by intellect : RATIONALE

in·tel·li·gent de·sign \in-'te-l&-j&nt di-'zIn\ *n* **1:** The theory of [illegible] holds that certain features of the universe and of living things are best explained by an intelligent cause, not an undirected process such as natural selection.

1 a : having or indicating a high or satisfactory

The College Student's Back to School Guide to Intelligent Design

Resources to help you understand the debate between Darwinian evolution and intelligent design

www.intelligentdesign.org

Revised November, 2014

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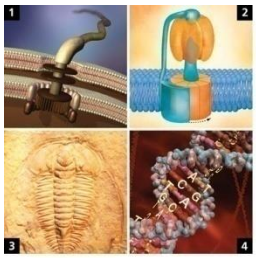

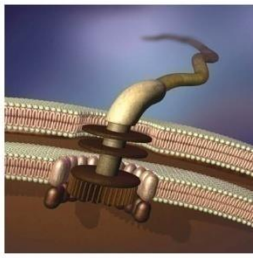

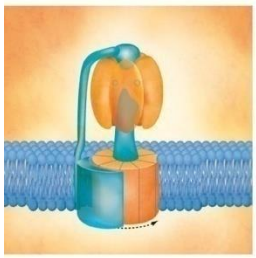

Part I: Letter of Introduction: Why this Student's Guide?

Welcome to College, Goodbye to Intelligent Design?

The famous Pink Floyd song that laments, "We don't need no education / We don't need no thought control," is not just the rant of a rebellious mind; it is also a commentary on the failure of education to teach students how to think critically and evaluate both sides of controversial issues.

Few scientists understood the importance of critical thinking better than Charles Darwin. When he first proposed his theory of evolution in *Origin of Species* in 1859, Darwin faced intense intellectual opposition from both the scientific community and the culture of his day. To help restore objectivity to the debate over evolution, Darwin wisely counseled, **"**A fair result can be obtained only by fully stating and balancing the facts and arguments on both sides of each question."[1]

One would think that adopting Darwin's approach to discussing evolution would be uncontroversial, but a lot has changed in the past 150 years. Unfortunately, many evolution lobbyists today reject Darwin's sound advice and are dogmatically opposed to teaching anything but the viewpoint that supports Darwinian evolution.

For example, in 2005, Bruce Alberts, a leading biochemistry textbook author and former president of the U.S. National Academy of Sciences (NAS), published an editorial in the journal *Cell* suggesting that "intelligent design [ID] should be taught in college science classes but not as the alternative to Darwinism that its advocates demand." Instead, Alberts argued that students should only learn "why intelligent design is not science."[2]

Even major scientific groups like the NAS endorse Alberts' one-sided and proscriptions for education. In 2008 the NAS declared that, "there is no scientific controversy about the basic facts of evolution" and therefore "the intelligent design movement's call to 'teach the controversy' is unwarranted."[3] Is this education, or indoctrination?

You Deserve More Than One-Sided Education

The evolutionist educational agenda seems clear: like judges who would ask a jury to give a verdict after only hearing one side of the case, evolution lobbyists push educators to give students a one-sided presentation of Darwin's theory in the classroom. Are evolutionists secure enough to let their viewpoint be subjected to hard questions? You decide for yourself: In recent years, many evolutionists have openly adopted an educational approach that indoctrinates students in only one side of the debate. Some examples include:

- Speech codes banning ID have become popular. The president of the University of Idaho instituted a campus-wide classroom speech-code, where "evolution" is "the only curriculum that is appropriate" for science classes,[4] and Ball State University's president issued a speech code which declared "intelligent design is not appropriate content for science courses."[5]
- Cornell's interim president used a campus address "to denounce 'intelligent design,' arguing that it has no place in science classrooms and calling on faculty members in a range of disciplines" to similarly attack ID.[6]
- The University of California at San Diego stated that "all first quarter freshmen" were "required to attend" a lecture by an anti-ID activist titled, "Why the Judge Ruled Intelligent Design Creationism Out of Science."[7]
- A leading evolutionary biologist at the University of Chicago stated that "adherence to ID (which, after all, claims to be a nonreligious theory) should be absolute grounds for not hiring a science professor."[8]
- Biology professors at Southern Methodist University taught a course attacking ID. The course website stated, "You don't have to teach both sides of a debate if one side is a load of crap."[9]
- A professor at the University of Toronto stated that a major public university "should never have admitted" students who support ID, and should "just flunk the lot of them and make room for smart students."[10]

- Three biology professors at Ohio State University halted a doctoral student's thesis defense by writing a letter claiming "there are no valid scientific data challenging macroevolution" and therefore the student's teaching about problems with neo-Darwinism was "unethical" and "deliberate miseducation."[11]

- A Biology 101 lecturer at Wesleyan College endorsed teaching students "inaccuracies" that are "wrong" if that enables educators to "gain their trust" and "help them accept evolution."[12]

- A biology professor at the University of Waikato stated that "If, for example, a student were to use examples such as the bacterial flagellum to advance an ID view then they should expect to be marked down"[13]

- At Iowa State University, over 120 faculty members signed a petition denouncing ID and calling on "all faculty members to ... reject efforts to portray Intelligent Design as science."[14]

ID-critics in some areas have become so intolerant that in 2007, the Council of Europe, the leading European "human rights" organization, adopted a resolution calling ID a potential "threat to human rights"![15]

Go Educate Yourself: Three Tips for Studying Intelligent Design and Evolution

My large, inner-city public high school was rich in diversity, and I learned to appreciate a multiplicity of viewpoints and backgrounds. Unfortunately, this diversity did not extend into the biology classroom. There I was told there was only one acceptable perspective regarding origins: neo-Darwinian theory. After attending public schools from kindergarten through my masters degree, I learned a few tips about staying informed while studying a biased and one-sided origins curriculum:

- ***Tip #1: Don't opt out of learning evolution. In fact, learn about evolution whenever you get the chance.***

I hope you are going to college because you want to be educated. But if the above examples are any indication, when it comes to the debate over ID and evolution, there's a good chance that your institution has no intent to educate you, but to indoctrinate you in only one side of the issue.

Despite the one-sided nature of education, I found that the more evolutionary biology I took, the more I became convinced that the theory was based upon unproven assumptions, contradictory methodologies, and supported weakly by the data. Thus, my first tip is to never be afraid to study evolution. But when you study evolution, always think critically and keep yourself proactively informed about a diversity of viewpoints (see tips 2 and 3 below).

- ***Tip #2: Think for yourself, think critically, and question assumptions.***

Though my professors rarely (if ever) would acknowledge it, I quickly discovered in college that nearly all evolutionary claims are based mostly upon assumptions. Modern evolutionary theory is assumed to be true, and then the data is interpreted based upon Darwinian assumptions. The challenge for you, as a truth-seeking student, is to try to separate out the raw data from the assumptions that guide interpretation of the data.

Keep your eyes out for circular reasoning. You'll see that very quickly, evolutionary assumptions become "facts," and future data must be assembled in order to be consistent with those "facts." Realize that evolutionary thinking often employs contradictory logic and inconsistent methodologies. The logic employed to infer evolution in situation A may be precisely the exact opposite of the logic used to infer evolution in situation B. For example:

- Biological similarity between species is said to imply inheritance from a common ancestor—except for when it doesn't (and then they appeal to processes like "convergent evolution" or "horizontal gene transfer").

- Neo-Darwinism predicts transitional forms may be found—except when they're not found, that just shows the transitions occurred in populations too small and too shortlived to leave any fossils.

- Evolutionary genetics predicts our genome will be full of useless junk DNA—except when we discover function for such "junk," then evolution is said to predict that cells would never retain useless DNA.

When both A and (not) A are said to imply evolution, you know a theory is based upon an inconsistent methodology. Keep an eye out for assumptions and contradictory methodologies, for they abound in evolutionary reasoning.

Finally, be careful to always think for yourself. Everyone wants to be "scientifically literate," but the Darwin lobby pressures people by redefining "scientific literacy" to mean "acceptance of evolution" rather than "an independent mind who understands science and forms its own informed opinions." Evolutionary thinking banks on you letting down your guard and letting its assumptions slip into your thought processes. This is why it's vital that you think for yourself and question assumptions.

Critical thinking showed me what neo-Darwinian evolution is about: questionable assumptions, not a compelling conclusion. Self-initiated critical thinking can be a tall task, but seeking truth is worth every mental calorie expended.

- ***Tip #3: Proactively learn about credible scientific viewpoints that dissent from Darwinism on your own time, even if your classes censor those non-evolutionary viewpoints.***

The Darwinian educational establishment doesn't make it easy for you to become objectively informed on the topic of evolution and intelligent design, but with a little work on your own, it can be done. If you want to base your views on a full and complete understanding of the scientific evidence, you may need to take the time to pro-actively research and investigate the pro-ID arguments that many of your faculty may be opposing, misrepresenting, or perhaps even outright censoring. Yes, take courses advocating evolution. But also read material from credible Darwin skeptics to learn about other viewpoints. Only then can you truly make up your mind in an informed fashion.

The purpose of this *College Student's Back to School Guide on Intelligent Design* is to help you in that investigation, and to give you direct rebuttals to common examples of misinformation you might hear from professors, and to point you to credible ID-friendly resources for more information. Whatever conclusion you come to, study evolution, think for yourself, think critically, question assumptions, and investigate dissenting viewpoints on your own time!

While academia's intolerance towards the pro-ID viewpoint may be intimidating or discouraging, don't be discouraged: If the evidence were on their side, ID's critics would not resort to such extreme tactics of indoctrination.

And don't forget that most of the scientists and scholars in the ID movement were once students—quietly enduring misinformation or biased instruction from faculty. Some of them even faced outright persecution due to their views on ID. You are not alone, and with a little proactive self-education, critical thinking, and patience, you will pass this test with flying colors. I wish you the best as you enter this exciting but sometimes difficult-to-handle debate.

Sincerely,

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- ID the Future Podcast: www.idthefuture.com
- Student Summer Seminar on ID: www.discovery.org/sem

Part II: What is Intelligent Design?

By Casey Luskin

Intelligent design—often called "ID"—is a scientific theory which holds that some features of the universe and living things are best explained by an intelligent cause rather than an undirected process such as natural selection. ID theorists argue that design can be inferred by studying the informational properties of natural objects to determine if they bear the type of information which in our experience arises from an intelligent cause.

Proponents of neo-Darwinian evolution contend that the information in life arose via purposeless, blind, and unguided processes. ID proponents contend that the information in life arose via purposeful, intelligently guided processes. Both claims are scientifically testable using the standard methods of science. But ID theorists say that when we use the scientific method to explore nature, the evidence points away from unguided material causes, and reveals intelligent design.

ID is in the business of trying to discriminate between naturally caused objects on the one hand, and intelligently caused objects on the other. A variety of scientific fields already use ID reasoning. For example, archaeologists find and artifact and they need to determine whether it arrived at its shape through natural processes, and it's just another rock, or whether it was carved for a purpose by an intelligence. Likewise forensic scientists distinguish between naturally caused deaths, and intelligently caused deaths, such as murder. These are important questions that our legal system must answer. Following such logic, design theorists ask a simple question: If we can use science to detect design in other fields, why should it be controversial when we detect it in biology or cosmology?

So how does ID work? Scientists investigating ID start by observing intelligent agents act when they design things. Human intelligent agents provide a large dataset for studying the products of the action of intelligent agents. And one of the things we find is that when intelligent agents act, they generate large levels of information. As ID theorist Stephen Meyer says: "Our experience-based knowledge of information-flow confirms that systems with large amounts of specified complexity (especially codes and languages) invariably originate from an intelligent source—from a mind or personal agent."[16]

Thus ID seeks to find in nature the types of information which are known to be produced by intelligent agents, and reliably indicate the prior action of intelligence. But what is the kind of information that is known to be produced by intelligence? The type of information which indicates design is generally called "specified complexity" or "complex and specified information" or "CSI" for short. Let's briefly investigate what that term means.

Something is complex if it is unlikely. But complexity or unlikelihood alone are not enough to infer design. To see why, imagine that you are dealt a 5-card hand of poker. Whatever hand you get is going to be a very unlikely set of cards. Even if you get a good hand, like a straight or a royal flush, you're not necessarily going to suddenly say "Aha, the deck was stacked." Why? Because unlikely things happen all the time. We don't infer design simply because of finding unlikelihood. We need something else to detect design: specification. Something is specified if it matches an independent pattern.

