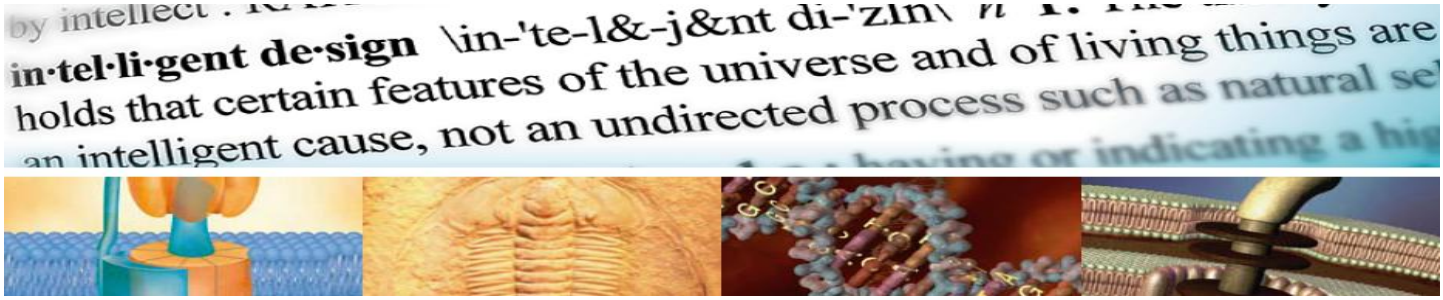

The Facts about Intelligent Design

A Response to the National Academy of Sciences' *Science, Evolution, and Creationism*

By Casey Luskin

Introduction

A 1982 poll found that only 9% of Americans believed that humans developed through purely natural evolutionary processes. Two years later, the U.S. National Academy of Sciences (NAS) issued its first *Science and Creationism* booklet, stating that science and religion occupy "separate and mutually exclusive realms."[1] Public skepticism of evolution remained high—a 1993 poll found that only 11% of Americans believed that humans developed through purely natural evolutionary processes.

In 1999 the NAS released a second version of *Science and Creationism*, again reassuring the public that "science and religion occupy two separate realms."[2] Still public skepticism remains high—a 2004 poll found that only 13% of Americans believe that humans developed through purely natural evolutionary processes, and a 2006 Zogby Poll found that about 70% of Americans support including scientific criticism of evolution in public school curricula.

Fearing the public's unyielding skepticism of evolution, the NAS has now issued another *ex cathedra* edict promoting misinformation about intelligent design (ID) and bluffs about the scientific status of Darwinian evolution. What follows is a discussion of some of the errors in *Science, Evolution, and Creationism*.

- **The NAS oversells the scientific importance of evolution.**

With a picture of a cute baby chimp on its cover, the NAS's new *Science, Evolution, and Creationism* booklet states, "Evolutionary biology has been and continues to be a cornerstone of modern science." This sweeping statement does not speak for all NAS members. As NAS member Philip Skell wrote in *The Scientist* in 2005:

> "Darwinian evolution – whatever its other virtues – does not provide a fruitful heuristic in experimental biology. This becomes especially clear when we compare it with a heuristic framework such as the atomic model, which opens up structural chemistry and leads to advances in the synthesis of a multitude of new molecules of practical benefit. None of this demonstrates that Darwinism is false. It does, however, mean that the claim that it is the cornerstone of modern experimental biology will be

[1] *Science and Creationism: A View from the National Academy of Sciences*, 1st edition, 1984.
[2] *Science and Creationism: A View from the National Academy of Sciences*, 2nd edition, 1999.

met with quiet skepticism from a growing number of scientists in fields where theories actually do serve as cornerstones for tangible breakthroughs."[3]

Some evolutionary biologists would also disagree with the NAS's claims in its new booklet that evolution has provided much agricultural, medical, or other commercial benefits to society. As evolutionary biologist Jerry Coyne admitted in *Nature*, "improvement in crop plants and animals occurred long before we knew anything about evolution, and came about by people following the genetic principle of 'like begets like'."[4]

Even when trying to fight anti-biotic resistance, Darwin's theory provides little guidance. As SUNY Professor of Neurosurgery Michael Egnor recounts, "Darwinism tells us that … bacteria survive antibiotics that they're not sensitive to, so non-killed bacteria will eventually outnumber killed bacteria. That's it."[5] It is probably for this reason that Coyne admitted in *Nature* that "if truth be told, evolution hasn't yielded many practical or commercial benefits. Yes, bacteria evolve drug resistance, and yes, we must take countermeasures, but beyond that there is not much to say."[6] To actually create drugs that can outsmart evolving bacteria or cancer cells, biomedical researchers must use a process of intelligent design.

- **The NAS unscientifically elevates evolution to the status of unquestionable dogma.**

The NAS defines evolution as evolution by natural selection and claims that "[t]here is no scientific controversy about the basic facts of evolution," asserting that evolution is "so well established that no new evidence is likely to alter" it. In doing so, the NAS treats Neo-Darwinian evolution like an unquestionable dogma, not like a science. Such proclamations from the NAS are dangerous because they threaten the prestige of the NAS as an objective and trustworthy voice advising society.

Moreover, the NAS's claim that there is no controversy over evolution is a bluff, for there is significant scientific dissent from the view of evolution by natural selection. Leading biologist Lynn Margulis, who opposes ID, criticizes the standard Darwinian mechanism by stating that the "Darwinian claim to explain all of evolution is a popular half-truth whose lack of explicative power is compensated for only by the religious ferocity of its rhetoric."[7] She further observes that "new mutations don't create new species; they create offspring that are impaired."[8] In 2001, biochemist Franklin Harold admitted in an Oxford University Press monograph that "there are presently no detailed Darwinian accounts of the evolution of any biochemical or cellular system, only a variety of wishful speculations."[9] Other scientists have gone much further.

