



A Critical Analysis of *Science and Creationism: A View from the National Academy of Sciences* (2nd Ed)

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Science and Creationism A view from the National Academy of Sciences (2nd edition) (henceforth referred to as "S & C") is available free, with text and illustrations, online on the National Academy of Sciences website at: "<http://books.nap.edu/html/creationism/>".

What is the National Academy of Sciences (NAS)?

According to S & C:

"The NAS is a private, nonprofit, self-perpetuating society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of sciences and technology and to their use for the general welfare. Upon the authority of the charter granted to it by Congress in 1863, the Academy has a mandate that requires it to advise the federal government on scientific and technical matters" (*Science and Creationism (S & C), A View from the National Academy of Sciences 2nd edition*, Pg. ii).

A Short History of the NAS

On March 3, 1863, Abraham Lincoln signed the NAS into existence with the charge that, "the Academy shall, whenever called upon by any department of the Government, investigate, examine, experiment, and report upon any subject of science or art" (S & C, p. ii). The founding members include Benjamin Peirce, Alexander Dallas Bache (first president of the Academy), Joseph Henry, Louis Agassiz, President Lincoln, Senator Wilson, Admiral Charles Henry Davis, and Benjamin Apthorp Gould. Since that time it has advised the federal government about many projects including weapons design, space travel, and educational policy. The job of the NAS is essentially to advise the government on matters of science.

According to the NAS website, "members and foreign associates of the National Academy of Sciences are elected in recognition of their distinguished and continuing achievements in original research. Election to the Academy is considered one of the highest honors that can be accorded a scientist or engineer"¹. The website² says that as of March 5, 2002, membership included 1,852 active members, and 80 members emeriti, 318 foreign associates for a total of 2,250 members. According to a poll conducted and published by Scientific American in 1999, 40% of scientists at large believe in a personal God, but only 5% of NAS members believe in a personal God³. The article then posed the question, "are the deepest contemporary scientific minds drawn to atheism, or do the higher echelons of academia select for the trait of disbelief?"

Some questions which need to be answered:

In light of this recent publication from the NAS, this paper will evaluate the arguments of the NAS and will attempt to answer the following questions:

What is the NAS trying to accomplish?

What is creation science?

What is a good definition of science?

Is intelligent design theory really creation science?

What exactly is the explanatory power of "intelligent design?"

Do non-naturalistic theories lack empirical evidence and can they be tested?

Or perhaps better put, should natural causes be used to explain all observed phenomena (as claimed by S & C)?

Does the NAS definition of science wrongly exclude certain causes from investigation?

Finally, if the NAS is right, would science be living up to its claim that it is a particular way of knowing the world which comes up with better explanations for natural phenomena, and that it recognizes the true causes and effects of phenomena?

What is the NAS attempting to accomplish through this booklet?

The purpose of the Science and Creationism booklet is to "summariz[e] key aspects of several of the most important lines of the evidence supporting evolution", to "describe some of the positions taken by advocates of creation science and presents an analysis of these claims" and to "la[y] out for a broader audience the case against presenting religious concepts in science class" (S & C, Pg. ix).

What is creation science (so we don't accidentally teach it)?

Bruce Alberts, President of the NAS and author of the preface to the document, states that creation science "posits that scientific evidence exists to prove that the universe and living things were specially created in their present form" (S & C, Pg. ix). One thus has to assume that the opposing theory to creation science--evolution, therefore must posit that the universe and living things were NOT specially created in their present form.

The document also claims that creation science is not science because it lacks, "empirical support and cannot be meaningfully tested" (S & C, Pg. 2) and that it, "should not be presented as [science] in science classes" (S & C, Pg. 2). However, according to the NAS, evolution *is* science, yet, creation science isn't. How is it that we are able to test and support if something WAS NOT created in its present form, but we aren't able to test and support the theory that it WAS created in its present form?

It should be noted that S & C refers to those who believe in a "young earth", "old earth", and "intelligent design" as advocates of "special creation" and "creation science".

If creation science is "not science" (S & C, Pg. 2), then what is science?

