



Dennis R. Venema

Intelligent Design, Abiogenesis, and Learning from History: A Reply to Meyer

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Weizsäcker's book The World View of Physics is still keeping me very busy. It has again brought home to me quite clearly how wrong it is to use God as a stop-gap for the incompleteness of our knowledge. If in fact the frontiers of knowledge are being pushed back (and that is bound to be the case), then God is being pushed back with them, and is therefore continually in retreat. We are to find God in what we know, not in what we don't know; God wants us to realize his presence, not in unsolved problems but in those that are solved.

Dietrich Bonhoeffer¹

I am thankful for this opportunity to reply to Stephen Meyer's criticisms of my review² of his book *Signature in the Cell* (hereafter *Signature*). Meyer's critiques of my review fall into two general categories. First, he claims I mistook *Signature* for an argument against biological evolution, rendering several of my arguments superfluous. Secondly, Meyer asserts that I have failed to refute his thesis by not providing a "causally adequate alternative explanation" for the origin of life in that the few relevant critiques I do provide are "deeply flawed." I will address these issues in turn.

Straw Man or Valid Critique?

I find Meyer's claim that biological evolution is irrelevant to the argument of *Signature* curious for several reasons. The most important reason is that the basic argument of *Signature* requires that biological evolution be incapable of generating new information. A constant thread running through *Signature* is the claim that *all* information, whatever its

nature, is the result of intelligence. Moreover, this assertion is proffered as the logical basis for inferring design for the origin of biological information: if information only ever arises from intelligence, then the mere presence of information demonstrates design. A few examples from *Signature* make the point easily:

... historical scientists can show that a presently acting cause must have been present in the past because the proposed candidate is the *only known cause* of the effect in question. If there is only one possible cause of a salient piece of evidence, then clearly the presence of that evidence establishes the past existence of its cause. (*Signature*, p. 167, emphasis in original)

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Indeed, our uniform experience affirms that specified information—whether inscribed in hieroglyphics, written in a book, encoded in a radio signal, or produced in a simulation experiment—*always* arises from an intelligent source, from a mind and not strictly a material process. So the discovery of the specified digital information in the DNA molecule provides strong grounds for inferring that intelligence played a role in the origin of DNA. Indeed, whenever we find specified information and we know the causal story of how that information arose, we always find that it arose from an intelligent source. It follows that the best, most causally adequate explanation for the origin of the specified, digitally encoded information in DNA is that it too had an intelligent source. (*Signature*, p. 347, emphasis in original)

Moreover, because experience shows that an intelligent agent is not only a known, but the *only* known cause of specified, digitally encoded information, the theory of intelligent design developed in this book has passed two critical tests: the tests of causal adequacy and causal existence ... Precisely because intelligent design uniquely passed these tests, I argued that it stands as the best explanation of the DNA enigma. (*Signature*, p. 405, emphasis in original)

The strength of this argument depends on the assertion that all information arises from intelligence. Note well: the argument requires that all information, in any form, be the result of intelligence, not just the information required for the origin of life. If any natural mechanism can be found that produces information of any sort, Meyer's argument collapses simply based on its own internal logic. This is not a peripheral argument tucked away in an appendix: it is warp and woof of the entire book, and Meyer reiterates it unchanged, even within his response.³ It was in this context and to this end that I discussed several examples of how evolutionary mechanisms generate biological information in my original review,⁴ and later in more detail as a series of blog posts for the BioLogos Foundation.⁵ In those sources, readers may examine the evidence that, contra Meyer, large amounts of new information have indeed arisen through the natural mechanisms of biological evolution. If a natural mechanism can produce information, then Meyer cannot claim that only intelligence produces it. As such, he cannot reliably infer that the information we see in modern DNA was designed,

since information is not uniquely associated with intelligent activity.

A second reason for puzzlement is that Meyer does indeed argue that Douglas Axe's work on *biological* evolution is evidence that information cannot arise in a *prebiotic* environment. A careful examination of how Meyer frames Axe's work is illuminating:

Thus, as a specific test of the efficacy of the neo-Darwinian mechanism (*as well as the chance origin of information in a prebiotic setting*), Axe posed the question: How rare or common are functional protein folds within their corresponding amino acid-sequence space? ... It's important to emphasize that Axe's prediction follows from the premise that intelligent design played a role in the origin of new genes and proteins during biological (*or chemical*) evolution. Since the case for intelligent design as the best explanation for the origin of biological information necessary to build novel forms of life depends, in part, upon the claim that functional (information-rich) genes and proteins cannot be explained by random mutation and selection, this design hypothesis ...” (*Signature*, pp. 494–5, emphases mine)

Note several features. Clearly both biological and chemical evolution are in view here, since Meyer explicitly says so twice. He claims that Axe's work, which is about biological evolution only, is a test of the possibility that information could arise *prebiotically*. He also feels that it is “important to emphasize” that Axe's work flows from a specific premise, not a prediction. And what is that premise? That “design played a role in the origin of new genes and proteins during biological (or chemical) evolution.” Meyer then goes on to cite Axe's 2004 paper as “initial confirmation” of Axe's prediction, thus providing support for his argument that information cannot arise through chemical evolution.