Over 700 doctoral scientists have signed a public statement asserting their agreement that they "are skeptical of claims for the ability of random mutation and natural selection to account for the complexity of life."[10] But what are these scientists to do when the top scientific organization in the U.S. proclaims that evolution is as unquestionable as the existence of atoms or the heliocentric model of the solar system? Clearly the NAS's statements threaten the academic freedom of scientists to dissent from Neo-Darwinian evolution.

The NAS similarly recommends that science educators take a dogmatic approach to teaching evolution, opposing "calls to introduce 'critical analysis' into science classes," claiming that "the intelligent design movement's call to 'teach the controversy' is unwarranted." But many science educators have read the

[3] Philip Skell, "Why Do We Invoke Darwin? Evolutionary theory contributes little to experimental biology," *The Scientist* (August 29, 2005)
[4] Jerry Coyne, "Selling Darwin: Does it matter whether evolution has any commercial applications?," reviewing *The Evolving World: Evolution in Everyday Life* by David P. Mindell, in *Nature*, Vol 442:983-984 (August 31, 2006).
[5] Michael Egnor, "Quick, Nurse, Give the Patient a Tautology!," http://www.evolutionnews.org/2007/03/quick_nurse_give_the_patient_a.html
[6] Coyne (2006).
[7] Lynn Margulis and Dorion Sagan, *Acquiring Genomes: A Theory of the Origins of the Species*, page 29 (Basic Books, 2003).
[8] Lynn Margulis quoted in Darry Madden, "UMass Scientist to Lead Debate on Evolutionary Theory," *Brattleboro (Vt.) Reformer* (Feb 3, 2006).
[9] Franklin M. Harold, *The Way of the Cell: Molecules, Organisms and the Order of Life*, pg. 205 (Oxford University Press, 2001).
[10] See "A Scientific Dissent from Darwinism," at http://www.dissentfromdarwin.org

scientific disagreement over neo-Darwinism and thus cannot accept the NAS's bluff that "[t]here is no scientific controversy" over evolution. What are such educators to do when the top science organization in the U.S. tells them that evolution should not be questioned in the classroom? The NAS's statements threaten to chill the academic freedom of teachers to teach students about scientific dissent from Darwinism. Sadly, this will only serve to perpetuate the decline of American science education.

The history of science shows that scientists often overturn ideas once thought to be proven fact. If Neo-Darwinism is ever abandoned, history will look upon this NAS document as obstructing the progress of science and education by opposing critical thinking on evolution.

- **The NAS misrepresents the facts about the state of origin of life research.**

In its prior edition of *Science and Creationism* (2nd ed., 1999),[11] the NAS made the blatantly false assertion that "many pathways [are known that] might have been followed to produce the first cells." Yet scientists have never created life in the lab, much less have they discovered any plausible pathways through which cells might have originated under conditions mimicking natural conditions on the early earth. While it is heartening to see that the NAS has removed that false claim from its latest edition of *Science, Evolution and Creationism*, the NAS still drastically overstates the success of scientists trying to explain the natural chemical origin of life.

In *Science, Evolution, and Creationism*, the NAS asserts that "researchers have been developing hypotheses of how self-replicating organisms could form and begin to evolve, and they have tested the plausibility of these hypotheses in laboratories." While that statement is technically true on an extremely shallow level, the NAS obscures the fact that scientists are far from anything remotely close to a plausible complete explanation of the chemical origin of life. As science writer Gregg Easterbrook recently summarized the issue, "What creates life out of the inanimate compounds that make up living things? No one knows. How were the first organisms assembled? Nature hasn't given us the slightest hint. If anything, the mystery has deepened over time."[12]

The NAS's second misrepresentation is found in its assertion that "hundreds of laboratory experiments have shown that Earth's simplest chemical compounds, including water and volcanic gases, could have reacted to form many of the molecular building blocks of life, including the molecules that make up proteins, DNA, and cell membranes." This statement is misleading because most of those experiments used gasses and compounds that are not thought to have existed on the early earth. When water and volcanic gasses are used in such experiments attempting to synthesize pre-biotic building blocks of life, virtually no biological precursor molecules are generated. So drastic is the evidence against pre-biotic synthesis of biological monomers that in 1990 the Space Studies Board of the National Research Council recommended that origin of life scientists undertake a "reexamination of biological monomer synthesis under primitive Earthlike environments, as revealed in current models of the early Earth."[13]

Producing pre-biological precursors to life is only the beginning of the problem for origin of life researchers, as Stanley Miller once admitted that "making compounds and making life are two different things."[14] When trying to "make" the first life-form, scientists cannot rely upon Darwinian processes. Darwinian evolution requires replication, and prior to the origin of life there was no replication. Origin of life theorist Robert Shapiro explains that an explanation for the first self-replicating molecule "has not yet been described in detail or demonstrated" but "is taken for granted in the philosophy of dialectical materialism."[15]

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[11] For a critique of that document, *see* Casey Luskin, "A Critical Analysis of *Science and Creationism: A View from the National Academy of Sciences* (2nd. ed)," at http://www.ideacenter.org/contentmgr/showdetails.php/id/1131

[12] Gregg Easterbrook, "Where did life come from?," Wired Magazine, page 108 (February, 2007).

[13] National Research Council Space Studies Board, *The Search for Life's Origins* (National Academy Press: Washington D.C., 1990).

[14] Statements made by Stanley Miller at a talk given by him for a UCSD Origins of Life seminar class on January 19, 1999.

[15] Robert Shapiro, *Origins: A Skeptics Guide to the Creation of Life on Earth*, page 207 (Summit Books, 1986).