Various definitions and descriptions are given for science throughout the document. The introduction, states that science is, "a particular way of knowing about the world" (S & C, Pg. 1). The booklet claims that science uses observation, experiment, and empirical evidence to come up with explanations in "the quest for understanding" (S & C, Pg. 1). Scientists correct themselves because, "progress in science consists of the development of better explanations for the causes of natural phenomena" (S & C, Pg. 1). Bruce Alberts describes the goal of scientists as, "seek[ing] to relate one natural phenomena to another and to recognize the causes and effects of phenomena" (S & C, Pg. viii). This may be a good goal for science, but what sorts of "causes" are we then allowed to use when explaining "natural phenomena"?

A natural phenomenon is simply something we observe. We observe that rain falls from clouds, we observe that the Earth orbits the Sun. We observe many diverse and complicated forms of life are present on this planet. Observations form the basis for science, and it is our job to seek the best explanations for these observations.

Observations of natural phenomena thus represent the "data" of science. Our explanations provide interpretations of this data. When push comes to shove, however, their true definition for science is revealed: **"the job of science is to provide plausible natural explanations for natural phenomena"** (S & C, Pg. 7). According to the NAS, therefore, only "natural explanations" are the proper in science. How can we assume, before we even look at the data, that only natural explanations are correct?

Is intelligent design theory creation science?

The NAS states that some "advocates of creation science ... argue that the various types of organisms ... could only have come about with supernatural intervention, because they show 'intelligent design'" (S & C, p. 7). The NAS then claims that proponents of intelligent design argue that "structural complexity is proof of the direct hand of God in specially creating organisms as they are today ... echo[ing] the 18th century cleric William Paley" (S & C, Pg. 21).

This statement is at odds with conventional intelligent design theory, which says that the most one can infer from intelligent design arguments is that some components of biology did not arise due to mechanistic causes, and may have been designed by an intelligent agent (see William Dembski's, "*Intelligent Design*"). This "designer" may be "natural" or "non-natural" in nature, and intelligent design theory doesn't say that it was necessarily the "supernatural" "hand of God" which did the designing. The NAS booklet thus mischaracterizes intelligent design theory by implying that design proponents necessarily argue "structural complexity is proof of the direct hand of God in specially creating organisms" (S

& C, p. 21).

The booklet also mischaracterizes intelligent design by saying that it is the same as William Paley's arguments in the 18th century. This counter-argument to intelligent design presents a straw man, because Paley's arguments were allegedly refuted by the philosopher David Hume, and has been repeated elsewhere by evolutionists⁴. However, intelligent design theory is different than that presented by Paley and then allegedly refuted by Hume.

Hume argued that simple complexity in organisms isn't enough to justify inferring design. But design theorist William Dembski does not argue from the standpoint of the degree of complexity alone, but rather for the kind of complexity (see *The Design Inference*). Much like language, biological complexity is exceedingly complex, but specifically conforms to a pre-existing pattern. As Stephen Meyer says, "this 'sequence specificity' or 'specificity and complexity' or 'information content' of DNA suggests a prior intelligent cause, again because 'specificity and complexity' or 'high information content' constitutes a distinctive hallmark (or signature) of intelligence."⁵ This argument for design is much different than Paley and Hume's simple complexity. If Hume is correct, one who found a computer program or a stone tool floating in space would not have the philosophical right to say it is designed. Dembski and Meyer, however, would be justified in inferring design.

While intelligent design theory does not necessarily dispute "descent with modification" it does dispute the idea that all components of biology arose through natural-mechanistic processes, and suggests that some may have been created in something related to their present form. It is my view that intelligent design actually does NOT fit under the definition of creation science, *as it is defined by the NAS*.

Where intelligent design gets sticky, however, is that it strongly suggests that some non-mechanistic processes are at least in part responsible for creating life. Since mechanistic usually implies naturalistic, non-mechanistic might very well imply non-natural, and this sort of explanation is at odds with how the NAS defines science.

