Is Intelligent Design Testable?
A Response to Eugenie Scott

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Eugenie Scott is a physical anthropologist who as director of the National Center for Science Education travels the United States warning audiences about the threat of creationism and unmasking its various guises. Intelligent design, according to her, is currently the most sinister of these guises. Scott has developed a standard shtick, which includes not only some well-worn arguments against creationism and some newer arguments against intelligent design (which she refers to as "neocreationism") but also some comedic elements, like the Monty Python wink-wink-nudge-nudge routine, which she uses when she wants to make clear to her audiences that the designer of intelligent design is really none other than the "Big G" of the Christian faith.

Recently (January 18, 2001) Scott presented a lecture at U.C. Berkeley sponsored by the department of integrative biology and titled "Icons of Creationism: The New Anti-Evolutionism and Science." The title alludes to Jonathan Wells's recent book *Icons of Evolution*, which critiques the various standard evidences used in textbooks to support Darwinian evolution. Scott presumably means to turn the tables and show that intelligent design is similarly open to criticism.

Scott's key criticism against intelligent design, both in her talk the other day and since the early nineties, has been that intelligent design is untestable. For instance, in an exchange with Stephen Meyer back in 1994 in *Insight* magazine, Scott remarked that until design theorists develop a "theo-meter" (this neologism is hers) to test for design, they are treading water in a sea of retarded scientific aspirations. In her talk the other day at U.C. Berkeley she claimed that intelligent design does not propose any "testable model."

The testability objection to intelligent design can be interpreted in two ways. One is to claim that intelligent design is in principle untestable. This seems to have been Scott's line in the early nineties. Certainly it is a hallmark of science that any of its claims be subject to revision or refutation on the basis of new evidence or further theoretical insight. If this is what one means by testability, then design is certainly testable. Indeed, it was in this sense that Darwin tested William Paley's account of design and found it wanting. It simply won't wash to say that design isn't testable and then in the same breath say that Darwin tested design and refuted it.

The other way to interpret the testability objection is to claim that intelligent design may in principle be testable, but that no tests have been proposed to date. This seems to be Scott's line currently. Indeed, if the testability objection is to bear any weight, its force

must reside in the absence of concrete proposals for testing intelligent design. Are such proposals indeed lacking? Rather than looking solely at the testability of intelligent design, I want also to consider the testability of Darwinism. By comparing the testability of the two theories, it will become evident that even the more charitable interpretation of Scott's testability objection does not hold up.

In relation to science testability is a very broad notion. It certainly includes Karl Popper's notion of falsifiability, but it is hardly coextensive with it and can apply even if falsifiability does not obtain. Testability as well covers confirmation, predictability, and explanatory power. At the heart of testability is the idea that our scientific theories must make contact with and be sensitive to what's happening in nature. What's happening in nature must be able to affect our scientific theories not only in form and content but also in the degree of credence we attach to or withhold from them. For a theory to be immune to evidence from nature is a sure sign that we're not dealing with a scientific theory.

What then are we to make of the testability of both intelligent design and Darwinism taken not in a generic abstract sense but concretely? What are the specific tests for intelligent design? What are the specific tests for Darwinism? And how do the two theories compare in terms of testability? To answer these questions, let's run through several aspects of testability, beginning with falsifiability.

Falsifiability

Is intelligent design falsifiable? Is Darwinism falsifiable? Yes to the first question, no to the second. Intelligent design is eminently falsifiable. Specified complexity in general and irreducible complexity in biology are within the theory of intelligent design the key markers of intelligent agency. If it could be shown that biological systems like the bacterial flagellum that are wonderfully complex, elegant, and integrated could have been formed by a gradual Darwinian process (which by definition is non-telic), then intelligent design would be falsified on the general grounds that one doesn't invoke intelligent causes when purely natural causes will do. In that case Occam's razor finishes off intelligent design quite nicely.

On the other hand, falsifying Darwinism seems effectively impossible. To do so one must show that no conceivable Darwinian pathway could have led to a given biological structure. What's more, Darwinists are apt to retreat into the murk of historical contingency to shore up their theory. For instance, Allen Orr in his critique of Behe's work shortly after *Darwin's Black Box* appeared remarked, "We have no guarantee that we can reconstruct the history of a biochemical pathway." What he conceded with one hand, however, he was quick to retract with the other. He added, "But even if we can't, its irreducible complexity cannot count against its gradual evolution."