Accounting for the origin of a self-replicating molecule would still not explain how modern cells arose. Our DNA code necessitates an irreducibly complex system requiring the information in DNA, the enzymes that assist DNA's replication and protection, a protective cell wall, and a complex system of machinery used to transcribe and translate language of DNA into protein. Faced with the complexity of this system, biologist Frank Salisbury lamented in 1971 that "the entire system must come into being as one unit, or it is worthless. There may well be ways out of this dilemma, but I don't see them at the moment."[16] In 1995, leading biologists John Maynard Smith and Eors Szathmary explained that accounting for the origin of this system remains "perhaps the most perplexing problem in evolutionary biology" because "the existing translational machinery is at the same time so complex, so universal and so essential that it is hard to see how it could have come into existence or how life could have existed without it."[17]

We already know from studying human intelligence that language and encoded information—properties fundamental to life—come from intelligent agents. One scientist wrote in a mainstream scientific journal that "chance and necessity cannot explain sign systems, meaning, purpose, and goals," and since "mind possesses other properties that do not have these limitations," it is "therefore very natural that many scientists believe that life is rather a subsystem of some Mind greater than humans."[18] The language-based specified and complex information contained in DNA is precisely the type of code or language that, Stephen C. Meyer recognizes, "invariably originate[s] from an intelligent source, from a mind or personal agent."[19] Design proponents see the incredible amount of language-based specified and complex encoded information in DNA as testifying that a programmer was involved in the origin of life.

The NAS refuses to consider the possibility of design and only grudgingly admits that there are unsolved mysteries about the origin of life. But the NAS's strategy is not to encourage scientific skepticism, but rather to encourage the reader to have *faith* that science will solve these problems, as they write: "The history of science shows that even very difficult questions such as how life originated may become amenable to solution as a result of advances in theory, the development of new instrumentation, and the discovery of new facts." Such a statement encourages readers to have *faith in the power of science* rather than simply acknowledging that there are unsolved questions about the origin of life. Indeed, the history of science also shows that scientists often hold on to bad theories in spite of contrary data. Perhaps history will one day view scientists who claimed that life arose via unintelligent processes as clinging to ideas for philosophical reasons rather than following the evidence where it leads—towards intelligent design.

- **The NAS misrepresents the nature of the fossil record.**

The NAS asserts that "[f]ossil discoveries have continued to produce new and compelling evidence about evolutionary history," but it leaves out any mention of instances where the fossil record may challenge Neo-Darwinism. Indeed, in 1979 evolutionary paleontologist David Raup wrote that "we are now about 120 years after Darwin, and knowledge of the fossil record has been greatly expanded ... ironically, we have even fewer examples of evolutionary transition than we had in Darwin's time."[20] The NAS further claims that "[t]he fossil record provides extensive evidence documenting the occurrence of evolution," but other paleontologists have lamented precisely the opposite: the fossil record rarely provides evidence of Darwinian change. As evolutionary paleontologist Niles Eldrege wrote in 1995:

[16] Frank B. Salisbury, "Doubts about the Modern Synthetic Theory of Evolution," page. 338, *American Biology Teacher* (September, 1971).
[17] John Maynard Smith and Eors Szathmary, *The Major Transitions in Evolution*, page. 81 (W.H. Freeman, 1995).
[18] Øyvind Albert Voie, "Biological function and the genetic code are interdependent," *Chaos, Solitons and Fractals* 28.4 (2006): 1000–4.
[19] Stephen C. Meyer, "The Origin of Biological Information and the Higher Taxonomic Categories," Proceedings of the Biological Society of Washington 117.2 (2004): 213–29.
[20] David Raup, "Conflicts Between Darwin and Paleontology", Field Museum of Natural History Bulletin, Vol. 50 (1) (1979).

> "No wonder paleontologists shied away from evolution for so long. It never seemed to happen. Assiduous collecting up cliff faces yields zigzags, minor oscillations, and the very occasional slight accumulation of change--over millions of years, at a rate too slow to account for all the prodigious change that has occurred in evolutionary history. When we do see the introduction of evolutionary novelty, it usually shows up with a bang, and often with no firm evidence that the fossils did not evolve elsewhere! Evolution cannot forever be going on somewhere else. Yet that's how the fossil record has struck many a forlorn paleontologist looking to learn something about evolution."[21]

One major event in the fossil record—left completely unmentioned by the NAS—is the Cambrian explosion, where nearly all of the major animal phyla appear in a geological instant without any apparent evolutionary transitional fossils. A recent biology textbook acknowledges that the fossil record has not given clues to help explain the origin of animal phyla in the Cambrian explosion:

> "Most of the animal phyla that are represented in the fossil record first appear, 'fully formed,' in the Cambrian some 550 million years ago. ... The fossil record is therefore of no help with respect to the origin and early diversification of the various animal phyla."[22]

This is not the only such "explosion" in the fossil record. Paleontologists have observed a fish explosion, a plant explosion, a bird explosion, and even a mammal explosion. As leading evolutionary biologist, the late Ernst Mayr, wrote in 2001, "When we look at the living biota, whether at the level of the higher taxa or even at that of the species, discontinuities are overwhelmingly frequent. . . . The discontinuities are even more striking in the fossil record. New species usually appear in the fossil record suddenly, not connected with their ancestors by a series of intermediates."[23] This phenomenon exists not only at the species level but also at the level of higher taxa, as one zoology textbook explains:

> "Many species remain virtually unchanged for millions of years, then suddenly disappear to be replaced by a quite different, but related, form. Moreover, most major groups of animals appear abruptly in the fossil record, fully formed, and with no fossils yet discovered that form a transition from their parent group."[24]

Rather than acknowledging the general pattern of explosions in the fossil record, the NAS focuses on the few occasions where there are possible transitional forms. But plausible evolutionary transitions seem to be the exception, not the rule, in the fossil record, which is dominated by abrupt explosions of mass biological diversity. In particular, the NAS focuses heavily upon *Tiktaalik*, an alleged transition between fish and amphibians, but *Tiktaalik* has a completely finlike fin and does virtually nothing to document the key aspect of the alleged fish to amphibian transition, the transformation of fins into feet.