The important point here is simple: evidence that refutes Axe's work on biological evolution, such as I have provided, does indeed undercut Meyer's argument. Meyer cannot simultaneously claim support from Axe's work on biological evolution for his own views on chemical evolution *and* claim that I am erecting a straw man by pointing out the flaws in Axe's work. Meyer's attempt to excise it notwithstanding, this appendix is functional and relevant to the argument of *Signature*.⁶ Furthermore, the point I raised in my original review still stands: the obser-

vation that biological evolution can add large amounts of information to DNA is a very good reason to investigate if similar processes were in operation at the origin of life.

Apologetics and Science: Learning from History

All apologetics arguments based on the lack of scientific knowledge, such as those Meyer employs in *Signature*, are potentially vulnerable to future advances in scientific understanding. As such, it is wise to carefully evaluate such arguments in an attempt to estimate their long-term stability. While there is no standard metric for such evaluations, I commonly keep the following questions in mind.

1. *Is scientific research in this area no longer productive?*

The most obvious question to ask when faced with such an argument is whether the relevant area of science is advancing in knowledge. In the biological sciences, a quick scan of the PubMed index is usually sufficient to answer this question.⁷ Even if the specific point of knowledge claimed as unsolvable by science is not directly addressed in the current literature, it is premature to claim that it never will be solved if the field is advancing.

2. *Is the area of science used for the argument a “frontier” area of science or a well-established area in which core ideas have not changed significantly for some time?*

Frontier science differs greatly from areas in which science is more settled (so-called “consensus” or “textbook” science).⁸ In the absence of a well-tested theory to inform research, investigators in the field explore numerous competing hypotheses. These hypotheses, should they find experimental support, may, in the future, become part of a more theory-like framework, though they will likely be modified in the process. Additionally, many hypotheses will be discarded along the way. In this “wild west” environment, researchers critique competing hypotheses vigorously, pointing out what they perceive as flaws and shortcomings. This is all well and good, for any explanatory framework worthy of the term “theory,” in the scientific sense, must survive this trial by experimental and peer-reviewed fire.⁹ Frontier science, by its very nature, is not stable for the purposes of developing apologetics arguments. It is simply not possible to argue from a position of scientific strength

when the science itself is in flux. Frontier science remains a tempting source for apologists, however, in that it is a natural place to look for unanswered questions and genuine scientific controversy.

3. *Has scientific progress strengthened or weakened the argument since its publication?*

This question becomes progressively easier to answer as time goes on, and may be difficult to discern in the short term. Still, in a rapidly advancing field of science, even a few years may suffice to demonstrate a trend supporting or undermining a specific argument.

Christian apologetics has a long history of argument based on unsolved scientific questions. While *Signature in the Cell* is the current argument of choice for the intelligent design (ID) movement, other arguments at other times have played a similar role for Christian apologists. Accordingly, applying the above questions to a sampling of other works is instructive before we consider how *Signature* itself fares under the same scrutiny.

Edwards on Astronomy, 1696

John Edwards’ book *A Demonstration of the Existence and Providence of God from the Contemplation of the Visible Structure of the Greater and Lesser World* was published in England in 1696, and in many ways is the “*Signature*” of its day. The main scientific controversies of the time perceived to threaten Christian faith were centered on astronomy, Copernican heliocentrism in particular. While Edwards argues against heliocentrism using both Scriptural¹⁰ and scientific arguments, we will focus only on the latter. Key to his argument for a stationary earth in a geocentric universe is the scientific fact that the movement of the earth can be felt:

Again, I argue thus, the Motion of the Earth can be felt, or it cannot: If they hold it cannot, they are confuted by *Earth-quakes* ... I mean the gentler Tremblings of the Earth, of which there are abundant Instances in History, and we our selves have had one not long since; so that by too true an experiment we are taught that the Earth’s Motion may be felt. If this were not a thing that had been frequently experienc’d, I confess they might have something to say, they put us off with this, that it is not possible to perceive the moving of the Earth: But now they cannot evade it thus; they must be

