

## Excerpts from the Reference Guide to Redeeming Darwin

[\*Redeeming Darwin: The Intelligent Design Controversy\*](#) is a small group study designed by [Probe Ministries \(probe.org\)](#) to educate the church and campus Christian organizations about the Darwin vs. Design debate.

Below are excerpts from the full reference guide which serves as a companion to the two DVDs and the study guides in the kit. It is a handy reference to many of the key terms and concepts central to the ongoing debate regarding Intelligent Design and Neo-Darwinism as competing theories explaining the origins of life on Earth.

For each term, the top box provides a generally accepted definition of the concept (note: just because different sides of the issue accept a definition of a term or concept does not mean that they agree on the validity of the concept). Below the definition, a summary of how this term is viewed from a Neo-Darwinist position is placed on the left and the view from an Intelligent Design position is placed on the right. In order to fairly represent opposing views, quotes from supporters of those views are frequently used. These are complex issues and since we are aiming for succinctness, no attempt is made to address the full depth of each topic. At the same time, sufficient detail is provided to understand the role of the term in this conflict of ideas.

This guide is focused on the debate between Intelligent Design and Neo-Darwinism. Issues associated with the age of the universe/earth or any interpretation of Genesis are not addressed. Since the validity of the Intelligent Design hypothesis does not rest on whether the earth is a few billion years old or a few thousand years old, the dates put forth by the proponents of Neo-Darwinism are assumed in this guide. This assumption should not be construed as endorsing these dating estimates.

Note: In each discussion, any terms used in the discussion which are addressed elsewhere in the full guide are highlighted in **bold letters**.

### **Subset of Terms from the Full Reference Guide**

Bacterial Flagellum  
Bad Design  
Big Bang  
Cambrian Explosion  
Common Descent  
Darwinism  
DNA/Genetic Code  
Evolutionary Tree  
High Specificity with Low Probability  
Intelligent Design  
Irreducible Complexity  
Just Right Universe  
Macroevolution  
Microevolution  
Mutations  
Natural Selection  
Neo-Darwinism  
Origin of Life Studies  
Punctuated Equilibrium  
Scientific Method

