Jian Dao 21 (2004): 109-127

PHILOSOPHICAL ASSUMPTIONS IN THE DISCUSSION OF IRREDUCIBLE COMPLEXITY, NATURALISM, DEMARCATION CRITERION, PROBABILITY, LAW, AND ADEQUATE EXPLANATION

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Introduction

In *Darwin's Black Box: The Biochemical Challenge to Evolution* (1996), Dr. Michael Behe evaluates the possibility of gradualism in macroevolution in the perspective of modern biochemistry. In this book he coins the term "irreducible complexity," which becomes a controversial topic among theologians, philosophers, and scientists. In addition, Behe is skeptical to the naturalistic view of science advocated by evolutionists. His supporters such as Philip Johnson (2000) and William Dembski (1999) also strongly oppose using methodological naturalism as a means to exclude God as a viable explanation for the origin of life.

This paper has two objectives. First, both viewpoints supporting and rejecting "irreducible complexity" will be introduced and evaluated. Second, epistemological and methodological aspects of the debate in reference to as naturalism and demarcation criterion will also be discussed. Though at first glance, the first aspect concerns with "factual,

objective science" for its focus is biochemistry, and the second area is primarily grounded on philosophy; I argue that even the debate regarding irreducible complexity is philosophical in nature. In other words, the difference between both parties are based on their epistemology, methodology, and metaphysics. As a matter of fact, many scholars who argue for or against irreducible complexity are philosophers rather than scientists.

Darwin's Black Box

As the title of his book implies, Behe attempts to uncover Darwin's black box. A black box is known for its mysteriousness; we know that it performs certain functions, but do not know how it works and how it came to be. For example, novice computer users know that when they input some commands via the keyboard, something magical will happen to the output device (e.g. monitor, printer). They have no idea how the RAM, the bus, and the microprocessor work together to make that happen, and how engineers design the architecture of a computer. According to Behe, by the time of Darwin, the cellular structure was still a black box, so he was only able to understand biology above the level of cells. Therefore, the theory of evolution was built upon many un-examined questions. Today with advanced biochemistry, we are able to look into the black box; and hence, based on new findings, Behe questions how this complicated structure can come to be in the first place.

It is important to note that Behe does not object to microevolution, which is about changes of traits within the same species over time; his questions are on macroevolution, which suggests a new species could be evolved from a different species. Contrary to the title of his book, *Origins of Species*, Darwin's theory of evolution mainly deals with microevolution rather than the origins of new species. Though the example of the pepper moth is often cited as evidence about how a species can adapt to the environment, still it does not show how new species are evolved.

Irreducible complexity

With the concept of irreducible complexity, Behe questions how a new species are evolved from another by the mean of gradualism. An irreducibly complex system is composed of many well-matched parts,

and each part contributes specific functions to the entire system. A system is irreducible in the sense that when one component is removed or malfunctions, the entire system collapses. Behe insists that biological structures are irreducibly complicated systems, and it is impossible to add in components and features bit by bit. Natural selection, the engine of Darwinian evolution, works only if there is something to select – something that is useful right now, rather than in the future.

Mousetrap Analogy

In supporting the mentioned claim, Behe uses both metaphors (e.g. mousetrap) and examples in biochemistry (e.g eyeball, cilium, and blood clotting). Consider first the mousetrap. A mousetrap is composed of five parts that are necessary for its operation, absence of any component will definitely disable its function. Many discussions concerning irreducible complexity are on this mousetrap metaphor. For example, Ussery (1998) points out that the mousetrap analogy only works for things built by humans, and it is dangerous and misleading to apply it to molecules. Shanks and Joplin (in press) argue that Behe's mousetrap is a technological hybrid descended from earlier traps in a historical evolutionary process, therefore it is not an irreducibly complicated system. Miller (1996) regards the mousetrap analogy invalid because there is more than one way to construct a mousetrap. Ruse (1998) also denies it as an irreducibly complicated system because one can remove the base and attach the unit directly to the floor.