The fact is that for complex systems like the bacterial flagellum no biologist has or is anywhere close to reconstructing its history in Darwinian terms. Is Darwinian theory therefore falsified? Hardly. I have yet to witness one committed Darwinist concede that any feature of nature might even in principle provide countervailing evidence to

Darwinism. In place of such a concession one is instead always treated to an admission of ignorance. Thus it's not that Darwinism has been falsified or disconfirmed, but that we simply don't know enough about the biological system in question and its historical context to determine how the Darwinian mechanism might have produced it.

For instance, to neutralize the challenge that the irreducible complexity of the bacterial flagellum raises against Darwinism, Ken Miller employs the following argument from ignorance. Like the rest of the biological community, Miller doesn't know how the bacterial flagellum originated. The biological community's ignorance about the flagellum, however, doesn't end with its origin but extends to its very functioning. For instance, according to David DeRosier, "The mechanism of the flagellar motor remains a mystery." Miller takes this admission of ignorance by DeRosier and uses it to advantage. In *Finding Darwin's God* he writes: "Before [Darwinian] evolution is excoriated for failing to explain the evolution of the flagellum, I'd request that the scientific community at least be allowed to figure out how its various parts work." But in the article by DeRosier that Miller cites, Miller conveniently omits the following quote: "More so than other motors, the flagellum resembles a machine designed by a human."

So apparently we know enough about the bacterial flagellum to know that it is designed or at least design-like. Indeed, we know what most of its individual parts do. Moreover, we know that the flagellum is irreducibly complex. Far from being a weakness of irreducible complexity as Miller suggests, it is a strength of the concept that one can determine whether a system is irreducibly complex without knowing the precise role that each part in the system plays (one need only knock out individual parts and see if function is preserved; knowing what exactly the individual parts do is not necessary). Miller's appeal to ignorance obscures just how much we know about the flagellum, how compelling the case is for its design, and how unfalsifiable Darwinism is when Darwinists proclaim that the Darwinian selection mechanism can account for it despite the absence of any identifiable biochemical pathway.

Confirmation

What about positive evidence for intelligent design and Darwinism? From the design theorist's perspective, the positive evidence for Darwinism is confined to small-scale evolutionary changes like insects developing insecticide resistance. This is not to deny large-scale evolutionary changes, but it is to deny that the Darwinian mechanism can account for them. Evidence like that for insecticide resistance confirms the Darwinian selection mechanism for small-scale changes, but hardly warrants the grand extrapolation that Darwinists want. It is a huge leap going from insects developing insecticide resistance via the Darwinian mechanism of natural selection and random variation to the very emergence of insects in the first place by that same mechanism.

Darwinists invariably try to minimize the extrapolation from small-scale to large-scale evolution, arguing that it is a failure of imagination on the part of critics to appreciate the wonder-working power of the Darwinian mechanism. From the design theorist's perspective, however, this is not a case of failed imagination but of the emperor's new

clothes. Yes, there is positive evidence for Darwinism, but the strength and relevance of that evidence on behalf of large-scale evolution is very much under dispute, if not within the Darwinian community then certainly outside of it.

What about the positive evidence for intelligent design? It seems that here we may be getting to the heart of Eugenie Scott's concerns. I submit that there is indeed positive evidence for intelligent design. To see this, let's consider an example that I recycle endlessly in my writings (if only because its force seems continually lost on Darwinists). Consider the movie *Contact* that appeared summer of 1997, based on the novel by Carl Sagan. In the movie radio astronomers determine that they have established contact with an extraterrestrial intelligence after they receive a long sequence of prime numbers, represented as a sequence of bits.