To appreciate specification, imagine you are a tourist visiting the mountains of North America. You come across Mount Rainier, a huge volcano near Seattle. There are features of this mountain that differentiate it from any other mountain on Earth. In fact, if all possible combinations of rocks, peaks, ridges, gullies, cracks, and crags are considered, this exact shape is extremely unlikely and complex. But you're not going to infer design simply because Mount Rainier has a complex shape. Why? Because you can easily explain its shape through the natural processes of erosion, uplift, heating, cooling, freezing, thawing, weathering, etc. Complexity alone is not enough to infer design, and there's no special, independent pattern to the shape of Mount Rainier.

But now let's say you go to a different mountain—Mount Rushmore in South Dakota. This mountain also has a very unlikely shape, you observe, but its shape is special. Its shape matches a pattern—the faces of four famous presidents. With Mount Rushmore, you don't just observe complexity, you also find *specification*. Thus, you would infer that its shape was designed.

ID theorists ask "How can we apply this kind of reasoning to biology?" One of the greatest scientific discoveries of the past 50 years is that life is fundamentally built upon information. It's all around us. As you read a book, your brain processes information stored in the shapes of ink on the page. When you talk to a friend, you communicate information using sound-based language, transmitted through vibrations in air molecules. Computers work because they can receive information, process it, and then give useful output.

Everyday life would be difficult without information. But could there even be life without it? Carl Sagan observed that the "information content of a simple cell" is "around 10^{12} bits, comparable to about a hundred million pages of the Encyclopedia Britannica."[17] Information forms the chemical blueprint for all living organisms, governing the assembly, structure, and function at essentially all levels of cells. But where does this information come from?

As noted previously, ID begins with the observation that intelligent agents generate large quantities of CSI. Studies of the cell reveal vast quantities of information in our DNA stored biochemically through the sequence of nucleotide bases. No physical or chemical law dictates the order of the nucleotide bases in our DNA, and the sequences are highly improbable and complex. Yet the coding regions of DNA exhibit very unlikely sequential arrangements of bases that match the precise pattern necessary to produce functional proteins. Experiments done by pro-ID scientists have found that the sequence of nucleotide bases in our DNA must be extremely precise in order to generate a functional protein. The odds of a random sequence of amino acids generating a functional protein is less than one in 10 to the 70^{th} power.[18] In other words, our DNA contains high CSI.

Thus, as nearly all molecular biologists now recognize, the coding regions of DNA possess a high "information content"—where "information content" in a biological context means precisely "complexity and specificity." Even the staunch Darwinian biologist Richard Dawkins concedes that "[b]iology is the study of complicated things that give the appearance of having been designed for a purpose."[19] Atheists like Dawkins believe that unguided natural processes did all the "designing" but intelligent design theorist Stephen C. Meyer notes, "in all cases where we know the causal origin of 'high information content,' experience has shown that intelligent design played a causal role."[20]

But just having the information in our DNA isn't enough. By itself, a DNA molecule is useless. You need some kind of machinery to read the information in the DNA and produce some useful output. A lone DNA molecule is like having a DVD—and nothing more. A DVD might carry information, but without a machine to read that information, it's useless (although maybe you could use it as a Frisbee). To read the information in a DVD, we need a DVD player. In the same way, our cells have a large amount of machinery to help process the information in our DNA.

That machinery reads the commands and codes in our DNA much like a computer processes commands in computer code. Many authorities have recognized the computer-like information processing of the cell and the computer-like information-rich properties of DNA's language-based code. Bill Gates observes, "Human DNA is like a computer program but far, far more advanced than any software we've ever created."[21] Craig Venter says that "life is a DNA software system,"[22] containing "digital information" or "digital code," and the cell is a "biological machine" full of "protein robots."[23] Richard Dawkins has written that "[t]he machine code of the genes is uncannily computer-like."[24] Francis Collins notes, "DNA is something like the hard drive on your computer," containing "programming."[25]

Cells are thus constantly performing computer-like information processing. But what is the result of this process? Machinery. The more we discover about the cell, the more we are learning that it functions like a miniature factory, replete with motors, powerhouses, garbage disposals, guarded gates, transportation corridors, and CPUs. As Bruce Alberts, former president of the U.S. National Academy of Sciences, stated:

> [T]he entire cell can be viewed as a factory that contains an elaborate network of interlocking assembly lines, each of which is composed of a set of large protein machines. … Why do we call the large protein assemblies that underlie cell function protein machines? Precisely because, like machines invented by humans to deal efficiently with the macroscopic world, these protein assemblies contain highly coordinated moving parts.[26]

There are hundreds, if not thousands, of molecular machines in living cells. But perhaps the most famous example of a molecular machine is the bacterial flagellum. The flagellum is a micro-molecular propeller assembly driven by a rotary engine that propels bacteria toward food or a hospitable living environment. There are various types of flagella, but all function like a rotary engine made by humans, as found in some car and boat motors. Flagella also contain many parts that are familiar to human engineers, including a rotor, a stator, a drive shaft, a u-joint, and a propeller. As one molecular biologist wrote, "[m]ore so than other motors the flagellum resembles a machine designed by a human."[27] But there's something else that's special about the flagellum.

In applying ID to biology, ID theorists often discuss "irreducible complexity," a concept developed and popularized by Lehigh University biochemistry professor Michael Behe. Irreducible complexity is a form of specified complexity, which exists in systems composed of "several interacting parts that contribute to the basic function, and where the removal of any one of the parts causes the system to effectively cease functioning."[28] Because natural selection only preserves structures that confer a functional advantage to an organism, such systems would be unlikely to evolve through a Darwinian process because there is no evolutionary pathway wherein they could remain functional during each small evolutionary step. According to ID theorists, irreducible complexity is an informational pattern which reliably indicates design, because 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.

Genetic knockout experiments by microbiologist Scott Minnich show that the flagellum fails to assemble or function properly if any one of its approximately 35 protein-parts is removed.[29] By definition, it is irreducibly complex. In this all-or-nothing game, mutations cannot produce the complexity needed to evolve a functional flagellum one step at a time, and the odds are too daunting for it to evolve in one great mutational leap.

The past 50 years of biological research have found that life is fundamentally based upon:

- A vast amount of complex and specified information encoded in a biochemical language.
- A computer-like system of commands and codes that processes the information.
- Irreducibly complex molecular machines and multi-machine systems.

Where, in our experience, do language, complex and specified information, programming code, and machines come from? They have only one known source: intelligence.

But there's much more to ID. Contrary to what many people suppose, ID is much broader than the debate over Darwinian evolution. That's because much of the scientific evidence for intelligent design comes from areas that Darwin's theory doesn't even address. In fact, much evidence for intelligent design from physics and cosmology.

The fine-tuning of the laws of physics and chemistry to allow for advanced life is an example of extremely high levels of CSI in nature. The laws of the universe are complex because they are highly unlikely. Cosmologists have calculated the odds of a life-friendly universe appearing by chance are less than one part in $10^{10^{\wedge}123}$. That's ten raised to a power of 10 with 123 zeros after it—a number far too long to write out! The laws of the universe are specified in that they match the narrow band of parameters required for the existence of advanced life. This high CSI indicates design. Even the atheist cosmologist Fred Hoyle observed, "[a] common sense interpretation of the facts suggests that a super intellect has monkeyed with physics, as well as with chemistry and biology."[30] *From the tiniest atom, to living organisms, to the architecture of the entire cosmos, the fabric of nature shows strong evidence that it was intelligently designed.*

Part III: Answers to Your Professors' Most Common Misinformed Objections to Intelligent Design

Objection #1: Intelligent Design is Not Science

The Short Rebuttal: Intelligent design is a scientific theory which holds that many aspects of life and the universe are best explained by an intelligent cause rather than an undirected cause like natural selection. ID is science because it uses the scientific method to make its claims. Specifically, ID theory detects design by using empirical data to test its positive predictions. ID uses well-accepted scientific methods of historical sciences to detect in nature the types of complexity which we understand, from present-day observations, come only from intelligent causes. One might disagree with ID, but one cannot fairly characterize it as a "faith-based" argument.

The Long Rebuttal: ID is science because it uses the scientific method to make its claims. The scientific method is commonly described as a four-step process involving observations, hypothesis, experiments, and conclusion.

- ***Observations:*** ID begins by observing that intelligent agents produce high levels of complex and specified information ("CSI"). Something is complex if it is unlikely, and specified if it matches an independent pattern. As Stephen Meyer observes, "Our experience-based knowledge of information-flow confirms that systems with large amounts of [CSI] (especially codes and languages) invariably originate from an intelligent source—from a mind or personal agent."[31]
- ***Hypothesis:*** ID theorists hypothesize that if a natural object was designed, it will contain high levels of CSI.
- ***Experiment:*** Scientists then perform experimental tests upon natural objects to determine if they contain high CSI. One easily testable form of CSI is irreducible complexity (IC), which exists in systems which require a certain core set of interacting parts in order to function.[32] IC can be experimentally tested by reverse-engineering biological structures to see if they require a core minimum of their parts to function.
- ***Conclusion:*** Irreducibly complex systems provide no advantage until all of their necessary parts are present, and thus cannot evolve in the gradual step-by-step manner required by Darwinian evolution.[33] IC is a reliable indicator of design because "[i]n all irreducibly complex systems in which the cause of the system is known by experience or observation, intelligent design or engineering played a role the origin of the system."[34] When ID researchers find IC in biology, they conclude that such structures were designed.

ID begins with present-day observations of the kind of information produced when intelligent agents act—i.e., high CSI. ID theorists then examine the historical record to determine if those same informational properties (high CSI) exist in nature and therefore warrant explanation by design. ID thus uses standard uniformitarian reasoning of historical sciences, applying an empirically-derived cause-and-effect relationship between intelligence and certain types of informational patterns in order to account for the origin of various natural phenomena. This is not a "faith-based" argument. Rather, it is an empirically-based argument that seeks to detect in nature the types of information and complexity which we know derive from intelligent causes. One might disagree with the conclusions of ID, but one cannot reasonably claim it is an argument based upon religion, faith, or divine revelation.

More Information:

- *Signature in the Cell: DNA and the Evidence for Intelligent Design* by Stephen Meyer (HarperOne, 2009).
- *Darwin's Black Box: The Biochemical Challenge to Evolution* by Michael J. Behe (Free Press, 1996).
- "DNA and Other Designs," by Stephen Meyer, *First Things* (April, 2000) — www.discovery.org/a/200
- "Intelligent design (ID) has scientific merit…," by Casey Luskin — www.discovery.org/a/7051
- "How Can We Know Intelligent Design is Science?" by Casey Luskin — www.discovery.org/f/9051
- "How Do We Know Intelligent Design Is a Scientific 'Theory'?" by Casey Luskin — www.ideacenter.org/contentmgr/showdetails.php/id/1548

Objection #2: Intelligent Design is just a Negative Argument against Evolution

The Short Rebuttal: Intelligent design is not merely a negative argument against Darwinian evolution or other material causes. Rather, ID uses a positive argument, based upon finding in nature the type of information and complexity which, *in our experience*, comes from intelligence. ID theorists begin by observing how intelligent agents act when they design things (e.g., intelligent agents generate high CSI). Then, they use those observations to make positive predictions about what we should observe in nature if a structure was designed (e.g., designed objects will contain high CSI). Experiments and studies of nature can test those predictions (e.g., testing for high CSI), yielding a positive argument for design.

The Long Rebuttal: The theory of intelligent design employs scientific methods commonly used by other historical sciences to conclude that certain features of the universe and living things are best explained by an intelligent cause, not an undirected process such as natural selection. As an historical science, ID employs the principle of uniformitarianism, which holds that the present is the key to the past. ID investigations thus begin with observations about how intelligent agents operate and then convert those observations into positive predictions of what scientists should expect to find if a natural object arose by intelligent design.

Mathematician and philosopher William Dembski observes that "[t]he principal characteristic of intelligent agency is directed contingency, or what we call choice."[35] According to Dembski, when an intelligent agent acts, "it chooses from a range of competing possibilities" to create some complex and specified event.[20] (Remember, something is complex if it is unlikely, and specified if it matches an independent pattern.) Dembski calls ID "a theory of information" where "information becomes a reliable indicator of design as well as a proper object for scientific investigation."[36] ID theorists then positively infer design by studying natural objects to determine if they bear the type of information which in our experience arises from an intelligent cause.