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for'd to acknowlegd the motion of it is sensible. If then they hold this, I ask why *this Motion* also which they speak of is not perceived by us? Can a Man perswade himself that the light Trepidation of this Element can be felt, and yet the rapid Circumvolution of it cannot? Are we presently apprehensive of the Earth's shaking never so little under us? And yet have no apprehension at all of our continual capering about the Sun?¹¹

Edwards draws additional scientific support for a stationary earth from other observations of physics:

Nay, truly, if the earth were hurl'd about in a Circle (as these Persons assert) we should feel it to our sorrow, for we should not be able to keep our ground, but must necessarily be thrown off, and all Houses and other Buildings would be thrown down, being forcibly shaken off from the Circumference of the Earth, as things that are laid on a Wheel are flung off by it when it turns round. This you will find demonstrated by Dr. More.¹²

Note several features. Edwards is arguing from science, and doing so appropriately for his time. Earthquakes can indeed be felt, and objects placed on a spinning wheel do indeed fly off. He also discusses a failed attempt to observe the effect of stellar parallax, a key prediction of the heliocentric model. As he sees it, the science of his time is conclusive and agrees with the longstanding geocentric view of the church. As such, he sees only folly in "*Copernicus's Gigantick Attempt to raise up the Earth into the place of the Heavens.*"¹³ Edwards' premature conclusions are easy to see in retrospect (question #3) because we have the benefit of over three hundred years of scientific progress since the 1600s. Still, he failed to take a cautionary stance, even though the science under consideration was both progressing rapidly for its time (question #1) and very much a frontier area (question #2). Indeed, even at the time of its publication, Edwards should have been aware that Newton's work lent heliocentrism considerable theoretical support.¹⁴

Critics may cry foul at this point: surely there are no parallels between the geocentrism debacle and the ID movement and their argument from information. After all, this argument, Meyer assures us, is based only on cutting-edge science and an argument from *knowledge of absence* gained through a comprehensive historical survey of abiogenesis research.¹⁵ Whereas evaluating the total failure of seventeenth-century geocentrist apologetics is easy from a modern vantage point, similar trends are present within

the ID argument from information. A historical survey of this line of argumentation in ID circles will bring those trends to light. Ironically, this survey will also further make the case that the supposed failure of biological evolution to generate new information is much more a part of Meyer's argument than his response to my review would suggest, and, indeed, has been so since its inception.

Lester and Bohlin on Information Theory and Created Kinds, 1984

In 1984, a substantial work on genetics and creationism appeared: Lane Lester and Raymond Bohlin's book *The Natural Limits to Biological Change*.¹⁶ Though written some twenty-five years before *Signature*, many arguments are familiar. For example, while discussing the possibility that mutations in regulatory regions of DNA might lead to changes outside of a "created kind,"¹⁷ Lester and Bohlin argue that the possibility is as unlikely as the natural origin of the universal genetic code. Moreover, a natural origin for the code is absurd, since codes are uniquely the product of intelligence:

... couldn't mutation and natural selection change the rules of regulatory mechanisms to produce biological novelty? The answer lies in the origin-of-life question. Informational codes are constructed of vocabulary and grammar. Both, of necessity, are produced only by intelligence. To argue that the genetic information in DNA originated originally as random nucleotide interactions seems analogous to claiming that the word processor, rather than the person operating it, actually authored a given book. Random changes in letter and word sequences ultimately can produce only gibberish. The same will result if one attempts to change the rules.¹⁸

Notice how, in this argument, developmental programs for the various created kinds are a series of informational codes. As such, like the genetic code itself, they are clearly the result of a designing intelligence.

A later section makes the point a second time. After a discussion of similarities and differences between human and chimpanzee chromosomes (in a manner that emphasizes their differences as a problem for evolution), Lester and Bohlin look to the application of information theory to genetics as the

next step for the creationist movement. Specifically, they state that this application will demonstrate two things: that intelligent design is needed for the origin of the genetic code, as well as for the origin of information for each created kind:

However, in terms of the mechanism of limited variation, the application of information theory to the genetic machinery should prove the most promising. The crucial factor will be delineation of the necessity of *intelligent* design in the structuring of the informational content of each prototype. This will indicate the necessity of not only intelligence in originating the genetic code in the broad universal sense but also, in the specific sense, of the unique adaptive programs of each prototype. (emphasis in the original)¹⁹