It is important to note that while the mousetrap case is an example for "irreducible complexity," it is only a metaphor to "biological irreducible complexity." Analogy is a tool to clarify explanation, but it is not an explanation of a phenomenon. When a theologian uses water, ice, and steam to illustrate the trinity and another theologian points out that there is much dissimilarity between the twos, they could argue whether the analogy is appropriate, but that does not add or remove any weight of evidence toward the doctrine of the Trinity. Some theologians apply dual characteristics of light (wave and particle) to illustrate the dual personalities of Jesus (deity and humanity) (Gould 2002). Gould is critical to this type of mapping,

> what am I to make of such a claim? That the status of Jesus as both God and man (a central Trinitarian concept) must be factually true because electrons, and other basic components, can be construed as either waves or particles? I don't see what such a comparison could indicate except that the human mind can embrace

> contradiction (an interesting point, to be sure, but not a statement about the factual character of God), and that people can construct the wildest metaphors. (Gould 2002, 216, bracketed phrases appear in the original text)

Consider an example in history of science: Huygens had once compared light to sound since they are similar in a number of aspects. One might say that sound consists of wave, and by the same token, light could be composed of wave too (Thagard 1978). Nevertheless, there are also dissimilarities between sound and light. One should not go so far as to say, "Light is wave *because* sound is wave" or "light is not wave *because* light is unlike sound." The sound analogy helps to explain light, but it does not prove or disprove the nature of light. It is true that in the history of science there are some successful stories of how using analogy leads to major scientific breakthroughs. For example, Newton's discovery of universal gravitational force was largely through analogy and Rutherford had also developed the idea that in the subatomic world electrons revolve around the nucleus from the analogy that planets revolve around the sun in a solar system. Analogy can be helpful in generating new ideas and to formulate new hypotheses, but it cannot be a logic for explanation because there is no rule to determine the degree of similarities between two entities (Nersession 1999; Dunbar 1999).

In this view, similarities and differences between a mousetrap and an organism are not the main point. Neither is the issue about whether a mousetrap is considered irreducibly complicated. The focal point should be whether an organism is a structure of irreducibly complexity and how likely this system can arise from evolution. To examine this issue, we have to look at biological examples.

Blood Clotting

Behe argues that many scholars who endorse macroevolution ignore details. Take blood clotting as an example. Dr. Russell Doolittle, one of the leading authorities of blood clotting, begins his research paper on this subject with a question: "How in the world did this complex and delicately balanced process evolve? The paradox was, if each protein depended on activation by another, how could the system ever have arisen?" (cited in Behe 1996), Behe criticized that no causative factors are cited in the paper. Phrases such as "appears," "is born," "arise," "springs forth" are all over the paper, but there is no detail mentioning about how things could appear, spring forth, or arise.

Critics argue that gene duplication could be a key to explaining this complexity. An organism produces a copy of the original gene. So the first set of genes keeps the system running while the duplicate could work on enhancing the system. This process is repeated over and over again until an advanced system has been fully developed. At one time, blood clotting may have used only a few genes, but the duplication process adds more and more genes into the system later (cited in DiSilvestro 1999).

DiSilvestro (1999) has rejected this argument by pointing out that the duplicated genes still has to go through a structural evolution and the agent that drives this change remained undetermined. Moreover, there is a high probability that additional genes would destabilize the system rather than to enhance the feature. This type of harmful mutation is well-documented in biology.

Some of Behe's opponents admit that it is difficult to explain certain irreducibly complicated systems, and they insist that it is only a matter of time. Dorit (1997) argues that unsolved questions are the hallmark of an exciting science. Problems that remain unsolved today may be solved in the future. In a similar tone, Miller (1999) argues that although creationists complain that natural processes cannot provide satisfactory explanation on most issues, given enough time, science will explain even the most difficult and complicated matter. On discussion of the topic, "Did God create the universe?," Davies (1983) asserts that we never know if at some distant time in the future, someone will be able to explain the most astonishing and inexplicable phenomena in a naturalistic point of view. This optimistic prophecy may not be fulfilled since there is no agreement between the two parties on what constitutes "explanation." To Doolittle and many other scientists, phrases like "arise" and "spring forth" are legitimate. Discovery of self-organizing organic structures is also considered an "explanation." To Behe and other creationists, terms like "automation" and "self-organization" are synonymous to "uncaused," "just happened." What counts to be an as explanation is a highly philosophical question.