ID thus seeks to find in nature the types of information—such as complex and specified information—known to be produced by intelligent agents, and reliably indicate the prior action of intelligence. Human intelligence provides a large empirical dataset for studying what is produced when intelligent agents design things. By studying the actions of humans in the world around us we can construct positive, testable predictions about intelligent design. Table 1 begins this process by discussing four observations of how intelligent agents act:

Table 1. Ways Designers Act When Designing (Observations):

(1) Intelligent agents think with an 'end goal' in mind, allowing them to solve complex problems by taking many parts and arranging them in intricate patterns that perform a specific function (e.g., they generate high levels of complex and specified information):

> "Agents can arrange matter with distant goals in mind. In their use of language, they routinely 'find' highly isolated and improbable functional sequences amid vast spaces of combinatorial possibilities."[37]
>
> "[W]e have repeated experience of rational and conscious agents-in particular ourselves-generating or causing increases in complex specified information, both in the form of sequence-specific lines of code and in the form of hierarchically arranged systems of parts. ... Our experience-based knowledge of information-flow confirms that systems with large amounts of specified complexity (especially codes and languages) invariably originate from an intelligent source—from a mind or personal agent."[38]

(2) Intelligent agents can rapidly infuse large amounts of information into systems:

> "Intelligent design provides a sufficient causal explanation for the origin of large amounts of information, since we have considerable experience of intelligent agents generating informational configurations of matter … We know from experience that intelligent agents often conceive of plans prior to the material instantiation of the systems that conform to the plans--that is, the intelligent design of a blueprint often precedes the assembly of

parts in accord with a blueprint or preconceived design plan."[39]

(3) Intelligent agents re-use functional components that work over and over in different systems (e.g., wheels for cars and airplanes, or keyboards on cell phones and computers):

"An intelligent cause may reuse or redeploy the same module in different systems, without there necessarily being any material or physical connection between those systems. Even more simply, intelligent causes can generate identical patterns independently."[40]

"According to this argument [from evolutionists], the Darwinian principle of common ancestry predicts such common features, vindicating the theory of evolution. One problem with this line of argument is that people recognized common features long before Darwin, and they attributed them to common design. Just as we find certain features cropping up again and again in the realm of human technology (e.g., wheels and axles on wagons, buggies and cars) so too we can expect an intelligent designer to reuse good design ideas in a variety of situations where they work."[41]

(4) Intelligent agents generate structures that have a purpose or function:

"Since non-coding regions do not produce proteins, Darwinian biologists have been dismissing them for decades as random evolutionary noise or 'junk DNA.' From an ID perspective, however, it is extremely unlikely that an organism would expend its resources on preserving and transmitting so much 'junk.'"[42]

"[Intelligent] design is not a science stopper. Indeed, design can foster inquiry where traditional evolutionary approaches obstruct it. Consider the term 'junk DNA.' Implicit in this term is the view that because the genome of an organism has been cobbled together through a long, undirected evolutionary process, the genome is a patchwork of which only limited portions are essential to the organism. Thus on an evolutionary view we expect a lot of useless DNA. If, on the other hand, organisms are designed, we expect DNA, as much as possible, to exhibit function. … Design encourages scientists to look for function where evolution discourages it."[43]

These observations can then be converted into testable hypotheses and predictions about what we should find if a natural object was intelligently designed. This makes intelligent design a scientific theory capable of generating testable predictions, as seen in Table 2 below:

Table 2. Predictions of Design (Hypothesis):

(1) Natural structures will be found that contain many parts arranged in intricate patterns that perform a specific function (e.g., they will contain high CSI).

(2) Forms containing large amounts of novel information will appear in the fossil record suddenly, "fully formed" and without similar precursors or evolutionary intermediates.

(3) Convergence will occur routinely. That is, genes and other functional parts will be re-used in different and unrelated organisms in a pattern that need not match a "tree," or nested hierarchy.

(4) So-called "junk DNA" will generally turn out to perform valuable functions.

These predictions can then be put to the test by performing experiments and evaluating the scientific data, leading to conclusions. If we keep constant the numbering of the observations and predictions in Tables 1 and 2, Table 3 on the next page shows how experiments and other studies of nature can allow us to test ID's predictions and detect design in four different fields: (1) biochemistry, (2) paleontology, (3) systematics, and (4) genetics:

Table 3. Examining the Evidence (Experiment and Conclusion):		
Line of Evidence	**Data (Experiment)**	**Prediction Confirmed? (Conclusion)**
(1) Biochemistry	Natural structures contain many parts arranged in intricate patterns that perform a specific function (e.g., they contain high CSI). These include language-based codes in our DNA, irreducibly complex molecular machines like the bacterial flagellum,[44] and highly specified protein sequences. Regarding the latter example, mutational sensitivity tests and genetic knockout experiments have shown that the amino acid sequences of functional proteins must be highly complex and specified in order to function.[45]	Yes. Best explanation is intelligent design.
(2) Paleontology	Biological novelty commonly appears in the fossil record suddenly, 'fully formed,' and without similar precursors or evolutionary intermediates.[46] The Cambrian explosion is a prime example,[47] but there are many other examples in the fossil record, including a bird explosion,[48] an angiosperm explosion,[49] and a mammal explosion.[50] Even our genus *Homo* appears abruptly.[51]	Yes. Best explanation is intelligent design.
(3) Systematics	Highly similar parts have been found re-used in widely different organisms where even evolutionists believe the common ancestor did not have the part in question. Examples include genes controlling eye or limb growth in different organisms whose alleged common ancestors are not thought to have had such forms of eyes or limbs.[52] There are numerous examples of extreme convergent genetic evolution, including similar genes used in whales and bats for echolocation. These examples are best explained by common design.[53] Genes and functional parts are commonly not distributed in a "tree-like" pattern or nested hierarchy predicted by common ancestry.[54]	Yes. Best explanation is intelligent design.
(4) Genetics	Studies have discovered mass-functionality for "junk-DNA."[55] Specific examples include functionality in pseudogenes, microRNAs, introns, endogenous retroviruses, and repetitive LINE, SINE, and *Alu* elements.[56] Examples of unknown DNA functions persist, but ID encourages researchers to investigate functions, whereas neo-Darwinism has discouraged seeking such function.[57]	Yes. Best explanation is intelligent design.

At its simplest level, the positive case for design is a two step process:

(1) Study intelligent agents to understand what kind of information is produced when they act.
(2) Study natural objects to determine if they contain the type of information known to be produced when intelligent agents act.

This case for design is strongly positive, and does not simply depend on negating evolution.

More Information:

- *Darwin's Doubt: The Explosive Origin of Animal Life and the Case for Intelligent Design*, by Stephen C. Meyer (HarperOne, 2013).
- Casey Luskin, "Finding ID in Nature" in *Intelligent Design 101* (H. W. House ed., Kregel, 2008).
- "A Positive, Testable Case for Intelligent Design," by Casey Luskin — www.evolutionnews.org/2011/03/a_closer_look_at_one_scientist045311.html
- "Intelligent Design," by Casey Luskin — www.caseyluskin.com/id.htm
- "The Positive Case for Design" — www.ideacenter.org/contentmgr/showdetails.php/id/1394

Objection #3: Intelligent Design Rejects All of Evolutionary Biology

The Short Rebuttal: Intelligent design does not reject all of evolutionary biology, especially when we define evolution as mere "change over time" or even "common ancestry." The main aspect of evolutionary biology that ID challenges is its claim that unguided processes such as random mutation and natural selection are entirely responsible for the diversification of life on earth.

The Long Rebuttal: The debate over evolution can be confusing because equivocation has crept into the discussion. Some people use "evolution" to refer to something as simple as small changes in the sizes of bird beaks. Others use the same word to mean something much more far-reaching. Used one way, the term "evolution" isn't controversial at all; used another way, it's hotly debated. Used equivocally, "evolution" is too imprecise to be useful in a scientific discussion. Darwin's theory is not a single idea. Instead, it is made up of several related ideas, each supported by specific arguments:

- ***Evolution #1:*** First, evolution can mean that the life forms we see today are different than the life forms that existed in the distant past. Evolution as "change over time" can also refer to minor changes in features of individual species — changes which take place over a short amount of time. Even skeptics of Darwin's theory agree that this type of "change over time" takes place.
- ***Evolution #2:*** Some scientists associate the word "evolution" with the idea that all the organisms we see today are descended from a single common ancestor somewhere in the distant past. The claim became known as the Theory of Universal Common Descent. This theory paints a picture of the history of life on earth as a great branching tree.
- ***Evolution #3:*** Finally, some people use the term "evolution" to refer to a cause or mechanism of change, the biological process which Darwin thought was responsible for this branching pattern. Darwin argued that natural selection had the power to produce fundamentally new forms of life. Together, the ideas of Universal Common Descent and natural selection form the core of Darwinian evolutionary theory. "Neo-Darwinian" evolution combines our knowledge of DNA and genetics to claim that mutations in DNA provide the variation upon which natural selection acts.

Intelligent design does not conflict with evolution if by "evolution" one simply means "change over time," or even that living things are related by common ancestry (Evolution #1 or Evolution #2). However, the dominant theory of evolution today is neo-Darwinism (Evolution #3), which contends that evolution is driven by natural selection acting on random mutations, an unpredictable and purposeless process that "has no discernable direction or goal, including survival of a species."[58] It is this specific claim made by neo-Darwinism that intelligent design directly challenges.

More Information:

- *The Design of Life: Discovering Signs of Intelligence in Biological Systems* by William Dembski and Jonathan Wells (Foundation for Thought and Ethics, 2007) — www.thedesignoflife.net
- *Discovering Intelligent Design: A Journey Into the Scientific Evidence* by Hallie Kemper, Gary Kemper, and Casey Luskin, (Discovery Institute Press, 2013) — www.discoveringid.org
- *The Edge of Evolution: The Search for the Limits of Darwinism* by Michael Behe (Free Press, 2007).
- "How Should Schools Handle Evolution? Debate it," by John Angus Campbell and Stephen C. Meyer in *USA Today* (August 26, 2005) — www.discovery.org/a/2786
- "The Meanings of Evolution," by Stephen C. Meyer and Michael Newton Keas, in *Darwinism, Design, and Public Education*, edited by John Angus Campbell and Stephen C. Meyer (Michigan State University Press, 2004) — www.discovery.org/a/645

Objection #4: Intelligent Design was Banned from Schools by the U.S. Supreme Court

The Short Rebuttal: Intelligent design has *not* been banned from America's public schools by the U.S. Supreme Court or by any appellate court. In fact, the U.S. Supreme Court has never even taken a case which dealt with ID. The only court that has squarely ruled on teaching of ID was one federal district court (the lowest level of the federal court system), whose ruling is not binding precedent outside the middle district of Pennsylvania. That case did find ID is a religious belief and a form of creationism, and unconstitutional to teach in public schools. But spend a day in law school and you'll quickly learn that judges get things wrong all the time. In fact, the district court ruling in *Kitzmiller v. Dover* misrepresented the arguments given by pro-ID expert witness biologists, and wrongly denied the existence of peer-reviewed scientific articles and research supporting ID. The judge who ruled in the case, Judge John E. Jones III, copied over 90% of his section on whether ID is science verbatim or nearly verbatim from an inaccurate brief written by plaintiffs' lawyers working with the ACLU. Judge Jones' ruling satisfied the textbook definition of judicial activism, and even leading anti-ID legal scholars have argued his ruling is "dangerous" to religious, scientific, and academic freedom. A single federal judge cannot negate the scientific evidence for design in nature.

