive in it a system of organization separately calculated for that purpose. What effect would this discovery have or ought it to have upon our former inference? What, as has already been said, but to increase beyond measure our admiration

of the skill which had been employed in the formation of such a machine? Or shall it, instead of this, all at once turn us round to an opposite conclusion, namely, that no art or skill whatever has been concerned in the business, although all other evidences of art and skill remain as they were, and this last and supreme piece of art be now added to the rest? Can this be maintained without absurdity? Yet this is atheism. . . .

CHAPTER FIVE: "APPLICATION OF THE ARGUMENT CONTINUED"

Every observation which was made in our first chapter concerning the watch may be repeated with strict propriety concerning the eye, concerning animals, concerning plants, concerning, indeed, all the organized parts of the works of nature. As,

I. When we are inquiring simply after the *existence* of an intelligent Creator, imperfection, inaccuracy, liability to disorder, occasional irregularities may subsist in a considerable degree without inducing any doubt into the question; just as a watch may frequently go wrong, seldom perhaps exactly right, may be faulty in some parts, defective in some, without the smallest ground of suspicion from thence arising that it was not a watch, not made, or not made for the purpose ascribed to it. When faults are pointed out, and when a question is started concerning the skill of the artist or dexterity with which the work is executed, then, indeed, in order to defend these qualities from accusation, we must be able either to expose some intractableness and imperfection in the materials or point out some invincible difficulty in the execution, into which imperfection and difficulty the matter of complaint may be resolved; or, if we cannot do this, we must ad- duce such specimens of consummate art and contrivance proceeding from the same hand as may convince the inquirer of the existence, in the case before him, of impediments like those which we have mentioned, although, what from the nature of the case is very likely to happen, they be unknown and unperceived by him. This we must do in order to vindicate the artist's skill, or at least the perfection of it; as we must also judge of his intention and of the provisions employed in fulfilling that intention, not from an instance in which they fail but from the great plurality of instances in which they succeed. But, after all, these are different questions from the question of the artist's existence; or, which is the same, whether the thing before us be a work of art or not; and the questions ought always to be kept separate in the mind. So likewise it is in the works of nature. Irregularities and imperfections are of little or no weight in the consideration when that consideration relates simply to the existence of a Creator. When the argument respects His attributes, they are of weight; but are then to be taken in conjunction-the attention is not to rest upon them, but they are to be taken in conjunction with the unexceptionable evidence which we possess of skill, power, and benevolence displayed in other instances; which evidences may, in strength, number, and variety, be such and may so overpower apparent blemishes as to induce us, upon the most reasonable ground, to believe that these last ought to be referred to some cause, though we be ignorant of it, other than defect of knowledge or of benevolence in the author. . . .