Meyer on Biological Evolution and Information, 1999

The argument from information thus has a long history within the ID movement, tracing back to its earliest roots. More importantly for our purposes, Lester and Bohlin's line of argument is also present within Meyer's works. As Meyer notes, he wrote several articles on the origin of biological information while *Signature* was in preparation.²⁰ One of the earliest is in an edited volume detailing the exchange between Denis Lamoureux and Phillip Johnson in the late 1990s.²¹ In this essay, we find that Meyer's defense of Johnson includes the claim that the origin of all forms of biological information is equally mysterious:

If for example, the teleological evolutionist seeks to avoid the information-theoretic difficulties discussed above by invoking *undirected* chance to explain the origin of genetic information, his position becomes indistinguishable from standard materialistic versions of evolutionary theory (either biological or chemical) that Johnson and many others have criticized on empirical, methodological, and theological grounds. (In any case, it should be noted that neo-Darwinism has failed every bit as much as chemical evolutionary theory to provide a mechanism that can explain the origin of specified genetic information—whether the information required to build novel genes, cell types, organs, molecular machines, developmental programs, or body plans that have arisen during the history of life on earth.)²²

It is clear that, at this time, Meyer's argument from information viewed specified genetic information in very broad terms, in keeping with Lester and Bohlin's earlier thinking. Moreover, Meyer's argument that only intelligence creates information is predicated on his assertion that "standard materialistic versions of evolutionary theory (either biological or chemical)" have failed to deliver the goods. Note well: the alleged failures of both biological and chemical evolution are presented as *equally important* for supporting Meyer's familiar argument that

... the specified complexity or information content of DNA and proteins implies a prior intelligent cause, again because "specified complexity" and "high information content" constitute a distinctive hallmark (or signature) of intelligence. Indeed, in all cases where we know the causal origin of high information content or specified complexity, experience has shown that intelligent design played a causal role.²³

As we have seen above, this argument is central to *Signature*. Given his position in 1999, it is surprising that Meyer claims that evidence for new information arising through biological evolution is of no import to his argument.

Meyer on Biological Evolution and Information, 2004

The use of this argument is not an isolated case for Meyer, but also forms a substantial portion of his 2004 paper published in, and subsequently withdrawn from, the *Proceedings of the Biological Society of Washington*.²⁴ In a discussion of the evidence for random mutation and natural selection acting over time to generate novelty, Meyer makes the following claims:

Yet the extreme specificity and complexity of proteins presents a difficulty, not only for the chance origin of specified biological information (i.e., for random mutations acting alone), but also for selection and mutation acting in concert. Indeed, mutagenesis experiments cast doubt on each of the two scenarios by which neo-Darwinists envisioned new information arising from the mutation/selection mechanism ... For neo-Darwinism, new functional genes either arise from non-coding sections in the genome or from preexisting genes. Both scenarios are problematic ...

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Evolving genes and proteins will range through a series of nonfunctional intermediate sequences that natural selection will not favor or preserve but will, in all probability, eliminate ... When this happens, selection-driven evolution will cease. At this point, neutral evolution of the genome (unhinged from selective pressure) may ensue, but, as we have seen, such a process must overcome immense probabilistic hurdles, even granting cosmic time.

Thus, whether one envisions the evolutionary process beginning with a noncoding region of the genome or a preexisting functional gene, the functional specificity and complexity of proteins impose very stringent limitations on the efficacy of mutation and selection. In the first case, function must arise first, before natural selection can act to favor a model variation. In the second case, function must be continuously maintained in order to prevent deleterious (or lethal) consequences to the organism and to allow further evolution. Yet the complexity and specificity of proteins implies that both these conditions will be extremely difficult to meet. Therefore, the neo-Darwinian mechanism appears to be inadequate to generate the new information present in the novel genes and proteins that arise within the Cambrian animals.²⁵

Here Meyer again argues against an evolutionary origin of information, and once again *biological* evolution is in view (in this instance, exclusively so). Specifically, Meyer argues (relying heavily on the works of Axe) that functional protein sequences are separated by nonfunctional intermediates, and that neutral evolution cannot be evoked to transition between functional forms.

One might wonder: if biological evolution was viewed as a potential threat to Meyer's argument in 1999 or 2004, why does Meyer not address any evidence for the ability of biological evolution to generate information in *Signature*? Applying the above diagnostic questions to this argument may be informative.

Evaluating the ID Argument from Information, 1984–2004

Having surveyed the historical importance of biological evolution to the ID argument from evolution, we are now able to apply our test questions to this apologetic as it was argued during this time.²⁶

1. *Is scientific research in this area no longer productive?*

At all time points examined, and, indeed, over the entire twenty-year period, biological evolution was a productive area of scientific inquiry. As such, arguments based on perceived failings of evolution were likely to be challenged as new evidence arose. As we shall see, this was very much the case.