Conceptual Precursor, Physical Precursor, and Common Descent

When Behe (1997) delivered a speech in Princeton University, an audience challenged him by giving the following example: assume that a few thousands of years later our current computer technology had ceased to exist. When our descendents discover a relic of a microprocessor but not other pre-microchip artifacts, they may mistakenly conclude that a microprocessor is irreducibly complex and thus it is not a product of gradual improvement. Yet actually preceded the invention of the microprocessor, there were integrated circuits, transistors, vacuum tubes, and so on.

In the seminar Behe did not give a detailed response. Nevertheless, this argument could have been responded to by Behe's notion that there is a major difference between the conceptual precursor and physical precursor (1996). A conceptual precursor is a blue print, which is the source of inspiration of later improvements of an existing product, or the foundation (background knowledge) of later innovations. A physical precursor is the actual ascendant of the later improved version.

A vacuum tube is the conceptual precursor, but not the physical precursor, of a microprocessor. To be specific, an engineer can design the Pentium IV chip with reference to the concepts of Pentium III, but physically, a Pentium III microchip cannot be improved bit by bit to be a Pentium IV based upon the existing physical structure. The engineer could not cramp more transistors into the older chip simply because it has a physical limit. Behe asserted that in Darwinian evolution, only physical precursors count. To validate evolution, evolutionists must explain how one species could be the physical precursor of another one.

Further, the notion of the conceptual precursor fits nicely with the notion of common descent, which is accepted by Behe. He (1999a) emphasized that evidence of common descent is not evidence of evolution. According to common descent, similarities between species could imply that an intelligent designer has created different species based upon a common conceptual architecture. Consider again designing microchips as an analogy. The engineers designed Pentium, Pentium II, Pentium III, and Pentium IV with Intel's technology, and that's why there are similarities among these microprocessors. However, this does not mean that a Pentium IV chip is physically improved from a Pentium III by adding more transistors and a higher capacity of on-chip cache.

Arguments by Probability

Given that organisms are truly complicated, the question is: how high the probability is that such a complicated system arises from a natural cause like macroevolution? A philosopher of biology, Elliot Sober (1993), argues that creationists unfairly compare design hypothesis with the mindless random hypothesis. He contends that natural selection is not a random process. For in a random process, probabilities of different options will be the same; and the principle of natural selection implies that the fittest species have the highest probability of survival. Therefore, the probability that well-structured organisms could evolve is much higher than what most people perceive. Sober uses the following metaphor as an illustration. Imagine that there is a combination lock: to open it, one must decode 19 letters in the right sequence. If the person guesses the codes randomly, the probability of opening the lock is 1/26 raises to a power of 19. However, if that person can "freeze" the code when it is chosen correctly, and then proceed to the next one, the probability of decoding the lock is much higher than the first case.

With the metaphor, Sober argues that variation is generated at random, but selection among variants is not. When a feature of an organism is functional (adaptive to the environment), that can be considered as "frozen" (selected) and then the subsequent evolution could build upon this foundation. In this view, the probability that well-structured species are evolved by natural selection is much higher than that of a purely random process.

Behe was not convinced by Sober's argument. According to Behe (1996), if our reproductive success depends on probability on the analogy of opening a lock, we would leave no offspring. As a disk turns, who decides which letter to freeze and why? Behe argues that, the Sober scenario not only cannot support evolution, on the contrary, it is actually an example of intelligent design. If we leave for the environment to select (freeze) a feature, natural selection could evolve or regress; it does not necessarily retain good features. Thus, there must be an agent (a lock-opener, an intelligent designer) to work through the process. Behe points out that seven years before publication of Sober's *Philosophy of Biology*, Robert Shapiro (1986) has examined this scenario in *Origins: A Skeptic's Guide to the Creation of Life on Earth*, and concludes the argument invalid from the viewpoint of chemistry.