Despite the fact that the designer could very well have a non-natural origin, the NAS science is not off the hook in its comes to rejecting intelligent design theory. If "[s]cience is a particular way of knowing about the world ... [whose] explanations are limited to those based on observations that can be substantiated by other scientists" (S & C, p. 1) and is a "quest for understanding" (S & C, Pg. 1) to find "better explanations for the causes of natural phenomena" (S & C, Pg. 1), then any empirically investigateable question ought to qualify as science. If the answers to some such questions might lie outside the natural realm, then science might be handicapped towards attaining its goals if "the job of science is to provide plausible natural explanations for natural phenomena" (S & C, Pg. 7)?

What can intelligent design theory contribute to science?

As the NAS says, intelligent design theory may potentially be a form of "creation-science" but it may also just help to uncover the philosophical flaws preventing science from discovering truth. If some possibly non-natural explanations might be "limited to those based on observations that can be substantiated by other scientists" (S & C, p. 1) and solely use explanations "based on empirical evidence" (S & C, Pg. 1) as a part of that "quest for understanding" (S & C, Pg. 1) and finding "better explanations for the causes of natural phenomena" (S & C, Pg. 1), then it is likely that in disqualifying all potentially non-natural explanations from science, the NAS may have done a great disservice to the scientific community as a whole. Intelligent design theory is excluded on a technicality, but it may qualify as science in all other respects, and it may hold many of the answers which science is looking for.

What is the explanatory power of intelligent design theory?

Intelligent design theory is not just as a set of arguments against various natural explanations for the origin of life. The theory that an intelligent designer existed is based upon the inability of natural causes to explain the data, but also on our understanding of how intelligent agents operate, and how we can detect and infer their activity in the past. Given all possibilities, one could infer that undiscovered or new types of natural-mechanistic laws created life rather than the making the inference that life was designed. However given that our only other alternative is an undiscovered cause, Occam's Razor should lead to an Intelligent Designer as a logical inference. Intelligent design theory does appear to be falsifiable, however, as future investigations might always uncover natural laws which better explain the observed data.

Does intelligent design theory lack evidence or testability?

The S & C booklet claims that "molecular evolutionary data counter a recent proposition called 'intelligent design theory'" (S & C, Pg. 21). There are at least three components of biology for which intelligent design theory disputes a purely

natural origin and could use theories about intelligent design to contribute to explanation: **(1)** The nature of the information contained within the genetic code, **(2)** the origin of the first cell and replicating DNA system, and **(3)** irreducibly complex structures as a counterexample of Darwinian evolution.

1. The NAS booklet does not mention information theory and in no way attempts to mechanistically account for the existence of information as discrete entities within the cell. This existence of information within the cell is testable, and many scientific theories of information already exist. The ability of natural law to cause the existence of complex and specified information is in no way discussed, even though William Dembski had already formulated an intelligent design-hypothesis for the origin of such information in the cell before the booklet was released.

2. The NAS does mention the origin of life (how the first replicating DNA system came into existence), namely the evolutionary path of the first cells and the chemical explanation for the emergence of the first replicating genetic code system. It asserts that:

"Experiments conducted under conditions intended to resemble those present on primitive Earth have resulted in the production of some of the chemical components of proteins, DNA, and RNA. Some of these molecules have also been detected in meteorites from outer space and in interstellar space by astronomers using radio telescopes. Scientists have concluded that the "building blocks of life" could have been available early in Earth's history." (S & C, p. 5)

The NAS makes no attempt to provide counter-evidence to that claim, even though in recent years many researchers have made statements such as Noam Lahav's recent critique of pre-biotic synthesis:

"[B]y challenging the assumption of a reducing atmosphere, we challenge the very existence of the "pre-biotic soup", with its richness of biologically important organic compounds. Moreover, so far, no geochemical evidence for the existence of a pre-biotic soup has been published. Indeed, a number of scientists have challenged the pre-biotic soup concept, noting that even if it existed, the concentration of organic building blocks in it would have been too small to be meaningful for pre-biotic evolution."⁶

One could go on and on (for about 4.55 billion years) about the problems faced by origins of life researchers, but to save time, it is easier to just look at the way the NAS treats the subject.

The NAS claims that there are "many pathways [known that] might have been followed to produce the first cells," (S & C, p. 6). This claim is flatly false. No scientist has ever created a plausible pathway through which to create the first cell.