The NAS also focuses on *Archaeopteryx*, an alleged transition between dinosaurs and birds. *Archaeopteryx* is generally regarded as a true bird, but the NAS fails to mention that the alleged dinosaurian ancestors of *Archaeopteryx* have been found *in the wrong period of the fossil record*—"at least 20 Myr younger than *Archaeopteryx*."[25] If *Archaeopteryx* is the first known true bird, then from what, if anything, did birds evolve? The fossil record does not tell us. Despite the problems with this evolutionary story, Phillip Johnson provides a lucid and charitable analysis of the importance of this fossil:

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[21] Niles Eldredge, *Reinventing Darwin: The Great Debate at the High Table of Evolutionary Theory*, pg. 95 (John Wiley & Sons, 1995).
[22] R.S.K. Barnes, P. Calow and P.J.W. Olive, *The Invertebrates: A New Synthesis*, pgs. 9–10 (3rd ed., Blackwell Sci. Publications, 2001).
[23] Ernst Mayr, *What Evolution Is*, pg. 189 (Basic Books, 2001).
[24] C.P. Hickman, L.S. Roberts, and F.M. Hickman, *Integrated Principles of Zoology*, pg. 866 (Times Mirror/Moseby College Publishing, 1988, 8th ed).
[25] Carl C. Swisher III, Yuan-qing Wang, Xiao-lin Wang, Xing Xu, and Yuan Wang, "Cretaceous age for the feathered dinosaurs of Lianoing, China" *Nature*, Vol. 400: 58-61 (July 1, 1999).

"*Archaeopteryx* is on the whole a point for Darwinists, but how important is it? Persons who come to the fossil evidence as convinced Darwinists will see a stunning confirmation, but skeptics will see a lonely exception to a consistent pattern of fossil disconfirmation."[26]

Many skeptics of Neo-Darwinism contend that this pattern of explosions in the fossil record represents rapid infusions of new information into the biosphere that is more consistent with ID than with evolution. Yet, the NAS claims that skeptics of evolution (whom they lump together as "creationists"), "cite what they claim to be an incomplete fossil record as evidence that living things were created in their modern forms." This claim turns history on its head. In fact, it is well known that in many instances the fossil record *is quite complete*—adequate enough to show that new fossil forms appeared in abrupt explosions. Ironically, it is the Darwinists who have historically used the excuse that the fossil record is "incomplete" to justify their clinging to Darwinian change in the face of missing fossil transitions. Eventually, biologists were forced to accept the fact that transitional forms were not missing because the fossil record was incomplete, for "the gaps we see reflect real events in life's history—not the artifact of a poor fossil record."[27] As one biologist wrote, "Evolutionary biologists can no longer ignore the fossil record on the ground that it is imperfect."[28] In contrast, the NAS's inflated claims rewrite history and ignore the pattern of abrupt explosions in the fossil record.

- **The NAS misrepresents the evidence for universal common ancestry.**

The NAS states that, "If two species have a relatively recent common ancestor, their DNA sequences will be more similar than the DNA sequences for two species that share a distant common ancestor." This is how the DNA data is supposed to look in theory. But the NAS makes no mention of the numerous instances where actual DNA-similarities between species conflict with expectations based upon Darwinian common descent.

Intelligent design is not necessarily incompatible with common ancestry, but it must be noted that intelligent agents commonly re-use parts that work in different designs. Thus, similarities in such genetic sequences may also be generated as a result of functional requirements and common design rather than by common descent. The NAS ignores this possibility and asserts that "[m]olecular biology has confirmed and extended the conclusions about evolution drawn from other forms of evidence." In fact, Darwin's tree of life—the notion that all living organisms share a universal common ancestor—has faced increasing difficulties in recent years.

The problem for Neo-Darwinism is that phylogenetic trees based upon one fundamental gene or protein often conflict with trees based upon another gene or protein. In fact, this problem is particularly acute when one studies the fundamental genes at the base of the tree of life, which NAS wrongly claims demonstrate universal common ancestry. As W. Ford Doolittle explains, "Molecular phylogenists will have failed to find the 'true tree,' not because their methods are inadequate or because they have chosen the wrong genes, but because the history of life cannot properly be represented as a tree."[29]

Doolittle, a Darwinian biologist, elsewhere writes that "there would never have been a single cell that could be called the last universal common ancestor."[30] Doolittle attributes his observations to gene-swapping among microorganisms at the base of the tree. But Carl Woese, the father of evolutionary molecular systematics, finds that such problems exist beyond the base of the tree: "Phylogenetic incongruities [conflicts] can be seen everywhere in the universal tree, from its root to the major branchings within and among the various taxa to the makeup of the primary groupings themselves."[31]

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[26] Phillip E. Johnson, *Darwin on Trial*, pg. 81 (Intervarsity Press, 1993).
[27] Niles Eldredge, and Ian Tattersall, The Myths of Human Evolution, pg. 59 (Columbia University 1982).
[28] David S. Woodruff, *Science*, pg.717 (May 16, 1980).
[29] W. Ford Doolittle, "Phylogenetic Classification and the Universal Tree," *Science*, Vol. 284:2124-2128 (June 25, 1999).
[30] W. Ford Doolittle, "Uprooting the Tree of Life," *Scientific American*, pages 90-95 (February, 2000).
[31] Carl Woese "The Universal Ancestor," *Proceedings of the National Academy of Sciences USA*, Vol. 95:6854-9859 (June, 1998).