Naturalism and Demarcation Criterion

Behe (1996, 1998) objects that many scientists view invoking natural cause as the only legitimate approach of conducting research. He asserts that, naturalism itself is not a scientific argument. It is philosophy. In some cases, it is even more difficult to consent to naturalistic and materialistic explanations than to the intelligent design argument; for example, the alien seed hypothesis and non-cause cosmology from the steady-state theory are two cases.

Steady-state theory, proposed by Fred Hoyle, is a cosmological model of how the universe began. Unlike what the big bang theory suggests, the steady-state theory asserts that the universe is infinite and eternal. To explain why the universe is so dense, Hoyle proposes that matter is continually coming into existence with no cause.

Alien seed theory was proposed by Francis Crick, a Nobel Prize winner. According to Crick, life on earth may have begun when aliens from another planet sent a space ship to seed the earth with spores, which are small, usually single-celled reproductive bodies that are highly resistant to desiccation and heat and are capable of growing into new organisms.

There are several other natural theories regarding the origin of the universe or life on earth, such as bubble universe, zillion anthropic universes. Behe criticizes that no experiments have ever been carried out to support any of the preceding notions.

In a similar vein, Dembski (1997) also criticizes that some cosmological theories pursue certain approaches just because they are naturalistic. For instance, in his youth Einstein had committed to Spinoza's God. Spinoza had identified God with nature and assumed that this God is infinite in extent and duration. Consistent with Spinoza's conception, Einstein formulated his field equations to model such an infinite universe. In the 1930s when Edwin Hubble announced his discovery of an expanding universe, Einstein then was convinced that the universe was indeed finite. But Alan Guth and his successors, much like Fred Hoyle, attempt to recapture Spinoza's lost infinity. In Dembski's view, their theories arose solely out of a need to preserve scientific naturalism.

The issue of naturalism and materialism is tied to the issue of demarcation. In the heyday of positivism and falsificationism, the demarcation criterion was often used to classify science and non-science.

According to positivism, only propositions that are testable as true or false carry cognitive meanings. Un-testable propositions are simply metaphysics. Later, Popperians has changed the criterion from verification to falsification. Nonetheless, both set a watershed between science and metaphysics, and the intelligent argument is classified a non-verifiable or non-falsifiable belief.

Today, both positivism and falsificationism are no longer appealing to many philosophers (Meyer 1999). As Behe notices, many cosmological models proposed by scientists results neither of experiments nor observation. For instance, in answering the question whether it is possible to explain the origin of the universe without a first cause (God), Davies (1983) suggests that our existing universe might only be a disconnected fragment of space and time resulting from the Big Bang. There could be many, even an infinite number of other universes, yet all are physically inaccessible to others. Here arises the question, what would happen if testability and falsifiability were to apply to such theory? How could one employ any scientific method to study something that is totally inaccessible to us and to which the common physical laws do not apply? The only thing still makes it "scientific" is that it offers a naturalistic explanation.

Henceforth, the demarcation criterion has changed its emphasis: theories that follow natural laws are considered science, while those giving supernatural explanations are not science (Ruse 2000). In a similar vein, Pennock (1999) promoted "methodological naturalism," in which lawful regularity provides a ground for inductive evidential inference. To defend scientific naturalism, Grinnell (1997) argues that inter-subjectivity within the scientific community necessitates the demarcation criterion. According to Grinnell, discovery is only the first part of scholarly inquiry, and credibility is the second step. Individual scientists make discoveries and the scientific community verifies whether those discoveries are credible. Inter-subjectivity refers to the recognition of others as people who are like scientists, whose basic experience of reality is complementary. Since the naturalistic world is the only world accessible to scientists, naturalism becomes the theory should be adopted. If a theory cannot be empirically measured with reference to the accessible world, then it cannot be science.