Origins of life research Klaus Dose wrote in 1988:

"More than 30 years of experimentation on the origin of life in the fields of chemical and molecular evolution have led to a better perception of the immensity of the problem of the origin of life on Earth rather than to its solution. At present all discussions on principal theories and experiments in the field either end in stalemate or in a confession of ignorance. New lines of thinking and experimentation must be tried ... Considerable disagreements between scientists have arisen about detailed evolutionary steps. The problem is that the principal evolutionary processes from prebiotic molecules to progenotes have not been proven by experimentation and that the environmental conditions under which these processes occurred are not known. Moreover, we do not actually know where the genetic information of all living cells originates, how the first replicable polynucleotides (nucleic acids) evolved, or how the extremely complex structure-function relationships in modern cells came into existence ... It appears that the field has now reached a stage of stalemate, a stage in which hypothetical arguments often dominate over facts based on experimentation or observation."⁹

Rather than admitting ignorance as to how the origins of life could have happened, the NAS appeals to an argument from authority. The NAS does everything it can to emphasize the abilities of science and to justify a faith in naturalism rather than admit that the answers it seeks with regards to the origin of life are distant. During this tacit admission it asks, "[w]ill we ever be able to identify the path of chemical evolution that succeeded in initiating life on earth?" (S & C, Pg. 6). But it then sites the history of science to overcome "seemingly intractable problems ... as a result advances in theory, instrumentation, or the discovery of new facts" (S & C, Pg. 7). Finally, to quench any temptations the reader might be feeling to invoke non-natural explanations, at this point that the NAS then states that, "it is the job of science to provide plausible natural explanations for natural phenomena" (S & C, Pg. 7).

In light of the overwhelming lack of evidential support for the purely natural origins of life, it seems that the NAS is clearly putting faith in the ability of science to undercover naturalistic answers. This faith exists despite countless unanswered problems related to the natural origins of life. The NAS veils the lack of evidence for and explanation of the origins of life with statements about philosophy and past achievements of science. The very presence of this blatantly dogmatic strong-arm tactic reveals their bluff: they have no explanations for the origins of life, but they don't want you to consider non-naturalistic hypotheses.

3. The NAS also attempts to provide evidence to counter the claim that irreducibly complex structures exist within the cell. It provides an analysis of irreducible complexity:

"[S]tructures and processes that are claimed to be "irreducibly" complex typically are not on closer inspection. For example, it is incorrect to assume that a complex structure or biochemical process can function only if all its components are present and functioning as we see them today. Complex biochemical systems can be built up from simpler systems through natural selection." (S & C, Pg. 22)

This critique of irreducible complexity makes general statements which are without supporting evidence. The use of the word "typically" leads one to believe that irreducibly complex systems can exist (but often don't). Assuming that the NAS is arguing against the existence of any irreducibly complex structures. The booklet attempts to outline the growth of a complex system from a simpler system by claiming that organisms such as jawless fish have simpler hemoglobin than do the more complex jawed fish.

However, this term "simpler" means nothing. Even within each fish, the fact that the hemoglobin is "simpler" does not mandate that the system is not irreducibly complex. One has to assume that an evolutionary pathway took one system to the other. The actual data here is purely circumstantial--all we have observed is that that two systems are similar. If both systems are indeed irreducibly complex, then an account of how one system could turn into the other must be given.

The booklet gives a vague explanation of how this can happen, claiming that, "[n]atural selection can bring together parts of a system for one function at one time, and then at a later time recombine those parts with other systems of components to produce a system that has a different function" (S & C, Pg. 22). Without assessing the complexity of the parent and daughter systems, this re-assembly scenario might very well be to be the same type of evolutionary jump which irreducible complexity claim is impossible. For evolutionists and the authors of S & C, the question they need to answer is not, "does irreducible complexity exist?" but rather "can natural selection spontaneously reassemble many already-existing components into new functions?" The heart of irreducible complexity is thus the problem of functional intermediates, and there are no discussions of how intermediates between these two irreducibly complex systems were functional. All we are told is that "natural selection" can do the job.