2. *Is the area of science used for the argument a "frontier" area of science or a well-established area in which core ideas have not changed significantly for some time?*

While biological evolution as a whole was not a frontier area during this time, several lines of inquiry within it were new or rapidly expanding. In 1984, the field of evolutionary developmental biology, or "evo-devo" was comparatively nonexistent. In 1999, comparative genomics was in its infancy, and some areas of experimental evolution such as ancestral protein reconstruction were just getting off the ground. In 2004, the chimpanzee genome project remained incomplete. As such, the ID argument from information would need to weather the storm of new evidence from these advances in order to remain viable.

3. *Has scientific progress strengthened or weakened the argument since its publication?*

This question is, of course, the crucial one. An argument is only as good as its ability to withstand new data. Unfortunately for the ID argument from information, the robust ability of biological evolution to generate new information has been increasingly documented in recent years. Let me cite a few examples.

Novel biological information does not need to arise all at once, but can arise piecemeal through independent mutation events. For example, separate mutations that do not confer a selectable advantage on their own have been shown to combine later to form new information. In other words, mutations that are neutral with respect to the survival of the organism can later be co-opted into biological information that does have a distinct survival advantage.²⁷

Contrary to Meyer's assertion in his 2004 essay that proteins cannot transition to new information states via neutral intermediates, laboratory "resurrection" of ancient protein sequences has shown good evidence that such neutral intermediate states do play a key role in protein evolution.²⁸ New com-

parative genomics approaches indicate that such changes in protein structure and function through evolutionary mechanisms are widespread.²⁹ Indeed, there is strong evidence that large regions of modern vertebrate genomes, including the human genome, are the product of whole-genome duplication events hundreds of millions of years in our evolutionary past. This further adds to the list of proteins that have acquired new functions, and thus represent new biological information.³⁰

Contrary to Lester and Bohlin, and Meyer's 1999 essay, evolutionary developmental biology has accumulated strong evidence that novel body plans and developmental programs are accessible to evolutionary mechanisms, specifically, through small mutations that alter the expression patterns of key regulatory genes.³¹ The large biological differences between humans and chimpanzees, despite our close genetic relationship,³² is entirely consistent with this conclusion.³³

Taken together, these advances render the biological evolution component of the ID argument from information null and void. What seemed a strong argument in 1984, 1999, and 2004 has been weighed and found wanting.

Meyer on Chemical Evolution and Information, 2009

Why is it that Meyer chose to avoid the topic of biological evolution in *Signature*, when hitherto it was a consistent part of the argument from information, even within his own works? Certainly, the sheer size of *Signature* raises the possibility that Meyer needed to trim the argument to what he felt made the strongest case. Even so, this may be informative: it suggests that Meyer himself realizes that arguments against biological evolution as a generator of biological information are seriously compromised compared to arguments based on chemical evolution. Accordingly, Meyer focuses on abiogenesis in *Signature*, though, as we have seen, vestiges of the full argument that includes biological evolution persist within it. What is absent from *Signature*, however, is the admission that the logic that only intelligence produces information has failed. In 1999 and 2004, Meyer states that this logic covers both biological and chemical evolution. His protests notwithstanding,

it continues to do so for *Signature*. Neither does Meyer provide a rationale why it should not, nor why his previous argument, recycled from these earlier essays and woven throughout *Signature*, remains valid.

Whether in 1984 or 2004, the ID movement would have done well to consider questions such as I have presented here before building an apologetic on the presumed failure of evolutionary biology. Perhaps a greater concern for the ID argument from information, beyond the failure of its inherent logic that information arises only through intelligence, is that the balance of its arguments rest on a similarly precarious foundation. As we shall see, *Signature* itself does not fare well under the same questions.

1. *Is scientific research in this area no longer productive?*

Contrary to Meyer's claim, abiogenesis research is not at an impasse. Knowledge in this area is advancing, and has done so even since the publication of *Signature*. Some of this work even threatens Meyer's remaining arguments (see below).