At first glance, the demarcation criterion has shifted the focus from testability and falsifability to natural laws, but actually, its fundamental

principles are not too different from positivism and falsificationism. Promoting "natural laws" or "lawful regularity" is another way to endorse the covering law model. Inter-subjectivity among scientists and accessibility to a common reality is the same thing as basing judgment on empirical or logical means; and to a certain extent, naturalism and the demarcation criterion are defensive rather then offensive. It does not declare the intelligent design argument to be false, but simply says theology and metaphysics should not step into the arena of science, which is self-sufficient in inquiry. As Morrow (1997) says, a naturalistic and scientific inquiry of the origin of life does not assert that God does not exist, but simply that it is unnecessary to propose a divine purpose to explain how things came to be. However, while naturalists such as Morrow devote efforts to prevent metaphysics at the front door, they are not aware that metaphysical assumptions have sneaked through the backdoor.

As mentioned before, Behe found the naturalistic criterion unacceptable. Meyer (1997, 1999) and Dembski (1997) also firmly refute demarcation criterion. In response to Ruse's natural law criterion, they argue that there are some difficulties on the covering law model. First, many laws are descriptive but not explanatory. A typical example is Newton's universal law of gravitation, which Newton himself had admitted did not explain, but merely described gravitational motion. Second, covering laws could not explain a past single event. There are things that do not come into existence via series of events that regularly recur; the origin of the universe and the origin of life belong to this category. In Meyer's view, historical events can employ neither empirically-oriented induction, nor logically-based covering law models. Instead, historical theories depend on what C.S. Peirce (1934/1960) called "abductive inferences." In abduction, various plausible explanations of a phenomenon are explored and the best explanation is accepted when alternate hypotheses do not give a satisfactory explanation. This mode of inquiry is also termed as "inference to the best explanation."

Further, when inter-disciplinary inquiries have been gaining popularity, it is not a progressive move to revert to the demarcation criterion. For example, historians and psychologists have been collaborating in exploring psychohistory, and computer scientists, mathematicians, social scientists, and philosophers also have been exchanging ideas on causality in structural equation modeling (Yu, 2001). More and more researchers in the field of social science employ mixed

methodologies such as quantitative and qualitative methods. Rejecting other views just because of their non-compliance of "house rules" would hinder researchers from fruitful dialogue and collaboration.

Philosophical Conflict

There is a popular myth that the debate between evolutionists and creationists is a conflict between science and religion; and Phillip Johnson (1991, 1996) indicates that this conflict is indeed philosophical. If evolution is viewed as improvement of organisms over a long period of time, evolution and creationism do not necessarily conflict with each other. It is the philosophies derived from Darwinism, such as the naturalistic and materialistic approach of inquiry, which implicate that life is accidental and without a purpose, and morality has no objective and ultimate foundation, that go against Christianity.

It is not difficult to see that the debate regarding naturalism and demarcation criterion is a philosophical one, for it centers on epistemology and methodology. (What is cognitively meaningful knowledge? What is science? How can we conduct research on unobservable, single events?) At first glance, arguments pertaining irreducible complexity seem to be based upon biochemistry and probability, which are less philosophical in nature. Yet, in my view, this discussion is also directed by philosophical beliefs, especially metaphysical assumptions.

Probability and Law

Shanks and Joplin (1999) argue that typical biochemical systems exhibit considerate redundancy and overlap of function. They propose that "redundant complexity" is a more accurate description of biochemical structures than "irreducible complexity." Further, they argue that such redundant complicated system could be developed and maintained by a self-organizing process; therefore, it is *possible* to explain the origin of life in a naturalistic, evolutionary fashion. However, Behe (2000) criticized that the argument of self-organizing process introduced by Shanks and Joplin still have not answered the question of the origin of life. He asserts that saying a process is self-organizing and automatic has only described the phenomenon; the mathematical modeling does not call the automated system into being.

Ussery (1998) asserts that though a biochemical process is complex still it has room for mutation. For instance, one out of every thousand males has an extra X chromosome, and a similar number (one out of a thousand) of males have an extra Y chromosome. About one out of every thousand females only has one X-chromosome, instead of two. With this error rate, while DNA is replicated via various processes, it is *highly possible* that new species could arise from mutations.