Looking higher up the tree, a recent study conducted by Darwinian scientists tried to construct a phylogeny of animal relationships but concluded that "[d]espite the amount of data and breadth of taxa analyzed, relationships among most [animal] phyla remained unresolved."[32] The basic problem is that phylogenetic trees based upon one gene or other characteristic will commonly conflict with trees based upon another gene or macro-characteristic. Contrary to the NAS's assertion, the molecular has often not "confirmed and extended the conclusions about evolution drawn from other forms of evidence."

An abridged version of the *Science, Evolution, and Creationism* pamphlet released by the NAS goes even further, stating that "species that appear to be more distantly related from their positions in the fossil record are found to have correspondingly greater differences in their DNA than species that appear more closely related in the fossil record."[33] But this statement is flatly false. It is well known that the "molecular clock" hypothesis—the view that the time since a species' appearance in the fossil record predicts its degree of genetic evolution—is notoriously unreliable. Additionally, many evolutionary scientists have recognized that evolutionary trees based upon morphology (physical characteristics of organisms) or fossils commonly conflict with evolutionary trees based upon DNA (also called molecular-based trees). As a review paper by Darwinian leaders in this field stated, "As morphologists with high hopes of molecular systematics, we end this survey with our hopes dampened. Congruence between molecular phylogenies is as elusive as it is in morphology and as it is between molecules and morphology."[34] Another set of pro-evolution experts wrote, "That molecular evidence typically squares with morphological patterns is a view held by many biologists, but interestingly, by relatively few systematists. Most of the latter know that the two lines of evidence may often be incongruent."[35] A news article in *Nature* even reported that "disparities between molecular and morphological trees" lead to "evolution wars."[36]

The nice, neat, nested hierarchy of a grand Tree of Life predicted by Darwinian theory has not been found. Evolutionary biologists are increasingly appealing to epicycles like horizontal gene transfer, differing rates of evolution, abrupt molecular radiation, convergent evolution (*even convergent molecular evolution*), and other ad hoc rationalizations to reconcile discrepancies between different hypotheses about common descent. Darwinian biology is not explaining the molecular data; it is forced to explain away the data. If the NAS were willing to consider common intelligent design, perhaps they would find a simple explanation for why characteristics appear in species that are not expected by Darwinian evolution.

- **The NAS overstates the case for human evolution.**

In 1980, the famed late evolutionary paleontologist Stephen Jay Gould noted that "[m]ost hominid fossils, even though they serve as a basis for endless speculation and elaborate storytelling, are fragments of jaws and scraps of skulls."[37] The NAS asserts that "today there is no scientific doubt about the close evolutionary relationships between humans and all other primates." But the NAS ignores that the fossil case for human evolution is extremely weak, for skeptics of human evolution have ample scientific basis for their skepticism.

The fossil record contains two basic types of hominids: those that can be classified as ape-like and those that can be classified as modern human-like. But there remains a distinct break in the morphology of ape-like species and human-like species that is not bridged by our knowledge of the fossil record.

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[32] Antonis Rokas, Dirk Krüger, Sean B. Carroll, "Animal Evolution and the Molecular Signature of Radiations Compressed in Time," *Science*, Vol. 310:1933-1938 (Dec. 23, 2005).
[33] This 8-page abridged version of Science and Creationism was given to the press at the time that the full version was released.
[34] Patterson et al., "Congruence between Molecular and Morphological Phylogenies", *Annual Review of Ecology and Systematics*, Vol 24, pg. 179 (1993).
[35] Masami Hasegawa, Jun Adachi, Michel C. Milinkovitch, "Novel Phylogeny of Whales Supported by Total Molecular Evidence," *Journal of Molecular Evolution*, Vol. 44, pgs. S117-S120 (Supplement 1, 1997).
[36] Trisha Gura, "Bones, Molecules or Both" *Nature*, Vol. 406:230-233 (July 20, 2000).
[37] Stephen Jay Gould, The Panda's Thumb, page 126 (W.W. Norton, 1980).

The NAS touts Lucy, a member of the hominid species *Australopithecus afarensis*, as a representative of humanity's ancestors. But many studies have found that the australopithecines do not serve as good transitional forms from apes to humans. For example, one study found Lucy had handbones like a knuckle-walking ape. Another study wrote, "We, like many others, interpret the anatomical evidence to show that early *H[omo] sapiens* was significantly and dramatically different from earlier and penecontemporary australopithecines in virtually every element of its skeleton and every remnant of its behavior."[38] One commentator proposed this evidence implies a "big bang theory" of human evolution.[39] Similarly, two paleoanthropologists stated in *Nature* that the first human-like fossils appear so suddenly in the record that "it is hard at present to identify its immediate ancestry in east Africa. Not for nothing has it been described as a hominin 'without an ancestor, without a clear past.'"[40]

A Harvard evolutionary paleoanthropologist recently stated in the *New York Times* that newly discovered hominid fossils "show 'just how interesting and complex the human genus was and how poorly we understand the transition from being something much more apelike to something more humanlike.'"[41] Such an admission was echoed soon thereafter by a different set of evolutionary paleoanthropologists, stating that "we know nothing about how the human line actually emerged from apes."[42] While these scientists undoubtedly believe that humans and apes share a common ancestor, the NAS would do better to explain that there are many unsolved mysteries about human origins, rather than presenting the united front that humans are unequivocally descended from ape-like species: clearly skeptics of human evolution have ample scientific grounds for their views.