2. *Is the area of science used for the argument a "frontier" area of science or a well-established area in which core ideas have not changed significantly for some time?*

One of Meyer's significant criticisms of my review is that

Discerning readers will notice that Venema did not offer what would have been necessary to refute the thesis of the book, namely, a causally adequate alternative explanation for the origin of the information necessary to produce the first life. Instead, he effectively concedes the main argument of the book by acknowledging that "no such mechanism ... has been put forward."³⁴

As I noted in my review, Meyer here is correct (except for his claim, that I only admit so "grudgingly," which is not the case).³⁵ The origin of life is an unsolved area of chemistry/biology and as such is a frontier area of science in which many competing hypotheses are under investigation. There is no consensus in the field about how life arose, though some models (such as the RNA world hypothesis) currently have more experimental support than others. As such, no one has a "causally adequate alternative explanation" to offer. Where I differ from Meyer is that I do not see this state of affairs as reason to assert that the science has conclusively failed and divine intervention is necessary.

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3. *Has scientific progress strengthened or weakened the argument since its publication?*

The answer to this question is one that even the most stalwart supporter of ID should find troubling. Not two years from the publication of *Signature*, evidence from origin-of-life research has already been put forward that, by Meyer's own admission, threatens the argument of the book. As I stated in my original review,

A rhetorical thread that Meyer weaves throughout the book is that the genetic code is arbitrary: that, in principle, any codon could have been assigned to any amino acid since there is no physical connection between them. Meyer claims that this feature of the translation apparatus is a "mystery" for origin-of-life research ...

However, Meyer either avoids, or is simply unaware of, a significant amount of research in this area that *has* demonstrated chemical interactions between amino acids and their cognate anticodons or codons. This productive area of research was recently reviewed in extensive detail. In brief, several amino acids directly bind RNA sequences corresponding to their anticodon or codon. This finding is strong evidence that the genetic code was established, at least in part, by the exact sort of chemical interactions that Meyer explicitly denies have ever been found. If, indeed, the genetic code was arbitrary, there would be no reason to expect these correspondences; conversely, their presence is good evidence that the modern genetic code passed through a "stereochemical era" where proteins were synthesized by direct organization on an RNA template, consonant with the hypothesis that RNA was the original genetic material.³⁶

In reply, Meyer states that

Signature does argue that the current genetic code (as well as the text itself) defies explanation by reference to stereochemical affinities. *Signature* also asserts that this fact renders self-organizational explanations for the origin of the genetic code problematic. Thus, the claim by Yarus et al. to have explained the origin of the code by reference to stereochemical affinities alone, does challenge one important scientific claim of *Signature* (although not its main argument).³⁷

Confronted with this evidence, Meyer is, not surprisingly, concerned with rebutting it to the best of his abilities.³⁸ The accuracy and strength of that rebuttal is not my main concern here,³⁹ though I note that

Meyer provides no convincing reason why these affinities are present in what he views as a chemically arbitrary code. If the code truly is arbitrary and has no stereochemical basis, then there is no reason to find the sorts of affinities that have been documented. Meyer is at pains to demonstrate that unsolved questions remain and that the work of Yarus does not explain the complete origin of the code, and rightly so: this is work in a frontier area. Unsolved issues are to be expected. It is highly unlikely that any one paper could put forward a complete explanation at this time. Science seldom overthrows apologetics arguments in one fell swoop: experience indicates that a gradual erosion is more likely. Meyer is already defending his argument against new evidence. I suspect that trend will continue in the coming years.⁴⁰

Conclusion

In summary, what we see in *Signature* is the pared-down remnant of what was once a larger argument within the ID movement, and indeed within Meyer's own works. The reason for the paring down is obvious: comparative genomics, experimental evolution, and developmental biology have shed too much light on the ability of biological evolution to generate information. As such, only the frontier science of abiogenesis remains apologetically useful. Meyer expects it will continue to be useful for some time yet, and it likely will be for the foreseeable future. Indeed, it may endure beyond his or my lifetime. After all, John Edwards did not live to see the vindication of heliocentrism, and his argument for God supernaturally sustaining the fires of the sun and stars⁴¹ remained a puzzle until the discovery of solar fusion in the twentieth century, over 200 years later. It may well be that the ID movement has at last reduced their argument from information to its enduring essence, but I have my doubts: abiogenesis as a field remains productive, and recent developments have already begun to erode Meyer's claims. Only time will tell. Until then, I recommend Bonhoeffer's wise counsel. 

Notes

¹Dietrich Bonhoeffer, *Letters and Papers from Prison*, enlarged ed. (New York: Macmillan, 1972), 311.

²Dennis R. Venema, "Seeking a Signature: Essay Book Review of *Signature in the Cell: DNA and the Evidence for Intelligent Design* by Stephen C. Meyer," *Perspectives on Science and Christian Faith* 62, no. 4 (2010): 276–83.