The Long Rebuttal: In the three-tiered system of federal courts of the United States, the *Kitzmiller v. Dover* ruling was issued by the lowest level—a federal trial court. No other court case has dealt with the issue of teaching ID, including the U.S. Supreme Court. Thus, despite all its fanfare, the *Kitzmiller* ruling *only applies to the middle district of Pennsylvania*; the rest of the United States is not bound to this single ruling banning ID. Moreover, numerous factual and legal mistakes in the *Kitzmiller v. Dover* ruling reduce its influence as persuasive precedent. To be specific, Judge Jones:

- ***Incorrectly Defined ID*** by presuming that ID requires "supernatural creation" — a position refuted during the trial by ID proponents who testified in court;
- ***Ignored the positive case for ID*** and falsely claimed that ID proponents make their case solely by arguing against evolution;
- ***Overstepped the bounds of the judiciary and engaged in judicial activism*** by declaring that ID had been refuted when in fact the judge was presented with credible scientific witnesses and publications on both sides showing evidence of a scientific debate;
- ***Used poor philosophy of science*** by presuming that being wrong precludes being scientific;
- ***Blatantly ignored and denied the existence of pro-ID peer-reviewed scientific publications*** that were in fact testified about in his own courtroom;
- ***Blatantly ignored and denied the existence of pro-ID scientific research and data*** that was in fact testified about in his own courtroom;
- ***Adopted an unfair double-standard*** of legal analysis where religious implications, beliefs, and motives count against ID but never against Darwinism;
- ***Violated a fundamental rule of constitutional law*** by declaring a religious belief to be "false" from the bench of a U.S. government court;
- ***Uncritically reused material*** from a legal brief written by attorneys working with the ACLU. Indeed, "90.9% (or 5,458 words) of Judge Jones's 6,004-word section on intelligent design as science was taken virtually verbatim from the ACLU's proposed 'Findings of Fact and Conclusions of Law' submitted to Judge Jones nearly a month before his ruling"[59];
- ***Engaged in textbook judicial activism*** by presuming that it is permissible for a federal judge to define science, settle controversial social questions, settle controversial scientific questions, and settle issues for parties outside of the case at hand so that his ruling would be "a primer" for people "someplace else";

- ***Wrongly—and dangerously—turned science into a voting contest*** by claiming that popularity is required for an idea to be scientific. Stephen Jay Gould, writing with other scientists, eloquently explained why science should never be a popularity contest: "Judgments based on scientific evidence, whether made in a laboratory or a courtroom, are undermined by a categorical refusal even to consider research or views that contradict someone's notion of the prevailing 'consensus' of scientific opinion. . . . Automatically rejecting dissenting views that challenge the conventional wisdom is a dangerous fallacy, for almost every generally accepted view was once deemed eccentric or heretical. Perpetuating the reign of a supposed scientific orthodoxy in this way, whether in a research laboratory or in a courtroom, is profoundly inimical to the search for truth. … The quality of a scientific approach or opinion depends on the strength of its factual premises and on the depth and consistency of its reasoning, not on its appearance in a particular journal or on its popularity among other scientists."[60]

Arnold H. Loewy, a self-described "liberal First Amendment theorist," has critiqued Judge Jones' judicial opinion by arguing that "it is not the Court's job to distinguish good science from bad in the realm of education."[61] Similarly, leading anti-ID legal scholar Jay Wexler argues that "the part of *Kitzmiller* that finds ID not to be science is unnecessary, unconvincing, not particularly suited to the judicial role, and even perhaps dangerous both to science and to freedom of religion."[62] Judge Jones' ruling represented an ACLU-scripted attempt to legislate from the bench—not an accurate or fair assessment of intelligent design.

The bottom line is that one judge's ruling cannot settle the debate over intelligent design, and a federal judge cannot negate the evidence for design in nature. The numerous errors of fact and law in the *Kitzmiller v. Dover* case show exactly why we don't want judges trying to settle expansive philosophical and scientific questions as Judge Jones attempted to do in his ruling.

More Information:

- *TraipsingIntoEvolution.com* has an extensive collection of materials relating to the *Kitzmiller v. Dover* case, including legal briefs filed by Discovery Institute.
- *Traipsing Into Evolution: Intelligent Design and the Kitzmiller vs. Dover Decision*, by David K. DeWolf, John G. West, Casey Luskin, Jonathan Witt (Discovery Institute Press, 2006) — www.TraipsingIntoEvolution.com
- "Intelligent Design will Survive *Kitzmiller v. Dover*," by David K. DeWolf, John West, Casey Luskin, in *Montana Law Review*, 68:7 (Winter, 2007) — www.discovery.org/f/1372
- "Intelligent Design is Constitutional and has Educational and Legal Merit," by Casey Luskin — www.ideacenter.org/contentmgr/showdetails.php/id/1475
- "Not-So-Quick But Nonetheless Dirty Review of the *Kitzmiller* Decision," by Casey Luskin — www.ideacenter.org/contentmgr/showdetails.php/id/1405
- "A Visitor's Guide to the Dover Intelligent Design and Evolution Case," by Casey Luskin — www.evolutionnews.org/2005/12/a_visitors_guide_to_the_dover001755.html
- "Has ID Been Banned in Public Schools?," by Casey Luskin, Salvo Magazine (Issue 4, 2008) — www.salvomag.com/new/articles/salvo4/IDluskin.php
- "Dover In Review: A review of Judge Jones' decision in the Dover intelligent design trial," by John West — www.discovery.org/a/3135
- "Whether Intelligent Design is Science A Response to the Opinion of the Court in *Kitzmiller vs Dover* Area School District," by Michael Behe — www.discovery.org/f/697

Objection #5: Intelligent Design Is Just Politics

The Short Rebuttal: Intelligent design has a vibrant scientific research program, showing that ID is by no means "just politics." The charge that ID is "politics" ignores the vast body of pro-ID academic literature that make scientific arguments for design in nature and ignores the research into intelligent design being conducted by pro-ID scientists who hold respectable academic credentials and present their views in peer-reviewed scientific publications. Moreover, the priority of the ID movement is to support ID research and *avoid* politicizing ID, which is why leading ID organizations oppose pushing ID into public schools.

The Long Rebuttal: The vast majority of the work of the ID movement is scientific in nature, not political. Leading ID proponents are well-credentialed scientists and scholars who have conducted scientific research and have made their case for design to the scientific community. Not only do notable ID proponents hold tenured positions at respected universities, but they have published scholarship in reputable academic books and journals making scientific arguments that the empirical evidence reveals design in nature. Pro-ID scientific works have come from prestigiously published scientific sources such as *Journal of Molecular Biology*, *Protein Science, Theoretical Biology and Medical Modelling*, *Journal of Advanced Computational Intelligence and Intelligent Informatics*, *Quarterly Review of Biology, Cell Biology International*, *Rivista di Biologia / Biology Forum*, *Physics of Life Reviews*, *Annual Review of Genetics*, *Proceedings of the Biological Society of Washington*, *PLoS One*, Michigan State University Press, MIT Press, and Cambridge University Press.[63] (Documentation of some of these publications is given in the response to Objection 8: "Intelligent Design Proponents Don't Conduct or Publish Scientific Research.") A peer-reviewed journal, *BIO-complexity,* is devoted to investigating ID research.

The ID movement also devotes a huge amount of its limited resources to supporting ID research and scholarship. Biologic Institute is a research lab where by pro-ID scientists are conducting both laboratory experiments and theoretical simulations to study the origin and role of information in biology, the fine-tuning of the universe for life, and methods of detecting design. Another ID research group is the Evolutionary Informatics Lab, founded William Dembski and Robert Marks (Distinguished Professor of Electrical and Computer Engineering at Baylor University). Their lab has attracted graduate-student researchers and has published multiple peer-reviewed articles in technical journals showing "the need for an ultimate information source qua intelligent designer."

The ID movement's priority is to see ID advance through scientific research, not to turn ID into a political hot potato. For this reason, Discovery Institute and other leading ID groups oppose pushing ID into public schools. As Discovery Institute states in its recommendation for public school education:

> As a matter of public policy, Discovery Institute opposes any effort require the teaching of intelligent design by school districts or state boards of education. Attempts to mandate teaching about intelligent design only politicize the theory and will hinder fair and open discussion of the merits of the theory among scholars and within the scientific community."[64]

The ID movement's opposition to pushing ID into public schools shows that its primary goals are not political, but rather that its top priority is to focus on the scientific and intellectual advancement of ID.

More Information:

- "Books by Center for Science and Culture Fellows" — www.discovery.org/id/books/
- *The Design Inference: Eliminating Chance through Small Probabilities* by William Dembski (Cambridge Univ. Press, 1998)
- *The Politically Incorrect Guide to Darwinism and Intelligent Design* by Jonathan Wells (Regnery, 2006) — www.darwinismandid.com
- "The Theory of Intelligent Design: A Briefing Packet for Educators" — www.discovery.org/f/1453
- "Discovery Institute's Science Education Policy" — www.discovery.org/a/3164
- "Questions about Science Education Policy" — www.discovery.org/id/faqs/

Objection #6: Intelligent Design Is a Science Stopper

The Short Rebuttal: ID does not "stop science" because if ID is correct, it brings scientists to a better understanding of reality, thereby advancing scientific knowledge. ID also promises to encourage and open up lines of scientific investigation in fields such as biochemistry, genetics, systematic, cell biology, systems biology, animal biology, bioinformatics, information theory, paleontology, physics, and cosmology, and others. ID can have many practical benefits as well: a prime example of ID's promise to further biology and medicine is research into "junk" DNA, where ID predicts functionality and helps us better understand cellular function, but Darwinism has hindered such investigations.

The Long Rebuttal: Intelligent design does not stop science. Science is supposed to be an empirical search for the truth, so if intelligent design is the correct answer, then concluding that ID is correct would further the progress of science. Moreover, ID opens up new avenues of scientific research in fields such as:

- ***Biochemistry***, where ID encourages scientists to do research to detect high levels of complex and specified information in biology in the form of fine-tuning of protein sequences. This has practical implications not just for explaining biological origins but also for engineering enzymes and anticipating / fighting the future evolution of diseases.
- ***Microbiology***, where ID directs experimental and theoretical research into how limitations on the ability of Darwinian evolution to evolve traits that require multiple mutations to function. Such research can lead to medical advances, including helping us fight medical diseases like antibiotic resistance or engineering bacteria.
- ***Systematics***, where the concept of "common design" helps scientists resolve longstanding enigmas facing evolutionary biology, such as why "convergent evolution" is rampant, why species often fail to fit into a treelike pattern, and why we find examples of extreme genetic similarity among supposedly distantly related organisms. ID has also spawned ideas about life being front-loaded with information, such that it is designed to evolve, and had led scientists to expect (and find) previously unanticipated "out of place" genes in various taxa.
- ***Artificial Intelligence and Computer Science***, where ID produces computational research showing limits to the search abilities of Darwinian mechanisms. This has practical implications for the understanding the utility of genetic algorithms.
- ***Cell biology***, where ID causes scientists to view cellular components as "designed structures rather than accidental by-products of neo-Darwinian evolution,"[65] allowing scientists to better understand molecular machines and propose testable hypotheses about the causes of cancer. ID encourages scientists to reverse engineer molecular machines like the bacterial flagellum to understand how they function like machines, and to understand how machine-like properties of life are necessary for biological systems to function.
- ***Systems biology***, where an ID paradigm points biologists to view biological systems as integrated components of larger systems that are designed to work together in a "top-down,"[66] coordinated fashion. In this regard, ID pushes scientists to investigate computer-like properties of DNA and the genome in the hopes of better understanding the workings of genetics and the origin of biological systems.
- ***Animal biology***, where ID suggests scientists should seek function for allegedly "vestigial" structures.
- ***Information theory and Bioinformatics***, where ID leads scientists to understand intelligence as a scientifically studyable cause of biological complexity, and to understand the types of information it generates. ID also encourages scientists to look for new layers of information and functional language embedded in the genetic codes, as well as other codes within biology. ID also drives scientists to develop better measures of biological information, leading to concepts like CSI or functional sequence complexity. This allows us to better quantify complexity and understand what features are, or are not, within the reach of Darwinism.

- ***Paleontology***, where ID encourages scientists to understand how the irreducibly complex nature of biological systems can predict punctuated change and stasis throughout the history of life.
- ***Physics and Cosmology***, where ID has inspired scientists to seek and find instances of fine-tuning of the laws and constants of physics to allow for life, leading to a variety of fine-tuning arguments including the Galactic Habitable Zone. This has huge implications for proper cosmological models of the universe, hints at proper avenues for successful "theories of everything" which must accommodate fine-tuning, and other implications for theoretical physics.
- ***Genetics,*** where ID predicts function for non-coding "junk"-DNA, instigating research into that topic, and allowing us to better understand development and cellular biology.