Term	Definition and Description	
	Neo-Darwinist Position	Intelligent Design Position
<b>Bacterial flagellum</b>	<p>“Some bacteria boast a marvelous swimming device, the flagellum, which has no counterpart in more complex cells. . . . the bacterial flagellum acts as a rotary propeller. . . . The flagellum is a long, hairlike filament embedded in the cell membrane. (it) is the paddle surface that contacts the liquid during swimming. . . . The filament of a bacterial flagellum, . . . contains no motor protein; if it is broken off, the filament just floats stiffly in the water. Therefore the motor that rotates the filament-propeller must be located somewhere else. Experiments have demonstrated that it is located at the base of the flagellum.”<sup>1</sup></p>	
	<p>Since design cannot be considered as an explanation, evolutionists maintain that complex structures like flagellum evolved slowly over time from less complex structures performing other functions in the cell.</p> <p>Kenneth Miller states: “At first glance, the existence of the type III secretory system (TTSS), a . . . device that allows bacteria to inject these toxins through the cell membranes of its unsuspecting hosts, would seem to have little to do with the flagellum. However, molecular studies of proteins in the TTSS have revealed a surprising fact – the proteins of the TTSS are directly homologous to the proteins in the basal portion of the bacterial flagellum. . . . The existence of the TTSS in a wide variety of bacteria demonstrates that a small portion of the <b>"irreducibly complex"</b> flagellum can indeed carry out an important biological function. Since such a function is clearly favored by <b>natural selection</b>, the contention that the flagellum must be fully-assembled before any of its component parts can be useful is obviously incorrect. What this means is that the argument for <b>intelligent design</b> of the flagellum has failed.”<sup>2</sup></p>	<p>The flagellum is an excellent example of an <b>irreducibly complex function</b> in one of the simplest life forms. Different proteins and structures work together to create a swimming mechanism. This complex interaction cannot be adequately explained by evolutionary processes. <b>Mutations</b> creating only one piece of the flagellum in a life form without the other pieces would not create any value to be carried on to the subsequent generations.</p> <p>Miller’s statement that “the argument for intelligent design has failed” misses the point of <b>irreducible complexity</b>. The fact that one component of an irreducibly complex system may have another useful function does not remove the barrier that the irreducibly complex system requires the simultaneous appearance of multiple cooperating components to perform a function that has not been performed in that way before.</p> <p>“The best current molecular evidence, however, points to the TTSS as evolving <b>from</b> the flagellum and not vice versa. . . . Miller has nothing more than the TTSS to point to as a possible evolutionary precursor. Behe and the ID community have therefore successfully shown that Darwinists don’t have a clue how the bacterial flagellum might have arisen.”<sup>3</sup></p>
<b>Bad Design</b>	<p>Some biological functions appear to be less than optimal and may appear to be an adaptation of parts fashioned for other purposes. A truly intelligent designer would create an optimal design for each species.</p>	
	<p>Stephen Gould put it this way in his book, <i>The Panda’s Thumb</i>:          “If God had designed a beautiful machine to reflect his wisdom and power, surely he would not have used a collection of parts generally fashioned for other purposes. . . . Odd arrangements and funny solutions are the proof of evolution – paths that a sensible God would never tread but that a natural process, constrained by history, follows perforce.”<sup>4</sup>          Some evolutionists argue the human body reflects the mindless process of <b>natural selection</b>, and not intelligent design. . . . many of our physical shortcomings exist because <b>natural selection</b> causes us to survive “just long enough to reproduce.” Once we’ve passed on our genes, our bodies start to fall apart, since <b>natural selection</b> no longer operates.”<sup>5</sup></p>	<p>Reject “bad design” as a convincing argument for at least three reasons.</p> <ol style="list-style-type: none"> <li>1. Apparently sub-optimal design is still design. No one would suggest that the first airplanes were optimal designs. At the same time, no one would doubt that they were designed by intelligent beings. Even unsuccessful attempts at flying machines were clearly designed.</li> <li>2. Makes assumptions about the nature of the Designer while denying the existence of a designer. This argument assumes that the non-existent designer is both capable of creating optimal designs AND is only interested in creating things that are optimal.</li> <li>3. Many examples suggested as “bad design” upon further investigation appear to be ideally suited for their intended purpose. Several examples of these are the human esophagus, the Panda’s thumb, the human eye, the human appendix and “junk DNA”.<sup>6</sup></li> </ol>