Although in the actual SETI program (Search for Extraterrestrial Intelligence) radio astronomers look not for something as flamboyant as prime numbers but something much more plebeian, namely, a narrow bandwidth of transmissions (as occur with human radio transmissions), the point nonetheless remains that SETI researchers would legitimately count a sequence of prime numbers (and less flamboyantly though just as assuredly a narrow bandwidth transmission) as positive evidence of extraterrestrial intelligence. No such conclusive signal has yet been observed, but I can assure you that if it were to be observed, Eugenie Scott would not be complaining about SETI not having proposed any "testable models." Instead she would rejoice that the model had been tested and decisively confirmed.

Now what's significant about a sequence of prime numbers from outer space is that they exhibit specified complexity--there has to be a long sequence (hence complexity) and it needs to display an independently given pattern (hence specificity). But what if specified complexity is also exhibited in actual biological systems? In fact it is--notably in the bacterial flagellum. Internet mavens have been pestering me for actual calculations of complexity involved in such systems. I address this in my forthcoming book (*No Free Lunch*), but such calculations are out there in the literature (cf. the work of Hubert Yockey, Robert Sauer, Peter R st, Paul Erbrich, Siegfried Scherer, and most recently Douglas Axe--I'm not enlisting these individuals as design advocates but merely pointing out that methods for determining specified complexity are already part of biology).

Even so, it appears that Eugenie Scott would not be entirely happy admitting that intelligent design is positively confirmed once some clear-cut instances of specified complexity are discovered in biological systems. Why not? As she put it in her U.C. Berkeley lecture, design theorists "never tell you what happened." Well, neither do SETI researchers. If a SETI researcher discovers a radio transmission of prime numbers from outer space, the inference to an extraterrestrial intelligence is clear, but the researcher doesn't know "what happened" in the sense of knowing any details about the radio transmitter or for that matter the extraterrestrial that transmitted the radio transmission.

Ah, but we have experience with radio transmitters. At least with extraterrestrial intelligences we can guess what might have happened. But we don't have any experience

with unembodied designers, and that's clearly what we're dealing with when it comes to design in biology. Actually, if an unembodied designer is responsible for biological complexity, then we do have quite a bit of experience with such a designer through the designed objects (not least ourselves) that confront us all the time. On the other hand, it is true that we possess very little insight at this time into how such a designer acted to bring about the complex biological systems that have emerged over the course of natural history.

Darwinists take this present lack of insight into the workings of an unembodied designer not as remediable ignorance on our part and not as evidence that the designer's capacities far outstrip ours, but as proof that there is no unembodied designer (at least none relevant to biology). By the same token, if an extraterrestrial intelligence communicated via radio signals with earth and solved computational problems that exceeded anything an ordinary or quantum computer could ever solve, we would have to conclude that we weren't really dealing with an intelligence because we have no experience of super-mathematicians that can solve such problems. My own view is that with respect to biological design humans are in the same position as William James's dog studying James while James was reading a book in his library. Our incomprehension over biological design is the incomprehension of a dog trying to understand its master's actions. Interestingly, the biological community regularly sings the praises of natural selection and the wonders it has wrought while admitting that it has no comprehension of how those wonders were wrought. Natural selection, we are assured, is cleverer than we are or can ever hope to be. Darwinists have merely swapped one form of awe for another. They've not eliminated it.

It is no objection at all that we don't at this time know how an unembodied designer produced a biological system that exhibits specified complexity. We know that specified complexity is reliably correlated with the effects of intelligence. The only reason to insist on looking for non-telic explanations to explain the complex specified structures in biology is because of prior commitment to naturalism that perforce excludes unembodied designers. It is illegitimate, scientifically and rationally, to claim on a priori grounds that such entities do not exist, or if they do exist that they can have no conceivable relevance to what happens in the world. Do such entities exist? Can they have empirical consequences? Are they relevant to what happens in the world? Such questions cannot be prejudged except on metaphysical grounds. To prejudge these questions the way Eugenie Scott does is therefore to make certain metaphysical commitments about what there is and what has the capacity to influence events in the world. Such commitments are utterly gratuitous to the practice of science. Specified complexity confirms design regardless whether the designer responsible for it is embodied or unembodied.