To elaborate on the last item, ID stands in contrast to neo-Darwinism in that ID has encouraged scientists to seek function for non-coding DNA "junk" DNA. As William Dembski wrote in 1998, "on an evolutionary view we expect a lot of useless DNA. If, on the other hand, organisms are designed, we expect DNA, as much as possible, to exhibit function. … Design encourages scientists to look for function where evolution discourages it."[67] Even some evolutionists admit that their paradigm has hindered research into junk DNA. A 2003 article in *Scientific American* exposes how evolutionary assumptions have stopped research into junk DNA. According to the article, "introns," a type of non-coding DNA found within genes, "were immediately assumed to be evolutionary junk." But once it was discovered that introns play vital roles regulating gene production, a leading biologist was quoted saying the failure to recognize function for intronic DNA might have been "one of the biggest mistakes in the history of molecular biology."[68] Likewise, a 2003 paper in the journal *Science* observed:

> Although catchy, the term 'junk DNA' for many years repelled mainstream researchers from studying noncoding DNA. Who, except a small number of genomic clochards, would like to dig through genomic garbage? However, in science as in normal life, there are some clochards who, at the risk of being ridiculed, explore unpopular territories. Because of them, the view of junk DNA, especially repetitive elements, began to change in the early 1990s. Now, more and more biologists regard repetitive elements as a genomic treasure.[69]

Under an ID perspective, such mistakes might have been avoided much earlier, thus furthering our knowledge of biochemistry and progress in medicine.

In conclusion, ID is not "giving up" or "stopping science." Rather, ID aims to invoke the correct causal mechanism to explain the origin of information in biology. When critics claim that one cannot detect design because it will "stop science," it is they who are actually stopping science by preventing scientists from considering ID.

More Information:

- *Molecular Machines: Experimental Support for the Design Inference*, by Michael Behe — www.discovery.org/a/54
- "Becoming a Disciplined Science: Prospects, Pitfalls, and Reality Check for ID," by William Dembski — www.discovery.org/f/141
- *The Privileged Planet: How our Place in the Cosmos Is Designed for Discovery*, by Guillermo Gonzalez and Jay Richards (Regnery, 2004) — www.privilegedplanet.com
- "Using Intelligent Design Theory to Guide Scientific Research," by Jonathan Wells, in *Progress in Complexity, Information, Design*, 3.1.2 (November 2004) — www.iscid.org/papers/Wells_TOPS_051304.pdf
- "Molecular Machines in the Cell," by Casey Luskin — www.discovery.org/a/14791
- "Systems Biology as a Research Program for Intelligent Design," by David Snoke, *BIO-Complexity*, 2014 (3) — www.bio-complexity.org/ojs/index.php/main/article/viewArticle/BIO-C.2014.3
- "Does Intelligent Design Help Science Generate New Knowledge?," by Casey Luskin — www.evolutionnews.org/2010/11/does_intelligent_design_help_s040781.html

Objection #7: Intelligent Design Is "Creationism" and Based on Religion

The Short Rebuttal: Intelligent design is 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 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, ID 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 critics who wish to delegitimize ID without actually addressing the merits of its case.

The Long Rebuttal: Intelligent design is based upon science and is different from creationism. Creationism is the religious belief that the universe and life were created by a supernatural being. Many creationists are "young earth creationists" who believe that the earth and universe are on the order of six to ten thousand years old. What all creationists have in common is that they start with religious texts like the Bible and end with religious conclusions. ID is different from creationism because it begins with our observations of nature rather than the Bible, and it limits its scientific claims to what can be learned from the scientific method. As a science, ID refers only to an intelligent cause and does not attempt to establish whether or not the source of intelligence is God. ID also does not claim the earth is only a few thousand years old. ID as a scientific theory limits its scientific claims to what can be learned from the empirical data and does not attempt to address religious questions about the identity or metaphysical nature of the designer. This makes ID distinct from creationism and shows that ID respects the limits of scientific inquiry.

Those who try to equate ID with creationism usually misconstrue the following facts about ID:

- ***ID detects design, not designers:*** Many critics mistakenly think ID is focused upon studying the designer, alleging that it specifically invokes supernatural forces or a deity. But ID is not focused on studying the actual intelligent cause responsible for life. Instead, ID studies objects in nature to determine if natural objects bear an informational signature indicating that an intelligent cause was involved in their origin.
- ***ID is limited in its scope:*** ID limits its claims to what can be learned from the empirical data, meaning that it does not try to address religious questions about the identity or nature of the designer. While the empirical data can allow us to study natural objects and determine whether they arose from an intelligent cause, the empirical data may not allow us to determine the identity or metaphysical nature of the intelligent cause.
- ***Principled, not rhetorical:*** The refusal of ID proponents to use ID to draw scientific conclusions about the nature or identity of the designer is principled rather than merely rhetorical. ID's non-identification of the designer stems from a desire to take a scientific approach, respect the limits of scientific inquiry, and not inject religious discussions about theological questions into science.
- ***Critics admit ID is different from creationism:*** Even ID's leading critics admit that ID is not creationism when defined as young earth creationism ("YEC"). As Eugenie Scott writes, "most ID proponents do not embrace a Young Earth, Flood Geology, and sudden creation tenets associated with YEC."[70]
- ***ID uses scientific methods:*** Creationists base their claims upon faith or divine revelation; ID makes its arguments using the scientific data, not faith or divine revelation. (For more information, see the answer to Objection 1.)
- ***Implications don't disqualify ID from being science:*** Just like neo-Darwinism, the scientific theory of intelligent design may have *implications* for religion, but it is not *based* on religion.
- ***ID doesn't appeal to the supernatural:*** When creationism is defined broadly (i.e., the view that "supernatural" powers created life),[71] ***ID still is not creationism.*** In its 1987 *Edwards v. Aguillard* ruling, the U.S. Supreme Court found creationism was religion because it referred to a "supernatural creator."[72] Since ID does not determine whether the designer is natural or supernatural, it lacks the key characteristic that causes creationism to be unscientific and unconstitutional.

Regarding the last item, some critics maintain ID is a religious view because it does not conform to methodological naturalism (MN). MN is a principle that says that whether or not the supernatural exists, we must pretend that it doesn't when practicing science. This idea was expressed in a letter to the editor in *Nature*: "Even if all the data point to an intelligent designer, such an hypothesis is excluded from science because it is not naturalistic."[73] Philosophers disagree on whether MN is a requirement of science, but even if it is, there are good reasons why ID offends neither the letter nor the spirit of this "rule."

ID Doesn't Violate the Letter of MN: As we have seen, ID does not appeal to the supernatural, and thus does not require non-natural causes. ID begins with observations of the types of information and complexity produced by intelligent agents. Intelligent agents are natural causes that we can understand by studying the world around us. This makes intelligent agency a proper subject of scientific study. When ID finds high levels of CSI in nature, the most it can infer is that intelligence was at work. Because ID respects the limits of scientific inquiry, it does not make claims beyond the data by trying to identify the designer. As Stephen Meyer writes:

> The theory of intelligent design does not claim to detect a supernatural intelligence possessing unlimited powers. Though the designing agent responsible for life may well have been an omnipotent deity, the theory of intelligent design does not claim to be able to determine that. Because the inference to design depends upon our uniform experience of cause and effect in this world, the theory cannot determine whether or not the designing intelligence putatively responsible for life has powers beyond those on display in our experience. Nor can the theory of intelligent design determine whether the intelligent agent responsible for information life acted from the natural or the "supernatural" realm. Instead, the theory of intelligent design merely claims to detect the action of some intelligent cause … and affirms this because we know from experience that only conscious, intelligent agents produce large amounts of specified information.[74]

Many other ID proponents have pointed out that ID only appeals to intelligent causes, not supernatural ones. Michael Behe writes, "as regards the identity of the designer, modern ID theory happily echoes Isaac Newton's phrase *hypothesis non fingo*."[75] William Dembski explains: "Supernatural explanations invoke miracles and therefore are not properly part of science. Explanations that call on intelligent causes require no miracles but cannot be reduced to materialistic explanations."[76] Likewise, an early ID textbook affirms MN, stating: "intelligence . . . can be recognized by uniform sensory experience, and the supernatural . . . cannot."[77]

Some claim ID violates MN by leaving open the possibility of a supernatural designer. ID does allow this possibility, but ID does not affirmatively claim to detect a supernatural creator. The most ID infers is intelligent causation. Many (though not all) ID proponents may believe the designer is God, but they do not claim this is a scientific conclusion of ID. This makes ID no different from Darwinian evolution, which claims that if there is a supernatural creator, it's beyond science's power to detect.

ID Doesn't Offend the Spirit of MN: Proponents of MN often justify this rule by arguing that it ensures that science uses only testable, predictable, and reliable explanations. However, as we saw in response to Objection 2, ID generates testable hypotheses and predictions based upon our knowledge of how the world works, and ID can be reliably inferred through the scientific method. In this way, ID is based upon science, not religion, and does not violate any mandates of predictability, testability, or reliability laid down for science by MN.

More Information:

- *The Design Revolution* by William Dembski (InterVarsity Press, 2004).
- "Intelligent Design is not Creationism," by Stephen C. Meyer, *The Daily Telegraph* — www.discovery.org/a/3191
- "FAQ: Is intelligent design just creationism (or creationism 'in disguise')?," www.ideacenter.org/contentmgr/showdetails.php/id/1183
- "ID Does Not Address Religious Claims About the Supernatural," by Casey Luskin — www.discovery.org/a/7501
- "Intelligent Design and Creationism Just Aren't the Same," by John West — www.discovery.org/a/1329

Objection #8: Intelligent Design is Religiously-Motivated

The Short Rebuttal: Even if some ID proponents do have religious motives, *so what?* In science, motives don't matter—only the evidence matters. Indeed, some religiously motivated scientists (such as Johannes Kepler and Isaac Newton) turned out to be right. The fact that they were religiously motivated did not harm their science. Moreover, many leading evolutionists have expressed anti-religious motives. If ID critics claim that the religious motives of ID-proponents make ID unscientific, then to be consistent they must accept that the anti-religious motives of leading evolutionists make Darwinism unscientific. Harping upon the alleged religious motives of ID-proponents also offends the principles behind the First Amendment, which promise that all persons—whether religious or not—have equal freedom to make their case to the public square.

The Long Rebuttal: Pro-ID scholars have published impressive volumes of scholarship in reputable academic books and journals about the empirical evidence supporting design. Critics often try to avoid rebutting this scholarship by trotting out quotes from ID proponents discussing their own personal religious beliefs, motives, and affiliations, or discussing the larger philosophical implications they draw from ID, to allege that ID is not science, but religion. These common attacks against ID are both logically fallacious and hypocritical for at least three reasons.

First, such arguments offend the First Amendment's protections on religious freedom: Scientists have freedom of religion, and their scientific views should not be disqualified due to their alleged religious motives or beliefs. Religious beliefs and motives of a scientist are irrelevant to whether they are scientifically correct.

Second, in science, the motives or personal religious beliefs of scientists don't matter; only the evidence matters. For example, the great scientists Johannes Kepler and Isaac Newton were inspired to their scientific work by their religious convictions that God would create an orderly, intelligible universe with comprehensible physical laws. They turned out to be right—not because of their religious beliefs but because the scientific evidence validated their hypotheses. (At least, Newton was thought to be right until Einstein came along and refined Newton's ideas) Their personal religious beliefs, motives, or affiliations did nothing to change the fact that their scientific theories had strong scientific merit that helped lay the foundation for modern science.