Term	Definition and Description	
	Neo-Darwinist Position	Intelligent Design Position
<b>Big Bang</b>	The Big Bang is the scientific theory that the universe emerged from a tremendously dense and hot state about 13.7 billion years ago. The theory is based on the observations indicating the expansion of space, cosmic background radiation and other factors compatible with an initial explosive beginning. <sup>7</sup>	
	The Big Bang demonstrates the inaccuracy of the Biblical account of creation and of other "creation myths". The estimated age of our solar system does create difficulties for probabilistic models for the origins of life on this planet. Noted physicist, Stephen Hawking, put it this way: "One may say that time had a beginning at the big bang, in the sense that earlier times simply would not be defined. . . An expanding universe does not preclude a creator, but it does place limits on when he might have carried out his job!" <sup>8</sup>	<b>Intelligent Design</b> takes no specific position on the Big Bang. ID proponents concur scientific evidence indicates the universe is not eternal or infinite. The longest time currently proposed by secular science for the existence of the universe (13.7 billion years) and the existence of Earth as a potential life supporting planet (< 4 billion years) are much too short to support current theories for undirected naturalistic forces to create the abundance of complex life on our planet. Consequently, the Big Bang could be considered more compatible with <b>Intelligent Design</b> theories than with <b>Neo-Darwinism</b> .
<b>Cambrian explosion</b>	"Between about 570 and 530 million years ago, another burst of diversification occurred, with the eventual appearance of the lineages of almost all animals living today. This stunning and unique evolutionary flowering is termed the "Cambrian explosion," taking the name of the geological age in whose early part it occurred. . . the changes seem to have happened in a range of about 30 million years, and some stages took 5 to 10 million years." <sup>9</sup>	
	Extraordinarily rapid appearance of almost all phyla (i.e. major divisions of types of beings below the level of kingdom) is not consistent with the theories of <b>Neo-Darwinism</b> . Consequently, several explanations have been hypothesized e.g. " <b>punctuated equilibrium</b> ", much earlier appearances with no <b>fossil record</b> , structuralism (operation of unknown and unobservable natural laws of structural formation), and downplaying the extent of changes in life observed during this period. However none of these explanations has a strong case and the behind the scenes debate is ongoing within the community of proponents of <b>Neo-Darwinism</b> .	Rapid appearance of the primary animal types in the <b>fossil record</b> is very consistent with an <b>Intelligent Design</b> model. The Cambrian explosion appears to point to ID as the best "explanation for the origin of the complex specified information required to build the Cambrian animals and the novel forms they represent." <sup>10</sup> "The sudden and simultaneous appearance of more than 70 complex animal phyla defies a naturalistic explanation, especially considering that only thirty of those phyla exist today and none of the thirty are new. With more than forty such phyla disappearing and zero new ones appearing over the past half billion years, evolution's going the wrong way." <sup>11</sup>
<b>Common descent</b>	A theory of universal common descent based on evolutionary principles was proposed by Charles Darwin in his book <i>The Origin of Species</i> (1859), and later in <i>The Descent of Man</i> (1871). This theory is now accepted by most biologists, and they estimate the last universal common ancestor (LUCA) appeared about 3.5 billion years ago.	
	That all known species use the same chemical building blocks in their genetic makeup (DNA, RNA) is seen as proof that all species evolved from the same genetic pool. "The theory specifically postulates that all of the earth's known biota are genealogically related, much in the same way that siblings or cousins are related to one another. Thus, macro-evolutionary history and processes necessarily entail the transformation of one species into another . . . Because it is so well supported scientifically, common descent is often called the "fact of evolution" by biologists." <sup>12</sup> Note: biota – all plants and animals	The commonality of chemical building blocks and organic functions across species is more of an argument for Intelligent Design than for Common Descent. One would expect an Intelligent Designer to create and reuse basic building blocks to create a multiplicity of models. This reuse is seen time and again in human endeavors from architecture to aerospace to automobiles. The overwhelming array of very different species appearing over a relatively short period of time creates a major problem for macro-evolutionary mechanisms even with common building blocks. Thus, the combination of common building blocks with a multitude of variations seems more suitable for design than to chance.

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<b>Darwinism</b>	A theory of biological evolution developed by Charles Darwin and others, stating that all species of organisms arise and develop through the <b>natural selection</b> of small, inherited variations that increase the individual's ability to compete, survive, and reproduce. <sup>13</sup>	
	One of the pillars of modern science that allows us to rid ourselves of dependence upon any god-myths and achieve our full potential. It is interesting to note that Darwin's struggles with the problem of evil and unmerited suffering motivated him to remove God from the creative role in his theories. His underlying theory was theological rather than scientific.	A theory which is so improbable given our current understanding of astrophysics and biochemistry as to beg for alternative theories. One argument of evolutionists is that the existence of a designer capable of creating this universe is even more improbable than Darwinism. <sup>14</sup> They agree our universe had a beginning, but neglect that the creation of all the matter and energy in this universe with no transcendent being is equally improbable.
<b>DNA / Genetic Code</b>	A DNA sequence or genetic sequence is a succession of letters representing the primary structure of a DNA molecule or strand, with the capacity to carry information. The sequence of DNA encodes the necessary information for living things to survive and reproduce. <sup>15</sup> The Genetic Code refers to the system in all living organisms by which the information in the DNA molecule is translated into protein information.	
	Modern evolutionary science has no plausible theories regarding the development of DNA with its crucial role in the replication of all living species. The existence of DNA as the mechanism for passing on characteristics is assumed to be a given. The high degree of commonality between the DNA sequences of different species is interpreted as evidence that these species share a common ancestor. Changes in the sequences are used to estimate how closely related species are and when they may have split apart from a common ancestor.	The astounding amount of information encoded in the DNA of the simplest life is an insurmountable barrier for random processes to create this information. "It seems to me that Richard Dawkins constantly overlooks the fact that Darwin himself, . . . pointed out that his whole argument began with a being which already possessed reproductive powers. This is the creature the evolution of which a truly comprehensive theory of evolution must give some account. Darwin himself was well aware that he had not produced such an account. It now seems to me that the findings of more than fifty years of DNA research have provided materials for a new and enormously powerful argument to design." <sup>16</sup> – Dr. Antony Flew.
<b>Evolutionary Tree</b>	<i>ALSO KNOWN AS PHYLOGENETIC ANALYSIS</i> Phylogenetics is the study of how various groups of organisms (e.g., species, populations) are related through the process of evolution. Phylogenetic analysis attempts to determine the ancestral relationships of known species by analyzing available data (including paleontology, biological and genetic)	
	A clear phylogeny exists for all humanoids and primates. The conflicting phylogenies presented in different textbooks are not a problem because they are representative of the correct phylogeny even though they themselves must be incorrect. In other words, the evolutionary trees we publish are only representative of the correct evolutionary tree because we don't yet know the correct version.  "The sequence of events in human evolution is still largely speculative and open to interpretation, and anthropologists have yet to agree upon a phylogenetic tree of the human lineage." <sup>17</sup>	"Paleoanthropologists compared phylogenies constructed from gene and protein sequences with those constructed from cranial and dental features for two currently existing groups of primates, . . . In both cases, the molecular phylogenies differed significantly from those derived using cranial and dental characteristics. The authors of the study conclude that craniodental characteristics cannot be used as reliable indicators of primate evolutionary relationships.  In light of these results, the assertion that human evolution is a fact becomes scientifically untenable. To demonstrate that humans evolved by natural processes, there must be rigorous evidence of clearly established evolutionary relationships with obvious transitions in the <b>fossil record</b> . This study shows that such determinations may never be possible, given that cranial and dental remains are the primary fossils available . . ." <sup>18</sup>