The NAS also states that genetic similarities between humans and chimpanzees show "our relatively recent common ancestry." They present a misleading diagram, making it appear that human and chimpanzee DNA is essentially 100% identical. But a recent news article in *Science* stated that the claim that humans and chimps have DNA that is only 1% different is a "myth,"[43] stating that the 1% figure "reflects only base substitutions, not the many stretches of DNA that have been inserted or deleted in the genomes." In other words, when the chimp genome has no similar stretch of human DNA, such DNA sequences are ignored by those touting the statistic that humans and chimps are only 1% genetically different. For this reason, the aforementioned *Science* news article was subtitled "The Myth of 1%," and printed the following language:

- "studies are showing that [genetically, humans and chimps] are not as similar as many tend to believe";
- the 1% statistic is a "truism [that] should be retired";
- the 1% statistic is "more a hindrance for understanding than a help";
- "Researchers are finding that on top of the 1% distinction, chunks of missing DNA, extra genes, altered connections in gene networks, and the very structure of chromosomes confound any quantification of 'humanness' versus 'chimpness.'"

Indeed, due to the huge caveats in the 1% statistic, some scientists are suggesting that a better method of measuring human/chimp genetic differences might be counting individual gene copies. When this metric is employed, human and chimp DNA is over 5% different. But new findings in genetics show that gene-coding DNA might not even be the right place to seek differences between humans and chimps.

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[38] J. Hawks, K. Hunley, L. Sang-Hee, and M. Wolpoff, "Population Bottlenecks and Pleistocene Evolution," *Journal of Molecular Biology and Evolution*, Vol. 17(1): 2-22 (2000).
[39] University of Michigan News and Information Services News Release, "New study suggests big bang theory of human evolution" (January 10, 2000), available at http://www.umich.edu/~newsinfo/Releases/2000/Jan00/r011000b.html
[40] Robin Dennell and Wil Roebroeks, "An Asian perspective on early human dispersal from Africa," *Nature*, Vol. 438:1099-1104 (Dec. 22/29, 2005).
[41] Daniel Lieberman, quoted in "Fossils in Kenya Challenge Linear Evolution," by John Noble Wilford, *New York Times* (August 9, 2007), at http://www.nytimes.com/2007/08/09/science/09fossil.html?_r=1&adxnnl=1&oref=slogin&ref=world&adxnnlx=1190251306-bd0mimh3naHn6sRHLOlP/A
[42] Scientists quoted in "Fossil find pushes human-ape split back millions of years," (August 24, 20070), at http://www.breitbart.com/article.php?id=070824121653.65mgd37f&show_article=1.
[43] Jon Cohen, "Relative Differences: The Myth of 1%," Science, Vol. 316:1836 (June 29, 2007).

Finally, the question must be asked, *If humans and chimps do have similar DNA, why should that demonstrate common ancestry?* As discussed above, similarities in key genetic sequences may be explained as a result of functional requirements and common design rather than mere common descent. Intelligent design is certainly compatible with human/ape common ancestry, but the truth is that the percent difference says nothing about whether humans and chimps share a common ancestor. The percent genetic similarity between humans and apes does not demonstrate Darwinian evolution, unless one excludes the possibility of intelligent design. Just as intelligent agents 're-use' functional components that work over and over in different systems (e.g., wheels for cars and wheels for airplanes), genetic similarities between humans and chimps could also be explained as the result of the re-usage of common genetic programs due to functional requirements of the hominid body plan. The NAS considers none of these possibilities.

- **The NAS misrepresents irreducible complexity and the flagellum.[44]**

The NAS accurately defines irreducible complexity — "If one component is missing or changed, the device will fail to operate properly"—but then promotes a false test of irreducible complexity, wrongly claiming that if one part of the flagellum can perform some other function, then irreducible complexity is refuted.

The NAS claims that the fact that some flagellar components can function as a needle-nosed pump—the Type III Secretory System (T3SS)—shows that the flagellum is not irreducibly complex. However, a number of biologists have concluded that that the T3SS was not a precursor to the flagellum.[45] Moreover, microbiologist Scott Minnich explained during the *Kitzmiller* trial that the fact that some sub-components of the flagellum can perform other functions is not sufficient to demonstrate a Darwinian explanation for the origin of the flagellum because there is still a huge leap in complexity from a the needle-nosed pump to a flagellum. The unresolved challenge that the irreducible complexity of the flagellum continues to pose for Darwinian evolution is summarized by William Dembski:

> "At best the TTSS represents one possible step in the indirect Darwinian evolution of the bacterial flagellum. But that still wouldn't constitute a solution to the evolution of the bacterial flagellum. What's needed is a complete evolutionary path and not merely a possible oasis along the way. To claim otherwise is like saying we can travel by foot from Los Angeles to Tokyo because we've discovered the Hawaiian Islands. Evolutionary biology needs to do better than that."[46]

Dembski's critique is apt because it recognizes that Darwinists wrongly characterizes irreducible complexity as focusing on the non-functionality of sub-parts. Conversely, pro-ID biochemist Michael Behe, who popularized the term "irreducible complexity," properly tests it by assessing the plausibility of the entire functional system to assemble in a step-wise fashion, even if sub-parts can have functions outside of the final system. The "leap" required by going from one functional sub-part to the entire functional system is indicative of the degree of irreducible complexity in a system. Contrary to the NAS's assertions, Behe never argued that irreducible complexity mandates that sub-parts can have no function outside of the final system.