Third, evolutionists who raise objections to ID based upon the alleged religious motives of ID proponents make a highly hypocritical argument, for many leading evolutionists have expressed blatantly anti-religious motives. This fact does ***not*** disqualify evolution from being scientific, but it shows that the religious or anti-religious motives and beliefs of scientists do not make a theory unscientific. Leading proponents of Darwinian evolution frequently express anti-religious motives or raise the cultural and metaphysical implications of the theory in their writings. For example:

- ***Eugenie Scott*** was for decades the executive director of the National Center for Science Education (NCSE) and was called by the scientific journal *Nature* "perhaps the nation's most high-profile Darwinist."[78] But Scott is also a public signer of the Third Humanist Manifesto, an aggressive statement of the humanist agenda to create a world with "without supernaturalism" based upon the view that "[h]umans are … the result of unguided evolutionary change" and the universe is "self-existing."[79]
- ***Barbara Forrest***, another prominent pro-evolution activist believes that "philosophical naturalism" is "the only reasonable metaphysical conclusion."[80] Dr. Forrest also sits on the Board of Directors of the New Orleans Secular Humanist Association,[81] an associate member of the American Humanist Association, which publishes the Humanist Manifesto III.[82] Forrest is also on the board of the NCSE.[83]
- ***Richard Dawkins*** is Oxford University's Charles Simonyi Professor for the Public Understanding of Science and is probably the most famous evolutionist in the world. Dawkins argues that belief in God is a "delusion"[84] and that "Darwin made it possible to become an intellectually fulfilled atheist."[85] Dawkins has stated his goal is "to kill religion,"[86] and when he received an award from the American Humanist Association, he declared that "faith is one of the world's great evils, comparable to the smallpox virus but harder to eradicate."[87]

- ***Douglas Futuyma*** has declared in a popular college-level textbook that "[b]y coupling undirected, purposeless variation to the blind, uncaring process of natural selection, Darwin made theological or spiritual explanations of the life processes superfluous."[88]

- ***Stephen Jay Gould***, a leading paleontologist before his death in 2003, discussed the "radical philosophical content of Darwin's message" and its denial of purpose in the universe: "First, Darwin argues that evolution has no purpose. . . . Second, Darwin maintained that evolution has no direction. . . . Third, Darwin applied a consistent philosophy of materialism to his interpretation of nature. Matter is the ground of all existence; mind, spirit, and God as well, are just words that express the wondrous results of neuronal complexity."[89]

- ***William Provine***, an evolutionary biologist at Cornell University, has similarly stated that "belief in modern evolution makes atheists of people" and that "[o]ne can have a religious view that is compatible with evolution only if the religious view is indistinguishable from atheism."[90]

- ***Steven Weinberg***, a Nobel Laureate in physics and public advocate one-sided pro-Darwin-only dogmatic evolution education,[91] says that his scientific career is motivated by a desire to disprove religion: "I personally feel that the teaching of modern science is corrosive of religious belief, and I'm all for that! One of the things that in fact has driven me in my life, is the feeling that this is one of the great social functions of science—to free people from superstition."[92] Weinberg elaborates on what he means by "superstition," as he hopes that "this progression of priests and ministers and rabbis and ulamas and imams and bonzes and bodhisattvas will come to an end, that we'll see no more of them. I hope that this is something to which science can contribute and if it is, then I think it may be the most important contribution that we can make."[93]

- ***The New York Times*** reported on an atheism conference held at the scientific research hub The Salk Institute. The story reported a striking agenda on the part of leading scientists present at the conference to stifle religious belief in order to promote Darwinism to the public: "one speaker after another called on their colleagues to be less timid in challenging teachings about nature based only on scripture and belief." The scientists were worried that scientific theories like evolution by natural selection and other views are "losing out in the intellectual marketplace," and one scientist sarcastically said the viewpoints expressed at the conference "have run the gamut from A to B. *Should we bash religion with a crowbar or only with a baseball bat*?"[94]

- Richard Lewontin, an evolutionary paleontologist at Harvard, states that materialism must be protected at all costs:

  > [W]e have a prior commitment, a commitment to materialism. It is not that the methods and institutions of science somehow compel us to accept a material explanation of the phenomenal world, but, on the contrary, that we are forced by our *a priori* adherence to material causes to … produce material explanations … [T]hat materialism is absolute, for we cannot allow a Divine Foot in the door.[95]

Lewontin is not alone in this view. Some scientists, educators and journalists have become so entrenched in seeing the world through a materialist prism, that they are no longer open to contrary evidence. As Darwinian philosopher Michael Ruse suggests, "for many evolutionists, evolution has functioned as … a secular religion."[96]

These examples are not given to argue that evolution is not science, or that one cannot accept evolution and religion. In science, the personal religious (or anti-religious) motives of scientists don't matter; only the evidence matters. Neither ID nor neo-Darwinian evolution should be disqualified from being scientific simply because of the religious (or anti-religious) motives of their proponents.

More Information:

- *Darwin Day in America: How Politics and Culture have been Dehumanized in the Name of Science* by John G. West (ISI Books, 2007) — www.darwindayinamerica.com
- *Darwin's God: Evolution and the Problem of Evil* by Cornelius G. Hunter (Brazos Press, 2001).
- "Any larger philosophical implications of intelligent design, or any religious motives, beliefs, and affiliations of ID proponents, do not disqualify ID from having scientific merit," by Casey Luskin — www.discovery.org/a/7081

Objection #9: ID Proponents Don't Conduct or Publish Scientific Research

The Short Rebuttal: This claim is simply false. ID proponents conduct scientific research and publish it in mainstream scientific venues. Research supporting ID concepts and arguments has been published and discussed in *Journal of Molecular Biology*, *Protein Science, Theoretical Biology and Medical Modelling*, *Journal of Advanced Computational Intelligence and Intelligent Informatics*, *Quarterly Review of Biology, Cell Biology International*, *Rivista di Biologia / Biology Forum*, *Physics of Life Reviews*, *Annual Review of Genetics*, *Proceedings of the Biological Society of Washington*, *PLoS One*, Michigan State University Press, and Cambridge University Press.

The Long Rebuttal: Critics often claim that ID proponents do not publish peer-reviewed scientific papers or that they do not do scientific research. Both of these claims are demonstrably false. In 2004, Discovery Institute senior fellow Stephen Meyer published a groundbreaking paper explicitly advocating intelligent design in the journal *Proceedings of the Biological Society of Washington*. His peer-reviewed article reviews research in the fields of information theory, paleontology, and biochemistry and concludes, "An experience-based analysis of the causal powers of various explanatory hypotheses suggests purposive or intelligent design as a causally adequate—and perhaps the most causally adequate—explanation for the origin of the complex specified information required to build the Cambrian animals and the novel forms they represent."[97]

In the years after Meyer's paper, the ID movement experienced a renaissance of research and publishing peer-reviewed papers. In 2014, the ID movement passed a landmark with its 75th peer-reviewed pro-ID scientific publication. Some of this research was discussed in response to the Objection 4: "Intelligent Design is Just Politics." Scientists and theorists who support the theory of intelligent design have published their work in a variety of appropriate technical venues, including peer-reviewed scientific journals, peer-reviewed scientific books (some published by university presses), peer-edited scientific anthologies, peer-edited scientific conference proceedings, and other mainstream scientific sources. There are multiple hubs of ID research producing these publications.

First, there's Biologic Institute, headed by protein scientist Douglas Axe, which is "developing and testing the scientific case for intelligent design in biology." Biologic Institute conducts both laboratory and theoretical research into the origin and role of information in biology, the fine-tuning of the universe for life, and methods of detecting design. Its research topics include:

- Building and testing computer models that study the ability of unguided mechanisms versus intelligent causes to produce new information.
- Examining the cosmological, physical, chemical, and biological fine-tuning required of life.
- Investigating how humans design complex structures so scientists can recognize the hallmarks of design.

Some of the most important experimental ID research has been conducted by Axe. In 2000 and 2004, he published the results of mutational sensitivity experiments in *Journal of Molecular Biology* showing that the odds of an amino acid sequence yielding a functional protein sequence are less than 10^{77}.[98] According to Axe, these findings "call into question the adequacy of chance, and that certainly adds to the case for intelligent design."[99]

In 2010, Axe published another peer-reviewed research paper which presented calculations modeling the evolution of bacteria evolving a structure which required multiple mutations before yielding any benefit. Making assumptions that were very generous towards Darwinian evolution, he found that molecular adaptations requiring more than six mutations before providing an advantage could not arise in the history of the earth.[100] A 2011 paper by Axe and Gauger showed that such structures exist. They found that converting one protein into a closely related protein—the kind of transformation which evolutionists claim happened easily in the history of life—would require at least 7 mutations.[101] In 2014, Gauger and Axe co-published another peer-reviewed research paper which sought to convert many enzymes in a family to perform the function of a closely related enzyme. Their mutagenesis experiments could not convert these proteins to acquire the new function within the mutational limits set by Axe's 2010 paper.[102] These results show proteins are rich in CSI, and challenge evolutionary models for the origin of new proteins.

Another ID research group is the Evolutionary Informatics Lab, founded by senior Discovery Institute fellow William Dembski along with Robert Marks, Distinguished Professor of Electrical and Computer Engineering at Baylor University. Their lab has attracted graduate-student researchers and has published multiple peer-reviewed articles in technical science and engineering journals providing theoretical research showing that only intelligence is capable of producing high levels of new information.[103]

There are a number of other individual pro-ID scientists worldwide publishing peer-reviewed pro-ID scientific papers. In 2010, Ralph Seelke, a biology professor at the University of Wisconsin Superior, co-published a paper with Ann Gauger providing additional empirical backing to Axe's aforementioned 2010 paper. They started by breaking a gene in the bacterium *E. coli* required for synthesizing the amino acid tryptophan. When broken in just one place, random mutations in the bacteria's genome were capable of "fixing" the gene.[104] But when two mutations were required to restore function, Darwinian evolution could not do the job. Other researchers who have published many peer-reviewed pro-ID papers include Wolf-Ekkehard Lönnig, who recently retired from the Max Planck Institute for Plant Breeding Research in Germany, and David Abel of the Origin of Life Science Foundation.

Another productive ID researcher is biochemist Michael Behe at Lehigh University. In 2010, he published an article in *Quarterly Review of Biology* arguing that Darwinian evolution tends to destroy or diminish molecular functions rather than building them.[105] This followed his 2004 article with physicist David Snoke in *Protein Science* showing that the Darwinian evolution of a simple bond between two proteins would be unlikely to arise in multicellular organisms if it required more than two mutations to function.[106] In 2008, Behe and Snoke's would-be critics tried to refute them in the journal *Genetics*, but found that to obtain only two specific mutations via Darwinian evolution "for humans with a much smaller effective population size, this type of change would take > 100 million years." The critics admitted this was "very unlikely to occur on a reasonable timescale."[107]

Together, ID research is converging upon a common conclusion: there is too much CSI in many proteins and other biological systems to be generated by Darwinian processes on a reasonable evolutionary timescale.

One obstacle to ID's research program is that the more research it produces, the more critics try to stifle ID's advance. In 2011, dozens of pro-ID research scientists gathered at a scientific conference at Cornell University to present their research results showing that intelligent design is necessary to explain the origin of biological information. The papers presented at the conference were to be published by Springer-Verlag, a prestigious scientific publishing company based in Germany. However, when pro-Darwin activists on the Internet learned of the book, they protested and threatened to boycott Springer if the company published the ID-friendly conference proceedings. Springer caved into the intolerant ID-critics, and illegally reneged on the contract and refused to publish the book. Thankfully, the proceedings of the *Biological Information: New Perspectives* conference at Cornell were eventually published by another mainstream scientific publishing house, World Scientific. But this incident shows how ID-critics seek to unfairly prevent ID proponents from being able to publish their research.[108]

Despite ID's publication record, recognition in the peer-reviewed literature is not an absolute requirement to demonstrate an idea's scientific merit.[109] Darwin's own theory of evolution was first published in a book for a general and scientific audience—his *Origin of Species*—not in a peer-reviewed paper. Nonetheless, ID's peer-reviewed publication record shows that it deserves—and is receiving—serious consideration by the scientific community.

More Information:

- Peer-Reviewed & Peer-Edited Scientific Publications Supporting the Theory of Intelligent Design — www.discovery.org/a/2640
- Biologic Institute — www.biologicinstitute.org
- The Evolutionary Informatics Lab — www.evoinfo.org
- *BIO-Complexity* journal — www.bio-complexity.org

Objection #10: Intelligent Design has been Refuted by the Overwhelming Evidence for Neo-Darwinian Evolution

The Short Rebuttal: The evidence for neo-Darwinian evolution is not "overwhelming." While it remains the dominant view within biology, a growing minority of scientists dissent from Darwin. Over 900 doctoral scientists have signed a public statement proclaiming, "We are skeptical of claims for the ability of random mutation and natural selection to account for the complexity of life."[110] Signers of the list include members of the national academies of science in the United States, Russia, Poland, the Czech Republic, and India (Hindustan), as well as faculty and researchers from a wide range of universities and colleges, including Princeton, MIT, Dartmouth, Ohio State, Tulane, and the University of Michigan. Biological and chemical evolution lack supporting evidence in fields such as genetics, biochemistry, taxonomy and systematics, paleontology, and the chemical origins of life. Unfortunately, some scientists report they are pressured to suppress problems with modern evolutionary biology.