Predictability

Another aspect of testability is predictability. A good scientific theory, we are told, is one that predicts things. If it predicts things that don't happen, then it is tested and found wanting. If it predicts things that do happen, then it is tested and regarded as successful. If it doesn't predict things, however, what then? Often with theories that try to account for features of natural history, prediction gets generalized to include retrodiction, in which a

theory also specifies what the past should look like. Darwinism is said to apply retrodictively to the fossil record and predictively in experiments that place an organism under selection pressures and attempt to induce some adaptive change.

But in fact Darwinism does not retrodict the fossil record. Natural selection and random variation applied to single-celled organisms offers no insight at all into whether we can expect multi-celled organisms, much less whether evolution will produce the various body-plans of which natural history has left us a record. At best one can say that there is consilience, i.e., that the broad sweep of evolutionary history as displayed in the fossil record is consistent with Darwinian evolution. Design theorists strongly dispute this as well (pointing especially to the Cambrian explosion). But detailed retrodiction and detailed prediction are not virtues of Darwin's theory. Organisms placed under selection pressures either adapt or go extinct. Except in the simplest cases where there is, say, some point mutation that reliably confers antibiotic resistance on a bacterium, Darwin's theory has no way of predicting just what sorts of adaptive changes will occur. "Adapt or go extinct" is not a prediction of Darwin's theory but an axiom that can be reasoned out independently.

Challenging me in *American Outlook* biologist Alex Duncan remarked: "A scientific theory makes predictions about the world around us, and enables us to ask and answer meaningful questions. For example, we might pose the question 'why do polar bears have fur, while penguins have feathers, given the similar nature of their environments?' Evolution provides an answer to this question. The only answer creationism (or intelligent design) provides is 'because God made them that way.'" Actually, evolution, whether Darwinian or otherwise, makes no predictions about there being bears or birds at all or for that matter bears having fur and birds having feathers. Once bears or birds are on the scene, they need to adapt to their environment or die. Intelligent design can accommodate plenty of evolutionary change and allows for natural selection to act as a conservative force to keep organisms adapted to their environments. Contrary to Duncan's remark, intelligent design does not push off all explanation to the inscrutable will of God. On the other hand, intelligent design utterly rejects natural selection as a creative force capable of bringing about the specified complexity we see in organisms.

It's evident, then, that Darwin's theory has virtually no predictive power. Insofar as it offers predictions, they are either extremely general, concerning the broad sweep of natural history and in that respect quite questionable (Why else would Stephen Jay Gould and Niles Eldredge need to introduce punctuated equilibria if the fossil record were such an overwhelming vindication of Darwinism?); and when the predictions are not extremely general they are extremely specific and picayune, dealing with small-scale adaptive changes. Newton was able to predict the path that a planet traces out. Darwin's disciples can neither predict nor retrodict the pathways that organisms trace out in the course of natural history.

But what about the predictive power of intelligent design? To require prediction fundamentally misconstrues design. To require prediction of design is to put design in the same boat as natural laws, locating their explanatory power in an extrapolation from past

experience. This is to commit a category mistake. To be sure, designers, like natural laws, can behave predictably (designers often institute policies that end up being rigidly obeyed). Yet unlike natural laws, which are universal and uniform, designers are also innovators. Innovation, the emergence to true novelty, eschews predictability. Designers are inventors. We cannot predict what an inventor would do short of becoming that inventor. Intelligent design offers a radically different problematic for science than a mechanistic science wedded solely to undirected natural causes. Yes, intelligent design concedes predictability. But this represents no concession to Darwinism, for which the minimal predictive power that it has can readily be assimilated to a design-theoretic framework.

Explanatory Power

According to Darwin the great advantage of his theory over William Paley's theory of design was that Darwin's theory managed to account for a wide diversity of biological facts that Paley's theory could not. Darwin's theory was thus thought to have greater explanatory power than Paley's , and this relative advantage could be viewed as a test of the two theories. Underlying explanatory power is a view of explanation known as inference to the best explanation in which a "best explanation" always presupposes at least two competing explanations and attempts to determine which comes out on top. Design theorists see advances in the biological and information sciences as putting design back in the saddle and enabling it to outperform Darwinism, thus making design currently the best explanation of biological complexity. Darwinists of course see the matter quite differently.