³See Stephen C. Meyer, "Of Molecules and (Straw) Men: A Response to Dennis Venema's Review of *Signature in the Cell*," *Perspectives on Science and Christian Faith* 63, no. 3 (2011): 171–82. As Meyer repeats in his reply,

Indeed, whenever we find specified information—whether embedded in a radio signal, carved in a stone monument, etched on a magnetic disc, or produced by a genetic algorithm or ribozyme engineering experiment—and we trace it back to its source, invariably we come to a mind, not merely a material process. (p. 174)

Note how the assertion continues to claim that *all* information, whatever its nature, is derived only from intelligent sources.

⁴Venema, "Seeking a Signature."

⁵This series of posts appeared on the BioLogos blog *Science and the Sacred* (www.biologos.org/blog) and had six parts:

Dennis Venema, "Evolution and the Origin of Biological Information, Part 1: Intelligent Design," March 20, 2011, <http://biologos.org/blog/evolution-and-origin-of-biological-information-part-1-intelligent-design>

—, "Evolution and the Origin of Biological Information, Part 2: *E. coli* vs. ID," March 24, 2011, <http://biologos.org/blog/evolution-and-the-origin-of-biological-information-part-2-e-coli-vs-id>

—, "Evolution and the Origin of Biological Information, Part 3: CSI on Steroids," April 7, 2011, <http://biologos.org/blog/evolution-and-the-origin-of-biological-information-part-3-csi-on-steroids>

—, "Evolution and the Origin of Biological Information, Part 4: Lost in (Sequence) Space," April 25, 2011, <http://biologos.org/blog/evolution-and-the-origin-of-biological-information-part-4>

—, "Evolution and the Origin of Biological Information, Part 5: Paralogs, Synteny and WGD," May 19, 2011, <http://biologos.org/blog/evolution-and-the-origin-of-biological-information-part-5>

—, "Evolution and the Origin of Biological Information, Part 6: A Long Look in the Mirror," July 7, 2011, <http://biologos.org/blog/evolution-and-the-origin-of-biological-information-part-6>

⁶In his reply, Meyer bases his complaint on the assertion that I have not read him carefully enough. I submit, based on the foregoing analysis (as well as my survey of the history of the argument from information within the ID movement and Meyer's own works, see below), that a second possibility is that I am reading him too closely for his taste.

⁷US National Library of Medicine, National Institutes of Health, www.ncbi.nlm.nih.gov/pubmed/

⁸Henry Bauer, "Frontier Science and Textbook Science," *Science & Technology Studies* 4, no. 3 (1986): 33–4.

⁹Indeed, the absence of such internal criticism and sharpening of ideas is a notable difference between science and the ID movement. Despite the range of mutually incompatible views held within the ID "big tent," members of the movement appear unwilling to critique each other academically.

¹⁰His scriptural arguments are also a fascinating study, however. For example, he specifically rules out that God used what we would call "accommodated language" to describe the miracle of the long day in Joshua 10.

¹¹John Edwards, *A Demonstration of the Existence and Providence of God from the Contemplation of the Visible Structure of the Greater and Lesser World* (London: 1696), 45–6.

¹²*Ibid.*, 46.

¹³*Ibid.*, 49.

¹⁴Indeed, a fourth question to keep in mind is whether an apologetics argument misrepresents the state of scientific knowledge current to its time. For example, in my original review, I contend that *Signature* does so in several places, especially with regard to the RNA world hypothesis. I will not, however, point out such flaws in the following historical survey of apologetics arguments but rather grant, *in arguendo*, that they were correct representations of the science of their day, despite this being manifestly not the case.

¹⁵See Stephen C. Meyer, *Signature in the Cell: DNA and the Evidence for Intelligent Design* (New York: Harper Collins Publishers, 2009), 376.

¹⁶Lane Lester and Raymond Bohlin, *The Natural Limits to Biological Change* (Grand Rapids, MI: Zondervan, 1984).

¹⁷Lester and Bohlin use the terms "kind," "created kind," and "prototype" interchangeably. The sense is exactly what is called a "baramin" by other creationists.

¹⁸Lester and Bohlin, *The Natural Limits to Biological Change*, 159.

¹⁹*Ibid.*, 167.

²⁰See Meyer, *Signature*, 347.

²¹See pages 101–2 of Stephen Meyer, "Teleological Evolution: The Difference It Doesn't Make" in *Darwinism Defeated? The Johnson-Lamoureux Debate over Biological Origins*, Phillip Johnson and Denis Lamoureux (Vancouver: Regent College Publishing, 1999), 91–102.

²²*Ibid.*, 102–3.

²³*Ibid.*, 92–3.