The Long Rebuttal: Biological and chemical evolution lack supporting evidence in many scientific fields. Yet some scientists report that they are pressured to remain silent about the problems with Darwinian biology—often out of fears that their criticisms might lend support to ID. Biologist W. Daniel Hillis acknowledges:

> There's a feeling in biology that scientists should keep their dirty laundry hidden, because the religious right are always looking for any argument between evolutionists as support for their creationist theories. There's a strong school of thought that one should never question Darwin in public.[111]

Likewise, cognitive scientists Jerry Fodor and Massimo Piattelli-Palmarini admit:

> We've been told by more than one of our colleagues that, even if Darwin was substantially wrong to claim that natural selection is the mechanism of evolution, nonetheless we shouldn't say so. Not, anyhow, in public. To do that is, however inadvertently, to align oneself with the Forces of Darkness, whose goal is to bring Science into disrepute. ... [N]eo-Darwinism is taken as axiomatic; it goes literally unquestioned. A view that looks to contradict it, either directly or by implication is ipso facto rejected, however plausible it may otherwise seem. Entire departments, journals and research centres now work on this principle.[112]

Günter Theißen of the Department of Genetics at Friedrich Schiller University in Jena, Germany explains what happens when he critiques neo-Darwinian biology:

> It is dangerous to raise attention to the fact that there is no satisfying explanation for macroevolution. One easily becomes a target of orthodox evolutionary biology and a false friend of proponents of non-scientific concepts.[113]

Finally, a 2014 paper in *Nature* admitted that some biologists self-censor criticisms of the neo-Darwinian paradigm out of fear of lending support for ID:

> Yet the mere mention of the EES [Extended Evolutionary Synthesis, a *non*-Darwinian model of biology] often evokes an emotional, even hostile, reaction among evolutionary biologists. Too often, vital discussions descend into acrimony, with accusations of muddle or misrepresentation. **Perhaps haunted by the spectre of intelligent design, evolutionary biologists wish to show a united front to those hostile to science.**[114]

On the one hand, it's disturbing to hear that biologists would self-censor their views simply because they don't like the perceived alternative—which they label as being "hostile to science." This shows that the field of evolutionary biology is in an incredibly unhealthy state. Dogmatism on evolution is hindering scientific advancement. If evolutionary biologists censor themselves, what might they might do to other scientists who step out of line and refuse to join the "united front"? The answer is before your very eyes in this article: They marginalize dissenters by calling them "hostile to science." Nonetheless, there are numerous legitimate scientific criticisms of the standard models of biological and chemical evolution.

Genetics—Mutations Cause Harm and Do Not Build Complexity: Darwinian evolution relies on random mutations that are selected by a blind, unguided process of natural selection that has no goals. Such a random and undirected process tends to harm organisms and does not improve them or build complexity. As past president of the French Academy of Sciences, Pierre-Paul Grasse, contended that "[m]utations have a very limited 'constructive capacity'" because "[n]o matter how numerous they may be, mutations do not produce any kind of evolution."[115] Similarly, biologist Lynn Margulis has said, "new mutations don't create new species; they create offspring that are impaired."[116] She continues:

> [N]eo-Darwinists say that new species emerge when mutations occur and modify an organism. I was taught over and over again that the accumulation of random mutations led to evolutionary change-led to new species. I believed it until I looked for evidence.[117]

Many other scientists feel this way. Over 900 Ph.D. scientists have signed a statement agreeing they "are skeptical of claims for the ability of random mutation and natural selection to account for the complexity of life."[118] Indeed, two biologists wrote in *Annual Review of Genomics and Human Genetics*: "it remains a mystery how the undirected process of mutation, combined with natural selection, has resulted in the creation of thousands of new proteins with extraordinarily diverse and well optimized functions. This problem is particularly acute for tightly integrated molecular systems that consist of many interacting parts…"[119] This leads to the next problem.

Biochemistry—Unguided and Random Processes Cannot Produce Cellular Complexity: Our cells contain incredible complexity, like miniature factories using machine technology but dwarfing the complexity and efficiency of anything produced by humans. Cells use miniature circuits, motors, feedback loops, encoded language, and even error-checking machinery to decode and repair our DNA. Past U.S. National Academy of Sciences President Bruce Alberts (who opposes ID) has described this complexity in the journal *Cell* as an elaborate factory: "The entire cell can be viewed as a factory that contains an elaborate network of interlocking assembly lines, each of which is composed of a set of large protein machines."[120] But could such integrated complexity evolve in a stepwise, Darwinian fashion? Michael Behe recalls that in *Origin of Species*, Darwin admitted that if "any complex organ existed which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down."[121] According to Behe, "by opening the ultimate black box, the cell," modern science "has pushed Darwin's theory to the limit."[122]

The simplest cell requires hundreds of genes, numerous complex biological machines and biochemical pathways, and a fully functional genetic code in order to survive. Darwinian evolution—blind natural selection acting on random mutations—has failed to provide Darwinian explanations for how basic cellular biochemistry might have evolved. Five years after Behe published *Darwin's Black Box*, biochemist Franklin Harold stated 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."[123] Indeed, one paper about the evolution of one molecular machine admitted, "the flagellar research community has scarcely begun to consider how these systems have evolved."[124]

But it's not just multi-part machines which are beyond reach of Darwinian evolution. The protein-parts themselves which build these machines would also require multiple simultaneous mutations in order to arise. In 2000 and 2004, protein scientist Douglas Axe published experimental research in the *Journal of Molecular Biology* on mutational sensitivity tests he performed on enzymes in bacteria.[125] Enzymes are long chains of amino acids which fold into a specific, stable, three-dimensional shape in order to function. Mutational sensitivity experiments begin by mutating the amino acid sequences of those proteins, and then testing the mutant proteins to determine whether they can still fold into a stable shape, and function properly. Axe's research found that amino acid sequences which yield stable, functional protein folds may be as rare as 1 in 10^{74} sequences, suggesting that the vast majority of amino acid sequences will not produce stable proteins, and thus could not function in living organisms.

Because of this extreme rarity of functional protein sequences, it would be very difficult for random mutations to take a protein with one type of fold, and evolve it into another, without going through some non-functional stage. Darwin said his theory only worked if structures could be built through "numerous, successive, slight modifications," but *many* changes would need to occur *simultaneously* to "find" the rare and unlikely amino acid sequences that yield functional proteins. To put the matter in perspective, Axe's results suggest that the odds of blind and unguided Darwinian processes producing a functional protein fold are less than the odds of someone closing his eyes and firing an arrow into the Milky Way galaxy, *and hitting one pre-selected atom*.

Proteins commonly interact with other molecules through a "hand-in-glove" fit, but these interactions often require multiple amino acids to be 'just right' before they occur. In 2004, Behe, along with University of Pittsburgh physicist David Snoke, simulated the Darwinian evolution of such protein-protein interactions. Behe and Snoke's calculations found that for multicellular organisms, evolving a simple protein-protein interaction which required more than two mutations in order to function would require more organisms and generations than would be available over the entire history of the Earth. They concluded that "the mechanism of gene duplication and point mutation alone would be ineffective…because few multicellular species reach the required population sizes."[126]

Four years later during an attempt to refute Behe's arguments, Cornell biologists Rick Durrett and Deena Schmidt ended up begrudgingly confirming he was basically correct. After calculating the likelihood of two simultaneous mutations arising via Darwinian evolution in a population of humans, they found that such an event "would take > 100 million years." Given that humans diverged from their supposed common ancestor with chimpanzees only 6 million years ago, they granted that such mutational events are "very unlikely to occur on a reasonable timescale."[127] The information required for proteins and enzymes to function is too great to be generated by Darwinian processes on any reasonable evolutionary timescale.

Paleontology—The Fossil Record Lacks Intermediate Fossils: The fossil record's overall pattern is one of abrupt explosions of new biological forms, and possible candidates for evolutionary transitions are the exception, not the rule. This has been recognized by many paleontologists such as Ernst Mayr who explained in 2000 that "[n]ew species usually appear in the fossil record suddenly, not connected with their ancestors by a series of intermediates."[128] Similarly, a zoology textbook observed that "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."[129]

The eventual realization that the fossil record is not entirely incomplete has forced evolutionary biologists to accept that the record shows *a pattern of explosions, not gradual evolution of living organisms*. Probably the most famous instance of abrupt appearance is the Cambrian explosion, where nearly all of the major living animal phyla appear in the Cambrian period. An invertebrate biology textbook explains this:

> Most of the animal groups that are represented in the fossil record first appear, 'fully formed' and identifiable as to their phylum, in the Cambrian, some 550 million years ago. These include such anatomically complex and distinctive types as trilobites, echinoderms, brachiopods, molluscs, and chordates. … The fossil record is therefore of no help with respect to the origin and early diversification of the various animal phyla...[130]

Evolutionary scientists acknowledge that they cannot explain this rapid appearance of diverse animal body plans by classical Darwinian processes, or other known material mechanisms. Paleontologist Robert Carroll argues in *Trends in Ecology and Evolution* that "The extreme speed of anatomical change and adaptive radiation during this brief time period requires explanations that go beyond those proposed for the evolution of species within the modern biota."[131] Another paper likewise maintains that "microevolution does not provide a satisfactory explanation for the extraordinary burst of novelty during the Cambrian Explosion" and concludes "the major evolutionary transitions in animal evolution still remain to be causally explained."[132] Likewise a 2009 paper in *BioEssays* concedes that

"elucidating the materialistic basis of the Cambrian explosion has become more elusive, not less, the more we know about the event itself."[133]

But the Cambrian explosion is by no means the only explosion of life recorded in the fossil record. Regarding the origin of major fish groups, former Columbia University geoscientist Arthur Strahler writes that, "This is one count in the creationists' charge that can only evoke in unison from paleontologists a plea of nolo contendere [no contest]."[134] A paper in *Annual Review of Ecology and Systematics* explains that the origin of land plants "is the terrestrial equivalent of the much-debated Cambrian 'explosion' of marine faunas."[135] Regarding the origin of angiosperms (flowering plants), paleontologists have discovered a "big bloom" type of explosion event. As one paper states:

> In spite of much research and analyses of different sources of data (e.g., fossil record and phylogenetic analyses using molecular and morphological characters), the origin of the angiosperms remains unclear. Angiosperms appear rather suddenly in the fossil record... with no obvious ancestors for a period of 80-90 million years before their appearance.[136]

In a similar way, many orders of mammals appear in an explosive manner. Niles Eldredge explains that "there are all sorts of gaps: absence of gradationally intermediate 'transitional' forms between species, but also between larger groups—between, say, families of carnivores, or the orders of mammals."[137] There is also a bird explosion, with major bird groups appearing in a short time period.[138] Biologist Jeffrey Schwartz explains:

> We are still in the dark about the origin of most major groups of organisms. They appear in the fossil record as Athena did from the head of Zeus—full-blown and raring to go, in contradiction to Darwin's depiction of evolution as resulting from the gradual accumulation of countless infinitesimally minute variations.[139]

This pattern of explosions directly contradicts the expectations of Darwinian biology.

Taxonomy—Biologists have Failed to Construct Darwin's "Tree of Life": Evolutionary biologists hoped that DNA evidence would reveal a grand tree of life where all organisms are clearly related. It hasn't. Darwin's tree of life—the notion that all living organisms share a universal common ancestor—has faced increasing difficulties in the past few decades. Trees describing the alleged ancestral relationships between organisms based upon one gene or biological characteristic very commonly conflict with trees based upon a different gene or characteristic. A 2009 article in *New Scientist* observes, the tree of life "lies in tatters, torn to pieces by an onslaught of negative evidence," leading one scientist to say "We've just annihilated the tree of life." It concludes: "[m]any biologists now argue that the tree concept is obsolete and needs to be discarded." The article explains the basic problem: "different genes told contradictory evolutionary stories."[140] This implies a challenge to universal common descent, the hypothesis that all organisms descend from a single common ancestor.

Many other papers concur that the tree of life hypothesis is in peril. W. Ford Doolittle explains in *Science*, "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."[141] Doolittle attributes the non-tree-like data 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."[142] Many other papers have had uncovered similar data.

A June, 2012 article in *Nature* reported that short strands of RNA called microRNAs "are tearing apart traditional ideas about the animal family tree." Dartmouth biologist Kevin Peterson who studies microRNAs lamented, "I've looked at thousands of microRNA genes, and I can't find a single example that would support the traditional tree." According to the article, microRNAs yielded "a radically different diagram for mammals: one that aligns humans more closely with elephants than with rodents." Peterson put it bluntly: "The microRNAs are totally unambiguous ...

they give a totally different tree from what everyone else wants."[143] As a 2012 paper stated, "Phylogenetic conflict is common, and frequently the norm rather than the exception."[144] Again, the problem is one gene or physical trait yields one version of the tree of life, but another gene or trait suggests a conflicting tree. So severe are the problems that a 2013 paper reported "the more we learn about genomes the less tree-like we find their evolutionary history to be,"[145] and a 2012 paper proposed "life might indeed have multiple origins."[146] This implies a breakdown in the common ancestry hypothesis.