None of this compares to the NAS's most egregious error regarding the flagellum: the NAS states that "there is no single, uniform structure that is found in all flagellar bacteria." While technically this statement may be true if one looks at the fine-grain of the amino-acid sequence of every single protein among flagellum-bearing bacteria, there most certainly are highly conserved flagellar parts and there *is* an identifiable core set of

[44] Portions of this section draws upon David K. DeWolf, John G. West, and Casey Luskin, "Intelligent Design will Survive Kitzmiller v. Dover," 68 *Montana Law Review* 7 (Spring, 2007).
[45] Milton H. Saier, Jr., Evolution of Bacterial Type III Protein Secretion Systems, *Trends in Microbiology*, Vol. 12:113 (2004);
[46] William A. Dembski, *Rebuttal to Reports by Opposing Expert Witnesses* 52, http://www.designinference.com/documents/2005.09.Expert_Rebuttal_Dembski.pdf (May 14, 2005)

structures to the flagellar machine. In this regard, the NAS's statement is extremely misleading and inaccurate. Consider the conclusions, directly to the contrary of the NAS's claims, of Mark J. Pallen *et al.*'s 2005 article in *Trends in Microbiology*, "Bacterial flagellar diversity in the post-genomic era":

> "The *E. coli*/*S. enterica* paradigm emerges remarkably intact from our survey of flagellar diversity in the postgenomic era and appears to provide a perfect example of Darwin's epithet: 'prodigal in variation but niggard in innovation'. We have been able to provide functional assignments to many conserved, but previously unrecognized, flagellar genes in diverse systems, emphasizing the continuity of flagellar structure and function. These observations will provide a firm foundation for future experimental studies, enabling conserved (and therefore presumably important) domains and residues to be identified. Surprisingly, we have determined the conservation of some regulatory components of the flagellar apparatus; for example, the FliA–FlgM system is common to flagellar systems spanning four bacterial phyla (proteobacteria, spirochaetes, firmicutes and thermotogales)."[47]

Finally, the NAS's abridged booklet asserts that biologists "have found intermediate forms of flagella." But no reference or description is given for these alleged "intermediate forms of flagella," because this claim is false. In 2006 Pallen co-wrote, "it is clear that all (bacterial) flagella share a conserved core set of proteins," observing that "[t]his reduced flagellum is still a challenge to explain." Pallen co-identified a core set of structural components "at the heart of the bacterial flagellum":

> Three modular molecular devices are at the heart of the bacterial flagellum: the rotorstator that powers flagellar rotation, the chemotaxis apparatus that mediates changes in the direction of motion and the T3SS that mediates export of the axial components of the flagellum.[48]

Pallen's article further admitted that "the flagellar research community has scarcely begun to consider how these systems have evolved." By claiming "there is no single, uniform structure that is found in all flagellar bacteria" and that there are "intermediate forms of flagella," the NAS is promoting incorrect information about the flagellar structure, and the NAS is wrong to imply that the evolution of the flagellum is understood.

In contrast to the NAS's assertions, proponents of intelligent design have done experimental tests on the bacterial flagellum showing it is irreducibly complex,[49] indicating that it is derived from an intelligent cause:

> "In all irreducibly complex systems in which the cause of the system is known by experience or observation, intelligent design or engineering played a role [in] the origin of the system. . . . Although some may argue this is a merely an argument from ignorance, we regard it as an inference to the best explanation . . . given what we know about the powers of intelligence as opposed to strictly natural or material causes."[50]

The flagellum is a self-assembling, irreducibly complex microscopic rotary engine that contains parts known from human technology—such as a rotor, a stator, a propeller, a u-joint, and an engine—yet it functions at a level of efficiency that dwarfs any motor produced by humans. In any other context we would immediately recognize such an information-rich, integrated system as the product of intelligence. The NAS can only dismiss the scientific case for the design of the flagellum by distorting the facts about the structure.

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[47] Mark J. Pallen, Charles W. Penn, and Roy R. Chaudhuri, "Bacterial flagellar diversity in the post-genomic era," *Trends in Microbiology*, Vol. 13(4):143-149 (April, 2005).

[48] Mark J. Pallen and Nicholas J. Matzke, "From The Origin of Species to the origin of bacterial flagella," *Nature Reviews Microbiology*, AOP, published online 5 September 2006.

[49] *See* Scott Minnich Testimony, Transcript of Proceedings, Afternoon Session, pgs. 99–108 (Nov. 3, 2005), *Kitzmiller v. Dover*, 400 F. Supp. 2d 707.

[50] Scott A. Minnich and Stephen C. Meyer, "Genetic Analysis of Coordinate Flagellar and Type III Regulatory Circuits in Pathogenic Bacteria," in *Proceedings of the Second International Conference on Design & Nature, Rhodes Greece*, pgs. 7–8, at http://www.discovery.org/scripts/viewDB/filesDB-download.php?id=389

- **The NAS misrepresents the nature of intelligent design.**

The NAS repeatedly uses the blithe label "intelligent design creationism" and asserts that ID "rejects natural scientific explanations of the known universe in favor of special creation by a supernatural entity." These statements are false on various levels.

First, ID proponents have made it clear that the theory does not try to address religious questions about whether the designer is natural or supernatural. The designer may indeed be supernatural, but the science of ID does not try to address such questions. As pro-ID biochemist Michael Behe has explained, "I myself do believe in a benevolent God, and I recognize that philosophy and theology may be able to extend the argument. ***But a scientific argument for design in biology does not reach that far.*** Thus while I argue for design, the question of the identity of the designer is left open…. [A]s regards the identity of the designer, modern ID theory happily echoes Isaac Newton's phrase *hypothesis non fingo*."[51] Similarly, three ID proponents wrote in a recent legal journal:

> "It is important to stress that the refusal of ID proponents to draw scientific conclusions about the nature or identity of the designer is principled rather than merely rhetorical. ID is primarily a historical science, meaning it uses principles of uniformitarianism to study present-day causes and then applies them to the historical record in order to infer the best explanation for the origin of the natural phenomena being studied. ID starts with observations from 'uniform sensory experience' showing the effects of intelligence in the natural world. As *Pandas* explains, scientists have uniform sensory experience with intelligent causes (i.e. humans), thus making intelligence an appropriate explanatory cause within historical scientific fields. However, the 'supernatural' cannot be observed, and thus historical scientists applying uniformitarian reasoning cannot appeal to the supernatural. If the intelligence responsible for life was supernatural, science could only infer the prior action of intelligence, but could not determine whether the intelligence was supernatural."[52]