²⁴Stephen Meyer, "The Origin of Biological Information and the Higher Taxonomic Categories," originally published in *Proceedings of the Biological Society of Washington* 117, no. 2 (2004): 213–39, but subsequently withdrawn. Text available online at www.discovery.org/a/2177

²⁵*Ibid.*

²⁶As mentioned before, the fourth question (that of scientific accuracy of the apologetic at the time it was made; see footnote 14) will not be addressed, though significant flaws of this nature are present for each time point sampled.

²⁷Venema, "Evolution and the Origin of Biological Information, Part 2: *E. coli* vs. ID."

²⁸Venema, "Evolution and the Origin of Biological Information, Part 3: CSI on Steroids."

²⁹Venema, "Evolution and the Origin of Biological Information, Part 4: Lost in (Sequence) Space." Note that this evidence is also relevant to Meyer's continued use of *Axe in Signature*.

³⁰Venema, "Evolution and the Origin of Biological Information, Part 5: Paralogs, Synteny and WGD."

³¹Sean B. Carroll, "Evo-Devo and an Expanding Evolutionary Synthesis: A Genetic Theory of Morphological Evolution," *Cell* 134 (2008): 25–36.

³²Dennis R. Venema, "Genesis and the Genome: Genomics Evidence for Human-Ape Common Ancestry and Ancestral Hominid Population Sizes," *Perspectives on Science and Christian Faith* 62, no. 3 (2010): 166–78.

Author Exchange

Intelligent Design, Abiogenesis, and Learning from History: A Reply to Meyer

³³Venema, "Evolution and the Origin of Biological Information, Part 6: A Long Look in the Mirror."

³⁴Meyer, "Of Molecules and (Straw) Men," 189.

³⁵Contrary to Meyer's assumption, scientists *enjoy* areas of science in which there are challenges yet to be solved.

³⁶Venema, "Seeking a Signature," 280–1.

³⁷See footnote #32 in Meyer's reply. The main argument, presumably, is that the origin of life itself remains unsolved (what Meyer elsewhere calls the "thesis" of *Signature*).

³⁸My critique seems to have been the impetus for Meyer to write an entire paper in reply. See Stephen C. Meyer and Paul A. Nelson, "Can the Origin of the Genetic Code Be Explained by Direct RNA Templating?" *BIO-Complexity* 2 (2011).

³⁹Though it should come as no surprise that I have my reservations about it as well.

⁴⁰A scan of recent literature supports this prediction. One example is a study that has engineered a short RNA that can

act as a general RNA polymerase: A. Wochner, J. Attwater, A. Coulson, and P. Holliger, "Ribozyme-Catalyzed Transcription of an Active Ribozyme," *Science* 322 (2011): 209–12. The point is not that this (or any) paper at present solves the origin-of-life question, but rather that the field as a whole continues to advance.

⁴¹As Edwards writes in "A Demonstration," speaking of the stars and sun:

This stupendous Magnitude argues the Greatness, yea the Immensity and Incomprehensibleness of their Maker. And if it be ask'd, Whence is that Fewel for those vast Fires, which continually burn? Whence is it that they are not spent and exhausted? How are those flames fed? None can resolve these Questions but the Almighty Creator, who bestowed upon them their Being; who made them thus Great and Wonderful, that in them we might read his Existence, his Power, his Providence ... (p. 61)

67th Annual Meeting of the American Scientific Affiliation

Science, Faith, and the Media: Communicating Beyond Books

**Point Loma Nazarene University
San Diego, CA
July 20–23, 2012**

"Therefore each of you must put off falsehood and speak truthfully to his neighbor, for we are all members of one body." –Ephesians 4:25, NIV

Some of the ways of communicating (beyond books) include film, TV, radio, Internet, and social networking. The 2012 Conference will bring ASA members together with leaders in various communication industries. These leaders will share their thoughts and ideas about ways of using modern media to communicate with the general public regarding issues of science, faith, and the interaction between the two.

Another major meeting theme will address how the media, in general, currently portray Christians, scientists, and scientists who are Christians, and, to the extent that misconceptions exist, how they can be changed.

Plenary and parallel sessions and activities currently being planned include the following:

- Plenary and seminar presentations by science, philosophy, communication, journalism, and film studies professors and industry professionals
- Plenary interviews and round table discussions involving film, radio, and TV studio executives, actors, directors, and producers
- Seminar presentations by members from The Science and Entertainment Exchange of the National Academy of Sciences, www.scienceandentertainmentexchange.org
- Tracks on use of social networking, Internet, alternative media, and marketing
- Movie Night in "The Greek," America's oldest outdoor amphitheater