Evolutionists will sometimes cite the congruence of the Cytochrome C tree with standard evolutionary trees as confirming theories of common descent. They rarely discuss the Cytochrome B tree, which has severe conflicts with the standard phylogeny of animal groups.[147] Cherry-picking data does not inspire confidence in the methods used to construct phylogenetic trees and advocate for common descent. An article in *Nature* reported that "disparities between molecular and morphological trees" lead to "evolution wars" because "evolutionary trees constructed by studying biological molecules often don't resemble those drawn up from morphology."[148]

Evolutionists often argue that shared amino acid sequences in genes across different organisms indicates that they must share a common ancestor. This circular argument rests upon the assumption that shared genetic similarities must be the result of 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 genetic sequences may also be generated as a result of functional requirements and common design rather than by common descent.

Chemistry—The Chemical Origin of Life remains an Unsolved Mystery: The mystery of the origin of life is unsolved, and all existing theories of chemical evolution face major problems. Basic deficiencies in chemical evolution include a lack of explanation for how a primordial soup could arise on the early earth's hostile environment, or how the information required for life could have been generated by blind chemical reactions. Leading evolutionary biologist Massimo Pigliucci has admitted that "we really don't have a clue how life originated on Earth by natural means,"[149] and leading origin of life researcher David Deamer asserts that "genetic information more or less came out of nowhere by chance assemblages of short polymers."[150]

Origin of life theorists have struggled simply to account for the origin of pre-biological organic chemicals on the early earth, with little success. For example, it is now known that the gasses used in the famous Miller-Urey experiments were not present on the early earth.[151] But this is only the beginning of the problem. 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."[152] Accounting for the origin of a self-replicating molecule would still not explain how modern cells arose. Our DNA code requires an irreducibly complex system requiring the information in DNA, the enzymes that assist DNA's replication and protection, a protective cell membrane, 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."[153]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."[154]

Scientists may one day create life in the lab, but they will have done so using intelligent design. The theory that life could have originated via blind natural chemical processes and sheer dumb luck remains unexplained. As Harvard chemist George Whitesides stated: "The Origin of Life. This problem is one of the big ones in science. It begins to place life, and us, in the universe. Most chemists believe, as do I, that life emerged spontaneously from mixtures of

molecules in the prebiotic Earth. How? I have no idea."[155] Likewise, a paper in the journal *Complexity* stated: "Many different ideas are competing and none is available to provide a sufficiently plausible root to the first living organisms."[156]

Icons of Evolution—Textbooks often overstate or misstate the evidence for modern evolutionary theory: Modern biology textbooks often paper over scientific evidence that dissents from the standard lines of evidence—or "icons"—used to support Darwinian evolution. For example, when attempting to demonstrate common ancestry, textbooks frequently portray drawings of vertebrate embryos which *inaccurately overstate* the similarities between different organisms in their earliest stages of development.[157] Textbooks also often present examples of small-scale "microevolution" and overextrapolate the evidence to make unwarranted claims about "macroevolution." They discuss minute changes in the sizes of beaks on the Galápagos finches or small changes in the colors of peppered moths[158] to claim that fundamentally new types of organisms can evolve via Darwinian processes. As evolutionary biologist Robert L. Carroll asks: "Can changes in individual characters, such as the relative frequency of genes for light and dark wing color in moths adapting to industrial pollution, simply be multiplied over time to account for the origin of moths and butterflies within insects, the origin of insects from primitive arthropods, or the origin of arthropods from among primitive multicellular organisms?"[159] Many scientists feel the answer is "no"—but biology textbooks never inform students of this fact.

Neo-Darwinian Evolution is Strongly Critiqued by Mainstream Scientists: The mainstream scientific and academic literature is becoming saturated with papers challenging the central tenets of neo-Darwinian theory. A 2011 paper in *Biological Theory* stated, "Darwinism in its current scientific incarnation has pretty much reached the end of its rope,"[160] and in 2012, the noted atheist philosopher Thomas Nagel argued in an Oxford University Press book that "the materialist neo-Darwinian conception of nature is almost certainly false."[161]

An article in *Trends in Ecology and Evolution* from 2008 acknowledge that there exists a "healthy debate concerning the sufficiency of neo-Darwinian theory to explain macroevolution."[162] In 2009, Günter Theißen wrote in the journal *Theory in Biosciences* that modern Darwinian theory has not fully explained biological complexity:

> [W]hile we already have a quite good understanding of how organisms adapt to the environment, much less is known about the mechanisms behind the origin of evolutionary novelties, a process that is arguably different from adaptation. Despite Darwin's undeniable merits, explaining how the enormous complexity and diversity of living beings on our planet originated remains one of the greatest challenges of biology.[163]

An even more striking criticism of what he called the "dogmatic science" of neo-Darwinian thinking can be found in a 2006 paper by Theißen:

> Explaining exactly how the great complexity and diversity of life on earth originated is still an enormous scientific challenge . . . . There is the widespread attitude in the scientific community that, despite some problems in detail, textbook accounts on evolution have essentially solved the problem already. In my view, this is not quite correct.[164]

Evolutionary biologist Stanley Salthe likewise describes himself as "a critic of Darwinian evolutionary theory,"[165] which he insists "cannot explain origins, or the actual presence of forms and behaviors"[166] in organisms. Journalist Susan Mazur elaborates on Salthe's criticisms of Darwinism:

> Stanley Salthe, a natural philosopher at Binghamton University with a PhD in zoology – who says he can't get published in the mainstream media with his views .. . . told me the following: "Oh sure natural selection's been demonstrated . . . the interesting point, however, is that it has rarely if ever been demonstrated to have anything to do with evolution in the sense of long-term changes in populations . . . . Summing up we can see that the import of the Darwinian theory of evolution is just unexplainable caprice from top to bottom. What evolves is just what happened to happen."[167]

Mazur gained notoriety for reporting on the 2008 Altenberg 16 conference where critics of neo-Darwinism gathered in Altenberg, Austria to discuss insufficiencies of the modern synthesis of evolution. According to Mazur, there are

"hundreds of other evolutionary scientists (non-creationists) who contend that natural selection is politics, not science, and that we are in a quagmire because of staggering commercial investment in a Darwinian industry built on an inadequate theory."[168]

Nature also published an article covering the Altenberg 16 conference,[169] quoting biologist Scott Gilbert stating that "[t]he modern synthesis is remarkably good at modeling the survival of the fittest, but not good at modeling the arrival of the fittest." Stuart Newman stated in the same article, "You can't deny the force of selection in genetic evolution . . . but in my view this is stabilizing and fine-tuning forms that originate due to other processes." Evolutionary paleobiologist Graham Budd was similarly open in the article about deficiencies in explanations of key evolutionary transitions: "When the public thinks about evolution, they think about the origin of wings and the invasion of the land, . . . [b]ut these are things that evolutionary theory has told us little about."

Also in 2008, William Provine, a Cornell University historian of science and evolutionary biologist, gave a talk before the History of Science Society arguing that "[e]very assertion of the evolutionary synthesis below is false":

> 1. Natural selection was the primary mechanism at every level of the evolutionary process. Natural selection caused genetic adaptation ... . 4. Evolution of phenotypic characters such as eyes and ears, etc, was a good guide to protein evolution: or, protein evolution was expected to mimic phenotypic evolution. 5. Protein evolution was a good guide to DNA sequence evolution. Even Lewontin and Hubby thought, at first, that understanding protein evolution was the key to understanding DNA evolution. 6. Recombination was far more important than mutation in evolution. 7. Macroevolution was a simple extension of microevolution. 8. Definition of "species" was clear[—]the biological species concept of Dobzhansky and Mayr. 9. Speciation was understood in principle. 10. Evolution is a process of sharing common ancestors back to the origin of life, or in other words, evolution produces a tree of life. 11. Inheritance of acquired characters was impossible in biological organisms. 12. Random genetic drift was a clear concept and invoked constantly whenever population sizes were small, including fossil organisms. 13. The evolutionary synthesis was actually a synthesis.[170]

The following year, Eugene Koonin of the National Center for Biotechnology Information stated in *Trends in Genetics* that due to breakdowns in core neo-Darwinian tenets such the "traditional concept of the tree of life" or the view that "natural selection is the main driving force of evolution" indicate that "the modern synthesis has crumbled, apparently, beyond repair" and "all major tenets of the modern synthesis have been, if not outright overturned, replaced by a new and incomparably more complex vision of the key aspects of evolution." Koonin concludes, "not to mince words, the modern synthesis is gone."[171]

Given this mass of credible scientific dissent from neo-Darwinism, Stephen Meyer observed in his 2013 book *Darwin's Doubt* that "Rarely has there been such a great disparity between the popular perception of a theory and its actual standing in the relevant peer-reviewed scientific literature."[172]

More Information:

- *Explore Evolution: The Arguments For and Against Neo-Darwinism* by Stephen C. Meyer, Scott Minnich, Paul Nelson, Jonathan Moneymaker, Ralph Seelke (Hill House, 2007) — www.exploreevolution.com
- *Darwin on Trial* by Phillip Johnson (InterVarsity Press 1991).
- *The Mystery of Life's Origin: Reassessing Current Theories*, by Charles B. Thaxton, Walter Bradley, and Roger Olsen (Philosophical Library, 1984).
- Casey Luskin, "The Top Ten Scientific Problems with Biological and Chemical Evolution," in *More Than Myth?*, Robert Stackpole and Paul Brown eds. (Chartwell Press, 2014).
- *Icons of Evolution: Why Much of What We Teach about Evolution is Wrong*, by Jonathan Wells (Regnery, 2000) — www.iconsofevolution.com
- "Survival of the Fakest," by Jonathan Wells, *American Spectator* (January, 2001) — www.discovery.org/a/1209

Part IV: Information About the Discovery Institute's Summer Seminars on Intelligent Design

Each July, Discovery Institute's Center for Science and Culture hosts an extraordinary opportunity for college students in the natural sciences, social sciences, and humanities to participate in an intensive nine-day seminar program that will prepare them to make research contributions advancing the growing science of intelligent design. This is a great opportunity for students who have heard only the anti-ID view in their college courses to learn about the topic from leading ID theorists. Two seminars are available:

- **Intelligent Design in the Natural Sciences** is designed for college-level juniors, seniors, and first-year graduate students who intend to pursue graduate studies in the natural sciences or the philosophy of science.
- **C.S. Lewis Fellows Program on Science and Society** is designed for college-level juniors, seniors, and first-year graduate students who intend to pursue graduate studies in the social sciences (including law) or the humanities.

Both seminars run concurrently and explore cutting-edge ID work in molecular biology, biochemistry, embryology, developmental biology, zoology, paleontology, computational biology, ID-theoretic mathematics, cosmology, physics, philosophy of science, philosophy of mind, evolutionary ethics, bioethics, criminology, law, education, and economics. Each seminar also includes frank treatment of the academic realities that ID researchers confront in graduate school and beyond, and strategies for dealing with them.

The seminar focusing on ID in the natural sciences will explore the scientific issues in greater technical detail and include a visit to a laboratory where molecular biological research is pursued from an ID perspective. The C.S. Lewis Fellows Program on Science and Society will give more in-depth attention to the social impact of science, the moral implications of science, and legal issues surrounding the debate between neo-Darwinism and intelligent design. Participants in both seminars will benefit from classroom instruction and interaction with prominent ID researchers and scholars such as Stephen Meyer, William Dembski, Michael Behe, Jonathan Wells, Paul Nelson, Douglas Axe, Scott Minnich, Bruce Gordon, John West, Jonathan Witt, and Casey Luskin.

Do you have a commitment to truth and to following the evidence where it leads? Do you have the desire, the vision and the determination necessary to breathe new purpose into the scientific enterprise and influence its self-understanding in ways that will benefit both science and humanity? Apply to become one of a select group of students participating in these exciting workshops.

Admission Requirements: You must be currently enrolled in a college or university as a junior, senior, or first-year graduate student. Required application materials include a resume/cv, a copy of your academic transcript, a short statement of your interest in intelligent design and its perceived relationship to your career plans and field of study, and either a letter of recommendation from a professor who knows your work and is friendly toward ID, or a phone interview with the CSC Research Director.

Room, Board, and Travel Costs: Students selected for these seminars can have their travel costs to Seattle fully or partly covered and will be provided with course materials, lodging and most meals.

Application deadline: Students can apply or find out more information by going to **www.discovery.org/sem**. Questions should be directed to the Research Director for the Center for Science and Culture at researchdirector@discovery.org.

For more information, see www.discovery.org/sem

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