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<b>High specificity with low probability</b>	Something that is highly specific is readily distinguishable random selection. For example, “The robber escaped in a car.” is not very specific, but “The robber escaped in a blue, 2006 Camry with Texas license plate ABC 789.” has high specificity – one car fits that description and it is driven by the robber. Something with a low probability is very unlikely to occur as the result of random events. For example, if you pick 100 letters at random from the 26 choices in the alphabet, there is a very low probability of creating a grammatically correct English sentence.	
	<p>“Biology is the study of complicated things that give the appearance of having been designed for a purpose.”<sup>19</sup></p> <p>Even though a natural system appears to be designed, given enough time, random <b>mutations</b> coupled with <b>natural selection</b> will result in the complex, specific interacting systems that are the essence of living things.</p>	<p>The combination of high specificity with low probability of undirected occurrence is a scientifically sound method of detecting the evidence of design.</p> <p>"There is no publication in the scientific literature that describes how molecular evolution of any real, complex, biochemical system either did occur or even might have occurred."<sup>20</sup></p>
<b>Intelligent Design</b>	“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, i.e. there exist well-defined methods that, based on observable features of the world, can reliably distinguish intelligent causes from undirected natural causes.” <sup>21</sup>	
	<p>ID is creationism repackaged in an attempt to be taught as science. We know this for the following reasons:</p> <ul style="list-style-type: none"> <li>• Design is a historical argument for the existence of God</li> <li>• Many proponents are Christians</li> <li>• Since science cannot identify the Designer, ID points to religion</li> </ul> <p>As Judge John Jones states in his <b>Dover decision</b>, “ID is a religious view, a mere re-labeling of creationism, and not a scientific theory.”<sup>22</sup></p>	<p>ID is an objective attempt to allow scientific observations to point us the hypotheses which best explain the observations. Eliminating some hypotheses from consideration because they have religious implications is unscientific and may keep us from finding the truth. The unresolved issues faced by Neo-Darwinism indicate that other models should be considered. ID offers the beginning of a model that addresses many of those issues.</p>
<b>Irreducible Complexity</b>	“. . . a single system composed of several well-matched, interacting parts that contribute to the basic function, wherein the removal of any one of the parts causes the system to effectively cease functioning. An irreducibly complex system cannot be produced directly (that is, by continuously improving the initial function . . .) by slight, successive modifications of a precursor system, because any precursor to an irreducibly complex (IC) system that is missing a part is by definition nonfunctional.” <sup>23</sup>	
	<p>Irreducible complexity does not mean that indirect evolution cannot produce the biological system through the following mechanisms:</p> <ul style="list-style-type: none"> <li>• Previously using more parts than necessary for the function.</li> <li>• The parts themselves evolve.</li> <li>• Deployment of parts (gene regulation) evolves.</li> <li>• New parts are created (gene duplication) and may evolve.<sup>24</sup></li> <li>• Some subcomponents could have another function allowing them to be passed on until needed for the irreducibly complex function</li> <li>• Some changes needed for the new function could be passed on in junk <b>DNA</b> until needed for the irreducibly complex function.</li> </ul>	<p><b>Natural selection</b> is only going to continue to replicate those <b>mutations</b> which improve an organism’s ability to reproduce. An IC function, whether <b>bacterial flagellum</b>, an eye or a giraffe’s neck require multiple new features to appear simultaneously in a single mutated organism in a way that can be passed on to future generations. The appearance of only one or a few of these features in an organism will not give that organism an advantage for <b>natural selection</b> and in most cases would result in a disadvantage if not premature death. The Neo-Darwinist arguments against irreducible complexity appear to misinterpret the concept and typically refer to the existence of IC systems as proof that IC systems must have evolved. (see the <b>bacterial flagellum</b>)</p>