Second, ID is not special creation. As leading ID theorist William Dembski writes, "Intelligent design does not require organisms to emerge suddenly or to be specially created from scratch by the intervention of a designing intelligence."[53] Thus, intelligent design is not incompatible with common ancestry, and the NAS has blatantly misrepresented intelligent design. This also implies that the NAS makes misplaced arguments by emphatically pushing alleged transitional forms like *Tiktaalik* as refuting intelligent design. Regardless, *Tiktaalik* is not very impressive as a transitional form because, as noted, it does not document the key aspect of the alleged fish-to-amphibian evolutionary transition: the transformation of fins into feet.

In the end, intelligent design has significant differences from creationism that the NAS purposefully brushes aside. The theory of intelligent design is simply an effort to empirically detect whether the "apparent design" in nature acknowledged by virtually all biologists is genuine design (the product of an intelligent cause) or is simply the product of an undirected process such as natural selection acting on random variations. Creationism typically starts with a religious text and tries to see how the findings of science can be reconciled to it. ID starts with the empirical evidence of nature and seeks to ascertain what scientific inferences can be drawn from that evidence. Unlike creationism, the scientific theory of intelligent design does not claim that modern biology can identify whether the intelligent cause detected through science is supernatural. The charge that ID is "creationism" is a rhetorical strategy on the part of Darwinists who wish to delegitimize ID without actually addressing the merits of its case.

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[51] Michael Behe, "The Modern Intelligent Design Hypothesis," *Philosophia Christi*, Series 2, Vol. 3, No. 1 (2001), pg. 165, emphasis added. "*Hypothesis non fingo*" means *I do not attempt to make a scientific hypothesis.*

[52] David K. DeWolf, John G. West, and Casey Luskin, "Intelligent Design Will Survive Kitzmiller v. Dover," 68 *Montana Law Review* 7, 30 (Spring, 2007).

[53] William A. Dembski, *The Design Revolution*, pg. 178 (InterVarsity Press, 2004).

- **The NAS adopts the "Judge Jones Said It, I Believe It, That Settles It" approach to ID.**

The NAS quotes Judge John E. Jones III's statements in the *Kitzmiller v. Dover* ruling as if it is gospel truth, stating: "ID is not science and cannot be adjudged a valid, accepted scientific theory, as it has failed to publish in peer-reviewed journals, engage in research and testing, and gain acceptance in the scientific community. ID, as noted, is grounded in theology, not science. . . . Moreover, ID's backers have sought to avoid the scientific scrutiny which we have now determined that it cannot withstand by advocating that the controversy, but not ID itself, should be taught in science class. This tactic is at best disingenuous, and at worst a canard."

Those are harsh words, but there's no truth in them whatsoever. The actual court record shows that University of Idaho microbiologist Scott Minnich testified at trial that there are between "seven and ten" peer-reviewed papers supporting ID, and he specifically discussed Stephen Meyer's explicitly pro-intelligent design article in the peer-reviewed biology journal, *Proceedings of the Biological Society of Washington*. Additional peer-reviewed publications, including William Dembski's peer-reviewed monograph, *The Design Inference* (published by Cambridge University Press), were described in an annotated bibliography of peer-reviewed and peer-edited publications supporting ID submitted in an amicus brief accepted as part of the official record of the case. The record contained ample evidence of the scientific support and empirical, non-religious basis underlying the theory of intelligent design, but Judge Jones simply ignored it.

In truth, the claim that there is no controversy over Darwinian evolution is the real canard.[54] Ask any scholar of the law and she will affirm that judges get things wrong all the time. In fact, Judge Jones blatantly misrepresented ID in the ruling—probably because he copied over 90% of his section on whether ID is science verbatim or nearly verbatim from a legal brief submitted by lawyers working with the ACLU, also misrepresenting intelligent design. The judge literally copied and pasted errors directly into the ruling.

Conclusion: The NAS dismisses the scientific case for intelligent design.

The NAS claims that "[n]o scientific evidence supports" intelligent design and that intelligent design "reject[s] scientific findings and methods" because it hopes the public will trust their pronouncements rather than looking at the evidence. On the contrary, each section of this rebuttal has discussed scientific evidence supporting intelligent design and challenging evolution. This evidence—which the NAS largely ignores—comes from fields such as biochemistry, paleontology, genetics, systematics, anthropology, and information theory.

The NAS's new *Science, Evolution, and Creationism* booklet will not reduce public skepticism of evolution because no pronouncements or edicts from the NAS can change the facts of science. For those who are willing to investigate the facts of this issue for themselves and not engage in blind adherence to the pronouncements of scientific authorities, it seems clear that legitimate scientific dissent from Neo-Darwinism is possible. Unfortunately, if science educators follow the NAS's approach, science education will become science indoctrination. Perhaps when it comes to evolution, that's exactly what the NAS wants.

For the facts about intelligent design, don't merely consult the misrepresentations of critics, read what ID proponents actually themselves say:

www.intelligentdesign.org
www.researchID.org
www.evolutionnews.org
www.iscid.org
www.traipsingintoevolution.com
www.arn.org
www.ideacenter.org
www.intelligentdesignnetwork.org
www.idthefuture.com
www.discovery.org/csc

[54] See http://www.discovery.org/scripts/viewDB/filesDB-download.php?command=download&id=1453 or http://www.discovery.org/a/1127 for documentation.