Regardless of whether a biochemical system is irreducibly complicated, redundantly complicated, or error-prone, the description of a biochemical system does not lead to a firm conclusion of either evolution or creation. It is important to note that when Ussery, Shanks and Joplin drew their conclusion, they said it is "possible" to give a naturalistic explanation. Behe (1999b) employs the same logic from the opposite side: the odds against finding a new functional protein structure are astronomical. Dembski (1998), who is also vocal in advocating intelligent design theory, uses mathematical probability to develop criteria for detecting intelligent design. Inferences from description to explanation are probabilistic, and probability itself is philosophical (Hacking 1975; Salmon 1967; Weatherford 1982; von Mises 1957).

As far as the universe is an open system, no event has a probability of zero; no matter how small the probability is (e.g. $p = .000001$), still it would have a chance to happen. One can only say that the chance for such an event to happen is extremely rare. Traditionally, the Fisherian hypothesis testing would be employed to determine whether the p value is significant or not. However, since the origin of the universe and the origin of life are considered single events in history. It does not make sense to compute the probability based upon relative frequency in the long run. In this context, phrases like "possible" and "high probable" reflect the subjective view of probability.

The propensity account of probability is another way to address non-repeatable events. According to the propensity school, the realization of probabilities, which may be random, depends on the total situation within which the possibilities are being actualized. In the frequentist view, all members of a set have equal chances to be drawn; while in the propensity view, all members are equal but some are "more equal." In other words, there are "weighted" probabilities rather than mere probabilities, and that leads to a tendency or a disposition. Therefore, Peacocke (2000) suggests that the evolutionary process is characterized by propensity.

Indeed, there is no generally agreed procedure for computing probabilities regarding the origin of life and the origin of universe. In Sober's scenario mentioned, Sober insists that the probability of that organisms evolve naturally is much higher than that of pure random process, for evolution involves both random mutation (the law of probability) and purposive selection (the law of biology). Similar arguments are also stated by Johnson (1997) and Ruse (1998). Fred Hoyle, the aforementioned scientist who proposed the steady-state theory, found that the odds against DNA assembling by chance are 10^{40000} (author note: It is 10 raise power to 40000, so 40000 must be superscript) to one. Nonetheless, Hoyle still favored a naturalistic approach to the origin of the universe. Defenders of evolution argue that DNA do not assemble purely by chance. They assemble by a combination of chance and according to the laws of physics. Without the laws of physics as we know them, life on earth would not have evolved in the short span of six billion years (Stenger 1997).

Behe does not agree that "laws" could increase the probability of that the emergence of life is natural. In reviewing Davies's *The Fifth Miracle: The Search for the Origin and Meaning of Life*, He (1998) points out that Davies contradicts himself by using the law argument. Davies says that laws could not contain the recipe for life because laws are "information poor" while life is "information-rich." In facing the challenge that a deterministic, mechanical, law-like process, like a primordial soup left to the mercy of familiar laws of physics and chemistry, could hardly achieve the complexity of life, Davies admitted that indeed no known law of nature could achieve this.

The notion that biological laws lead to a high probability of the occurrence of life is called "biological determinism"; in attempt to rectify its problem, Davies (1999, 2000) proposes a new type of law that is not derived from physical laws: the law of complexity; according to Davies, it is derived from the logical structure of the system, artificial life generated by computer models is an example. Lifelike qualities could be found in computer-generated characters that are maintained by self-organizing algorithms. Using the artificial life analogy, Davies argues that universal logical laws might provide a key to unlock the mystery of life. However, Behe (1998) asserts that such idea has met with considerable skepticism; organic life actually is not an example of self-organization.

On the assumption that the preceding arguments are valid; the law of biology, the law of physics, or the law of logic do raise the probability of naturally emerged lives. But how do those laws arise in the first place? Now, the question of the origin of life and universe became the question on the origin of laws, which ties closely to metaphysical assumptions.