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<b>Just Right Universe</b> <b>Fine Tuning for Life</b> <b>Goldilocks Phenomenon</b>	For physical life to be able to survive within the universe a large number of physical parameters must fall within specific limits on at least one planet. These parameters range from the specific values of constants associated with physical laws to the characteristics of stars to the relative location of planets.	Hugh Ross currently publishes a list of 93 parameters which must be just right to support life on earth <sup>25</sup> and calculates the probability of a planet like earth existing in our universe to be less than 1 in 10 <sup>282</sup> . <sup>26</sup> Thus, a very unlikely occurrence with a highly specific criteria (able to support long term life) is evidence earth was designed for life.
<b>Macroevolution</b>	Macroevolution refers to evolution that occurs to create new species or types of living beings, in contrast with <b>microevolution</b> , which refers to smaller evolutionary changes <i>within</i> a species or population.	<b>Microevolution</b> may result in creating new species in the sense that two populations may no longer interbreed. However, macroevolution creating distinctly different life cycles, forms, etc. has not been observed. The negative impact of major <b>mutations</b> and the barrier of <b>irreducible complexity</b> make the theory of macroevolution as the source of life on this planet extremely improbable.
<b>Microevolution</b>	“The occurrence of small-scale changes in allele frequencies <sup>1</sup> in a population, over a few generations, also known as change at or below the species level. These changes may be due to several processes: <b>mutation, natural selection, gene flow, and genetic drift.</b> ” <sup>27</sup>	Microevolution is a fact. It occurs as species respond to changes in environment. The existence of microevolution does not overcome the biggest obstacles to evolutionary theory as an explanation for life as we know it, e.g. complexity of the simplest life forms, early appearance of life with no <b>prebiotic soup</b> , and the abundance of irreducibly complex systems within higher life forms.
<b>Mutations</b>	A change of the <b>DNA</b> sequence within a gene or chromosome of an organism resulting in creation of a new character or trait not found in the parental type. <sup>28</sup>	Mutations do occur and may contribute to microevolution. Most mutations are deleterious or even fatal making the process of change through mutation less likely. Complex combinations of simultaneous mutations necessary for the initial formation of life or the evolution from one species to another have not been observed in nature or in the laboratory. For example, four winged fruit flies don't come with the muscles to make the extra wings work and cannot survive outside of the lab. <sup>30</sup>
<b>Natural selection</b>	The process in nature by which, according to Darwin's theory of evolution, only the organisms best adapted to their environment tend to survive and transmit their genetic characteristics in increasing numbers to succeeding generations while those less adapted tend to be eliminated. <sup>31</sup>	Natural selection contributes to changes in the frequency of genetic variations within species. Those changes may lead to divided populations that over time do not interbreed. Natural selection depends on preexisting complex living things with the ability to reproduce to pass on helpful variations. No plausible processes have been identified to explain how natural selection could overcome the immense barriers to the initial <b>origin of life</b> or to the development of <b>irreducibly complex</b> systems.
<b>Neo-Darwinism</b>	Generally denotes the integration of Charles Darwin's theory of the evolution of species by <b>natural selection</b> , Gregor Mendel's theory of genetics as the basis for biological inheritance, random genetic <b>mutation</b> as the source of variation, and mathematical population genetics.	The discovery of irreducibly complex machines in the cell, the complexity of the genome, and the sudden appearance of major animal forms in the fossil record make it an untenable hypothesis.