The only specifics of the alleged mechanism of how a re-assembly of pre-existing part can occur is that of blood clotting, where genes were supposedly amplified, duplicated, and altered in order to produce this entirely new system. However, when trying to evolve something, duplicating a gene is not going to help very much. After duplicating a gene, there is a new piece of genetic information to play around with, but what good is it? If complex systems need specific parts, what sort of evidence is there that these duplicated genes will be the part in need? Lynch and Conery found that the average gene duplicates about once every 100 million years⁷--exceedingly rare. These irreducibly complex structures are typically composed of many parts¹⁰, and duplicating one gene every 100 million years doesn't give a very good chance of getting the right parts to put together when they are needed.

Furthermore, it has been found that, "the vast majority of gene duplicates are silenced within a few million years, with the few survivors subsequently experiencing strong purifying selection"⁸. Another study showed that duplicated genes are not very free to mutate around at all, that there is strong selection pressure on them⁷. This supports the statement by Conery and Lynch that the actual mechanisms by which gene duplication contributes to evolution are not very well understood:

"However, it is unclear how duplicate genes successfully navigate an evolutionary trajectory from an initial state of complete redundancy, wherein one copy is likely to be expendable, to a stable situation in which both copies are maintained by natural selection. Nor is it clear how often these events occur."⁷

The bottom line is that the gene duplication explanation still leaves the details to the dice, and this pathway definitely hasn't been experimentally verified. In this explanation for the origin of bloodclotting, all the NAS has done is to find protein similarities, and then inferred a vague ancestral pathway of gene creation. This explanation for the origin of real evolutionary novelty lacks a reliable mechanism and is little better than hand waving. Furthermore, it does not solve the problems of irreducible complexity.

Again, nothing is said to account for the odds of these transformations happening naturally, or to ask if they can occur in a stepwise fashion (even after allowing for gene duplication, amplifications, and alterations). If it is true that blood clotting can be explained through step by stepwise events, then this needs to be detailed in the literature. In fact, it isn't. When one of the foremost experts on the alleged evolution of blood clotting spoke to refute Behe's work, the only explanation given was protein similarity leading to an inferred history of gene duplication¹¹. The NAS needs to concretely prove that an organism could get the new function through step by step mutation where the organism could survive with each change

and that little to no unused cellular components were being produced at each step (for this would be selected against).

Finally, the booklet discusses the various levels of complexity found in the eye. If less-complex eyes evolved into more-complex eyes, then the same logical fallacy is employed as in the hemoglobin example. Each eye, though having a different level of complexity, could still be irreducibly complex, or at least complex to the point of defying a step-by-step Darwinian origin. Evolution has to be assumed to assert that the structures are related to one another through descent with modification. Furthermore, if "eyes have evolved independently many times during the history of life on Earth" (S & C, Pg. 22), then it seems we have contingency, complexity, and specification for each instance of evolution. Perhaps we ought to infer design on each occasion. What are the odds that natural causes evolved the eye once, much less many alleged convergently similar times! Furthermore, the NAS completely leaves out a discussion of the testability of design, as laid out by William Dembski. Without the providing any non-circumstantial evidence or complete explanations to support their claim, the evolution of such irreducibly complex structures cannot be debated.

In closing, the existence of irreducibly complex structures is a very testable hypothesis. One could systematically make point mutations to alter each amino acid in every protein for an entire system and test whether any key point mutations allow the function to remain intact. While it is likely that many mutations would turn out to be neutral, further critical analysis could, however, determine if the system was truly part of an evolvable pathway. A irreducibly complex system would disallow an evolutionary cause and might very well bear the marks of design.

Is intelligent design a viable scientific theory?

The NAS admits that "[t]ruth in science ... is never final, and what is accepted as a fact today may be modified or even discarded tomorrow" (S & C, Pg. 2) and also says that, "Scientists **infer** that atoms exist and Earth revolves around the sun because they have tested predictions derived from these concepts by extensive observation and experimentation." (S & C, pg. 21). In much the same way, intelligent design theory makes inferences based upon observations about the types of complexity that can be produced by the action of intelligent agents vs. the types of information that can be produced through purely natural processes to infer that life was designed by an intelligence. For science, these principles of explaining through inference apply to both intelligent design and mechanistic causes (i.e. natural selection).