What I want to focus on here, however, is not the testing of Darwinism and design against the broad body of biological data, but the related question of which theory can accommodate the greater range of biological possibilities. Think of it this way: Are there things that might occur in biology for which a design-theoretic framework could give a better, more accurate account than a purely Darwinian and therefore non-teleological framework? The answer is yes.

First off, let's be clear that design can accommodate all the results of Darwinism. Intelligent design does not repudiate the Darwinian mechanism. It merely assigns it a lower status than Darwinism does. The Darwinian mechanism does operate in nature and insofar as it does, design can live with its deliverances. Even if the Darwinian mechanism could be shown to do all the design work for which design theorists want to invoke design (say for the bacterial flagellum), a design-theoretic framework would not destroy any valid findings of science. To be sure, design would then become superfluous, but it would not become contradictory or self-refuting.

The same cannot be said for Darwinism and the naturalism it embodies as a framework for science. Suppose I were a super-genius molecular biologist, and I invented some hitherto unknown molecular machine, far more complicated and marvelous than the bacterial flagellum. Suppose further I inserted this machine into a bacterium, set this genetically modified organism free, allowed it to reproduce in the wild, and destroyed all

evidence of my having created the molecular machine. Suppose, for instance, the machine is a stinger that injects other bacteria and explodes them by rapidly pumping them up with some gas (I'm not familiar with any such molecular machine in the wild), thereby allowing the bacteria endowed with my invention to consume their unfortunate prey.

Now let's ask the question, If a Darwinist came upon this bacterium with the novel molecular machine in the wild, would that machine be attributed to design or to natural selection? When I presented this example to David Sloan Wilson at a conference at MIT two years ago, he shrugged it off and remarked that natural selection created us and so by extension also created my novel molecular machine. But of course this argument won't wash since the issue is whether natural selection could indeed create us. What's more, if Darwinists came upon my invention of a novel molecular machine inserted into a bacterium that allows it to feed on other bacteria, they wouldn't look to design but would reflexively turn to natural selection. But, if we go with the story, I designed the bacterial stinger and natural selection had nothing to do with it. Moreover, intelligent design would confirm the stinger's design whereas Darwinism never could. It follows that a design-theoretic framework could account for biological facts that would forever remain invisible within a Darwinian framework. It seems to me that this possibility constitutes a joint test of Darwinism and intelligent design that strongly supports intelligent design--if not as the truth then certainly as a live possible theoretical option that must not be precluded for a priori philosophical reasons like naturalism.

In conclusion, there is no merit to Eugenie Scott's claim that intelligent design is untestable or hasn't put forward any "testable models." Intelligent design's claims about specified and irreducible complexity are in close contact with the data of biology and open to refutation as well as confirmation. What's more, as a framework for doing science intelligent design is more robust and sensitive to the possibilities that nature might actually throw our way than Darwinism, which must view everything through the lens of chance and necessity and take a reductive approach to all signs of teleology in nature.

But isn't intelligent design just a stone's throw from fundamentalist Christianity and rabid creationism? Even if a theory of intelligent design should ultimately prove successful and supersede Darwinism, it would not follow that the designer posited by this theory would have to be the Christian God or for that matter be real in some ontological sense. One can be an anti-realist about science and simply regard the designer as a regulative principle--a conceptually useful device for making sense out of certain facts of biology--without assigning the designer any weight in reality. Wittgenstein, for instance, regarded the theories of Copernicus and Darwin not as true but as "fertile new points of view."

Ultimately, the main question that confronts scientists working on a theory of intelligent design is whether design provides powerful new insights and fruitful avenues of research. The metaphysics underlying such a theory, and in particular the ontological status of the designer, can then be taken up by philosophy and theology. Indeed, one's metaphysics ought to be a matter of indifference to one's scientific theorizing about design. The fact

that it is not for Eugenie Scott says more about her own biases than about the biases of design theorists, whose primary task is to explore the fruitfulness of design for science. Yes, we've got our work cut out for us. But instead of facilitating that work, Scott and her National Center for Science Education are far more interested in exiling that work to oblivion. Fortunately, design theorists have suffered exile for so long at the hands of Darwinists that we've learned to operate effectively even in oblivion.

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