<sup>1</sup> rate at which different variants of a gene occupying a common chromosome position appear within the population of a given species

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<b>Origin of Life studies</b>	In the physical sciences, the study of how life on Earth may have evolved from non-life between 3.9 and 3.5 billion years ago. This topic also includes theories and ideas regarding possible extra-planetary or extra-terrestrial origin of life hypotheses, thought to have possibly occurred over the last 13.7 billion years. <sup>32</sup>	
	<p>“Many investigators feel uneasy about stating in public that the origin of life is a mystery, even though behind closed doors they freely admit that they are baffled. There seems to be two reasons for their unease. First, they feel it opens the door to religious fundamentalists and their god-of-the-gaps pseudo-explanations. Second, they worry that a frank admission of ignorance will undermine funding.”<sup>33</sup></p>	<p>Our recreations of past events, especially events in the distant past, should always be more tentative than our conclusions of how nature operates. It is really not possible for any hypothesis or theory in this realm of science to become “a proven fact”. The best a scientist can hope for in this area to get beyond “a reasonable doubt” and that level of certainty is very unlikely given the complexity of our universe.</p> <p>If we are looking for the truth on a topic where we can’t recreate the event, it would not be very good science to eliminate some hypotheses from consideration simply because we don’t like the theological implications of those hypotheses. Yet some people on both sides of the creation vs. evolution debate do just that.</p>
<b>Phylogenetic Analysis</b> <b>Evolutionary Tree</b>	Phylogenetics is the study of how various groups of organisms (e.g., species, populations) are related through the process of evolution. Phylogenetic analysis attempts to determine the ancestral relationships of known species by analyzing available data (including paleontology, biological and genetic)	
	<p>A clear phylogeny exists for all humanoids and primates. The conflicting phylogenies presented in different textbooks are not a problem because they are representative of the correct phylogeny even though they themselves must be incorrect. In other words, the evolutionary trees we publish are only representative of the correct evolutionary tree because we don’t yet know the correct version.</p> <p>“The sequence of events in human evolution is still largely speculative and open to interpretation, and anthropologists have yet to agree upon a phylogenetic tree of the human lineage.”<sup>34</sup></p>	<p>“Paleoanthropologists compared phylogenies constructed from gene and protein sequences with those constructed from cranial and dental features for two currently existing groups of primates, . . . In both cases, the molecular phylogenies differed significantly from those derived using cranial and dental characteristics. The authors of the study conclude that craniodental characteristics cannot be used as reliable indicators of primate evolutionary relationships.</p> <p>In light of these results, the assertion that human evolution is a fact becomes scientifically untenable. To demonstrate that humans evolved by natural processes, there must be rigorous evidence of clearly established evolutionary relationships with obvious transitions in the <b>fossil record</b>. This study shows that such determinations may never be possible, given that cranial and dental remains are the primary fossils available . . .”<sup>35</sup></p>
<b>Punctuated Equilibrium</b>	“A theory which states that most sexually reproducing species will show little to no evolutionary change throughout their history. When evolution does occur, it happens sporadically (by splitting) and occurs relatively quickly compared to the species’ full duration on earth.” <sup>36</sup>	
	<p>Species isolated on the edge of a large population can evolve much more rapidly using Neo-Darwinian processes. Once a new species has evolved on the geographic edge, its expansion across geographic areas occurs very rapidly (relative to evolution) making the <b>fossil record</b> appear to show a sudden appearance. This process could explain the <b>Cambrian explosion</b>. Often under attack from proponents of other theories for macroevolution.</p>	<p>“Despite its virtues as a descriptive model of the history of life, punctuated equilibrium has been widely criticized for failing to provide a mechanism sufficient to produce the novel form characteristic of higher taxonomic groups. For one thing, critics have noted that the proposed mechanism of punctuated evolutionary change simply lacked the raw material upon which to work.”<sup>37</sup></p> <p>In other words, punctuated equilibrium could plausibly explain the sudden appearance in the <b>fossil record</b> of significant variations in a phyla, but provides no explanation for the sudden explosion from simple cellular life forms to very complex species.</p>