The Nature of Reality

Johnson (1991) has distinguished "methodological naturalism" from "metaphysical naturalism," the former implies that scientists should go as far as to explain natural laws, and the latter assumes that the universe is just a material existence and nothing beyond that. No doubt there would be a big gap between description and explanation. To fill the gap, the debate has to be escalated from methodology to metaphysics, for subtle metaphysical assumptions are hidden in both.

While Behe (1996) argues that evolutionists are unable to give details on how simple biochemical systems could evolve into advanced ones, Shanks and Joplin (in press) also charge that no proponent of intelligent design has ever offered the slightest clue about how supernatural creation could be done. To explain the unexplained, both parties have developed their own philosophical interpretations. To some creationists, as the ultimate reality is supernatural, there is no need to give details on how the creation process happened, for the supernature is beyond our comprehension. While to some evolutionists, their ontology is naturalistic. Not surprisingly, they have no problem using phrases like "appear," "arise," "spring forth" without giving account on how things arise or appear. Metaphysics of both parties demonstrates the considered "self-evident axioms" respectively, and nothing could ever go beyond that ultimate point.

The next question is: how an explanation can be considered satisfactory in epistemological terms; again, both parties regard explanations given by the other side as inadequate. In *Darwin's Black Box*, Behe disapproves the alien seed theory as an explanation of the origin of life. His question is: If humans are descended from aliens' spores, who created those outer space aliens? Interestingly enough, when Behe (1997) held a seminar in Princeton University, one audience member also criticized that the intelligent design theory is not satisfactory. His challenge is: If God created the world, who created God? Stenger (1997) also asserts that the problem of creation *ex nihilo* could be applied to theism: You cannot get something out of nothing. The Creator is

something. How did God exist out of nothing? Again, different views to "an adequate explanation" is due to different approaches in metaphysics. To Christians, God is the ultimate and there is no need to ask "who created God?" And the natural realm, including outer space aliens, is not considered ultimate and thus it is legitimate not to accept "alien seed theory" as an adequate explanation. On the other hand, naturalists regard material as the primary reality, and therefore alien seed is considered an adequate explanation. They might answer, "on their home planets, aliens have their own evolutionary process." In short, with "the adequate explanation" remains undefined, such kinds of debate will have no ends.

Conclusion

This paper argues that the debate on creation versus evolution in the context of irreducible complexity is not necessarily a conflict between religion and science. It can be considered as a philosophical debate that involves discussion on demarcation criterion, probability and law, the meaning of adequate explanation, and other metaphysical assumptions. Although it seems that the demarcation criterion has shifted the focus from testability and falsifiability to naturalism, the new criterion is not much different from the old, and I found it detrimental to inter-discipline inquiry. In short, the debate on irreducible complexity could never be settled by biochemistry alone; and philosophy should play an important role in this "proxy war" between religion and science.

ABSTRACT

In *Darwin's Black Box: The Biochemical Challenge to Evolution*, Dr. Michael Behe evaluates the possibility of gradualism in macroevolution in the perspective of "irreducible complexity," which has become a controversial topic among theologians, philosophers, and scientists. This paper demonstrates that "reasoning by analogy" regarding the "mousetrap metaphor" could not illuminate the question at all. Besides, that author asserts that the debate on creation and evolution is not necessarily a religion-versus-science one; one should also consider aspects like probability, law, and the meaning of adequate explanation. After all, both parties are tied to hidden metaphysical assumptions.

撮　　要

在《達爾文的黑盒—— 生化學對進化論之挑戰》一書中，米高比希以「不能簡化之複雜性」這角度，評鑑宏觀進化論中的漸進主義，「不能簡化之複雜性」

已成為神學家、哲學家、科學家爭論的熱門話題。在這篇文章中，作者指出花在「類比思維」來討論「老鼠夾的比喻」的努力，並無助於解決問題，此外，作者認為關於爭辯創造論、進化論中或然率、法則、充分解釋的意義和其他問題，均牽涉到雙方隱藏的形上學假設。

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