The idea that life was in some way intelligently designed is a theory. According to the NAS, a theory is "a well-substantiated explanation of some aspect of the natural world that can incorporate facts, laws, inferences, and tested hypotheses. Thus a theory is not necessarily the final explanation, but merely the best explanation given the data and its current understanding.

Intelligent design is a theory based upon our understanding of intelligence which incorporates scientific facts, laws, inferences, and testable hypotheses. Intelligent design relies upon observations about how intelligent agents act, the fact of the existence of the nature of information within the cell, laws such as those which govern chemical reactions, inferences that natural selection was not at work, and tested hypotheses such as failed mechanistic accounts for un-evolvable biochemical structures. Given the data, it is potentially a better theory than many currently reigning theories for the creation of new information, the origins of life, and the origin of life's complexity.

Does science's own self-definition exclude certain theories from investigation?

There is only one thing stopping the NAS from supporting a seemingly better course for science--its definition of science itself. The NAS defines science as a search for purely natural explanations for all phenomena. Under this definition, science is bound to oppose any theory of intelligent design, no matter how compelling the evidence. That is fine, but the NAS should admit that this definition is a philosophic choice, and a statement of faith that natural explanations indeed exist for all things, and indeed are true. In making this choice, the NAS prevents science from making "progress in science [which] consists of the development of better explanations for the causes of natural phenomena".

Is science living up to its truth-discovering claims? What can be done?

If the place of science is truly to pursue better explanations of the world through observation and experiment, then perhaps science ought to discard its original self-definition and follow where the evidence leads. It seems that science is holding on to this definition so that it can explore naturalistic causes regardless of the state of the evidence. If natural explanations do not come forth (and it appears in many cases they are not) and non-naturalistic theories provide a better explanation, then science has two choices: **1.** It can change its own definition to one based solely off of empirical data, and infer a non-natural cause, or **2.** It can retain its mandate to naturalism and completely lose its purely empirical basis, but admit that there appear to be no naturalistic answers to certain questions, and then continue operate under naturalism, handicapped

with regards to the discovery of truth.

If science feels it requires its marriage with naturalism and believes that it must continue to search for natural causes for the origins of life, then that is fine, but science must be willing to accept the consequences. It must even be willing to admit if the current state of evidence if it does not seem to point to any foreseeable answers. If it is determined that those natural causes cannot be found, it must say so. In this case, science will be at the mercy of the government and accept any funding cuts to seemingly dead end research into naturalistic theories. Furthermore, science will lose its power over public thought and education as people will left to think for themselves and come up with their own answers to certain "unanswerable" questions. Science will no longer be an objective authority on many questions.

The NAS wants to have its cake of naturalism and eat it too. It wants the ability to discover truth, and naturalism. Perhaps it realizes that the two don't necessarily go hand in hand, but is over-committed to naturalism. Perhaps it subconsciously realizes that naturalistic causes fail as an explanatory mode, and that if this is found out then science will lose the undivided attention of the government and the respect of the people. Is it possible that because the NAS (and much of science) is over-committed to naturalism and self-bound to finding natural explanations, it is forcing itself to recommend policy which is not supported by evidence in an attempt retain its own power and prestige? Why else, then, does the NAS repeatedly emphasize the wonderful practical accomplishments of science in this century? What do these accomplishments have to do with the validity of intelligent design or purely natural cause? Is science attempting to assert authority it knows it doesn't have (and can't have unless it leaves naturalism behind)? Does science realize that it is impotent to provide the explanations it once hoped for? Is it afraid to say, "We just don't know" in response to the big questions?

What is better for America: truth governed by naturalist philosophy or the plain truth, whatever it may be? If the evidence and the philosophy are going in two different directions, let us hope that science will recognize this fact and make a decision which will allow science to discover truth with the same integrity, power, and prestige that it once had. The only choice is to redefine and accept design. If science does not do this, then the consequences for science could be disastrous.

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