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<b>Scientific Method</b>	The principles and empirical processes of discovery and demonstration considered characteristic of or necessary for scientific investigation, generally involving the observation of phenomena, the formulation of a hypothesis concerning the phenomena, experimentation to demonstrate the truth or falseness of the hypothesis, and a conclusion that validates or modifies the hypothesis. <sup>38</sup>	
	<p>Exclude any supernatural process from the domain of acceptable hypothesis as not testable through natural scientific observation and/or testing.</p> <p>Create increasingly improbable theories to avoid considering supernatural theories (e.g. <b>punctuated equilibrium</b>, directed Panspermia).</p> <p>As Paul Davis wrote in his book, <i>The Fifth Miracle, The Search for the Origin and Meaning of Life</i>: "science rejects true miracles.</p> <p>Although biogenesis strikes many as virtually miraculous, the starting point of any scientific investigation must be the assumption that life emerged naturally, via a sequence of normal physical processes."<sup>39</sup></p>	<p>Open to all possible hypotheses with the criteria for selecting viable hypotheses summarized as:</p> <ul style="list-style-type: none"> <li>• How well do they explain the bulk of observed phenomena?</li> <li>• Are there any observed phenomena which if real would preclude the hypothesis from being true?</li> </ul> <p>"Prohibiting an appeal to the supernatural places a false restriction on science's capability. . . naturalists hinder science's capacity to discover truth."<sup>40</sup></p>

## Footnotes:

<sup>1</sup> M. J. Behe, *Darwin's Black Box: The Biological Challenge to Evolution*. (New York: Free Press, 1996)

<sup>2</sup> Kenneth R. Miller, "The Flagellum Unspun: The Collapse of Irreducible Complexity" (<http://www.millerandlevine.com/km/evol/design2/article.html>)

<sup>3</sup> William A. Dembski, "Still Spinning Just Fine: A Response To Ken Miller" 2.17.03, v.1, [http://www.designinference.com/documents/2003.02.Miller\\_Response.htm](http://www.designinference.com/documents/2003.02.Miller_Response.htm)

<sup>4</sup> Stephen Gould, *The Panda's Thumb*, (New York, N.Y., W. W. Norton, 1980)

<sup>5</sup> Rich Deem, "Bad Designs in Biology? Why the "best" examples are bad.", [www.godandscience.org/evolution/designgonebad.html](http://www.godandscience.org/evolution/designgonebad.html)

<sup>6</sup> Ibid.

<sup>7</sup> <http://encyclopedia.thefreedictionary.com/big+bang>

<sup>8</sup> Stephen Hawking, *A Brief History of Time*, (New York, Bantam Books, 1996)

<sup>9</sup> Evolution Library, Cambrian Explosion - [http://www.pbs.org/wgbh/evolution/library/03/4/1\\_034\\_02.html](http://www.pbs.org/wgbh/evolution/library/03/4/1_034_02.html)

<sup>10</sup> Stephen C. Meyer, "The Origin Of Biological Information And The Higher Taxonomic Categories", *Proceedings Of The Biological Society Of Washington* (117(2):213-239. 2004)

<sup>11</sup> Fazale Rana & Hugh Ross, *Origins of Life*, (NavPress, Colorado Springs, Co., 2004), Chapter 16

<sup>12</sup> Douglas L. Theobald "29+ Evidences for Macroevolution: The Scientific Case for Common Descent." The Talk.Origins Archive. Vers. 2.87. 2007.31 Jan, 2007 <<http://www.talkorigins.org/faqs/comdesc/>>

<sup>13</sup> *The American Heritage® Dictionary of the English Language, Fourth Edition* copyright ©2000 by Houghton Mifflin Company. Updated in 2003.

<sup>14</sup> Dawkins, "The Illusion of Design", *Natural History*, November 2005, Volume 114, Number 9

<sup>15</sup> <http://encyclopedia.thefreedictionary.com/DNA+sequencing>

<sup>16</sup> Antony Flew & Gary Habermas, "My Pilgrimage from Atheism to Theism An Exclusive Interview with Former British Atheist Professor Antony Flew", *Philosophia Christi*, (Winter 2005)

<sup>17</sup> "What will the neanderthal genome teach us about human brain evolution?", <http://neurophilosophy.wordpress.com/2006/08/07/499/>

<sup>18</sup> Fazale Rana, "The Unreliability of Hominid Phylogenetic Analysis Challenges The Human Evolutionary Paradigm",

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