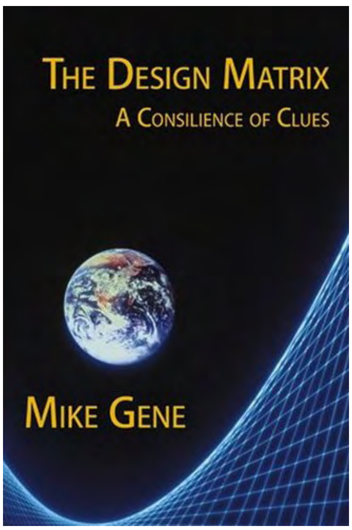
Book Review



Mike Gene

The Design Matrix: A Consilience of Clues

Arbor Vitae Press, 2007
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Reviewed by U. Mohrhoff

"Mike Gene" is a pseudonym the author has adopted to maintain continuity with his Internet handle. For the purpose of this review, I'll shorten it to MG. MG makes no appeal to qualification or relevant training. He prefers the risk of good arguments being overlooked or dismissed for want of formal training to the risk of bad arguments being embraced for the opposite reason. He comes to us not so much with convictions as "with nagging suspicions that there may really be something solid behind the hypothesis that life was designed." His well-written, well-organized, and richly referenced book is for

> people who are tired of the heated debates, name-calling, innuendo, and political fights. Such people might find themselves in the middle ground and would rather focus on the hypotheses, the arguments, and the evidence. We might not be completely convinced that life was designed, yet we find the hypothesis to be tremendously intriguing. Rather than belaboring the concern as to whether the study of Intelligent Design should be labeled science, metaphysics, or religion, it is my belief that there are people who would rather just ponder the issues that are raised by design and evolution. (p. xi)

The first of the book's ten chapters deals with a disanalogy. The design inference behind the infamous Face on Mars failed because under high-resolution the structure no longer looked like a face or appeared designed. What if the more recent high-resolution photographs had turned up an actual carving of a face? Many scientists would be seriously considering that Mars was once inhabited by intelligent beings.

Under low resolution life, too, appears designed. Hearts work as pumps, eyes work as cameras, joints work as fulcrums, and so on, all having the appearance of design. But this appearance doesn't go away if we look at life at a higher resolution: cells too appear designed. At an even higher resolution we find proteins organized into large complexes that are routinely described as molecular machines for the simple reason that they look and work like machines. The molecular contents of a cell resemble a factory full of miniature robotic machines following coded instructions.

> Unlike the Face on Mars, the biotic face of design remains at the highest relevant resolution. When we look inside the cell, the appearance is reminiscent of the inner workings of a watch. Organization does not simply emerge. Organization is encoded. It exists because of instructions. And where there are instructions, there may also be intelligence. (p. 17)

The second chapter introduces an innovative and highly commendable strategy. This consists in replacing the dichotomous truth values "true" and "false" by an "explanatory continuum" that ranges from "X could not possibly be true" to "the truth of X is certain" via "it is possible / plausible / probable that X is true." (A possible explanation can easily be denied, a plausible explanation can reasonably be denied, a probable explanation is difficult to deny.) "Factual" evidence is always subject to interpretation, and different interpretations of the same evidence are situated on the explanatory continuum somewhere between true and false.

MG is further to be complimented for considering the Darwinism/design controversy in the larger context of the debates between teleologists and non-teleologists, which began in the halls of ancient Greece and has involved some of history's greatest thinkers. "The notion that current arguments about design are nothing more than a fundamentalist reaction to the painful truth of Darwinism is a notion divorced from historical context." (p. 22) In the course of this 2500-year old debate, a sort of consensus on the modus operandi has developed. MG calls it the "traditional template."

> It looks like this: proponents of design look for some feature that cannot possibly be explained by natural causes. Then, once such a feature has been proposed, it is argued that only a designer can account for the existence of this feature.

The traditional template assigns the non-teleological explanation the default status. Non-teleological mechanisms are to be assumed unless it can be demonstrated, with great certainty, that they can't do their job. This has resulted in the arguments for design becoming arguments about the inadequacies of Darwinian evolution. The design proponent ends up having to prove a negative, while Darwinists are under no obligation to refute teleological explanations. But proving a negative is notoriously difficult *for any topic*. This is precisely why most legal systems lay the burden of proof on those who claim that X committed a crime: X is innocent until proven guilty. In philosophy, the burden of proof rests on the shoulders of the proponent of an assertion, rather than on those of the opponent. Differently put, while Darwinists only have to show that something — e.g., the evolution of the bacterial flagellum by natural selection — is *possible*, and thus *may or may not* have occurred, design theorists have to show that something *cannot* occur and thus *actually did* not occur. This is not a level playing ground, nor a fertile ground for investigation.

The field is slanted further by the misapprehension common to both parties that evolution is inherently opposed to design. As MG points out, neither "change in gene frequencies in a population over time" nor "descent with modification" nor the existence of a "common ancestor" is anti-design.

The following statement by Howard Berg, a professor of molecular and cell biology from Harvard, epitomizes the third chapter: "in addition to rotary engines and propellers, *E. coli*'s standard accessories include particle counters, rate meters, and gear boxes. This microorganism is a nanotechnologist's dream." (p. 41) MG: "Maybe is it so easy to treat life as carbon-based nanotechnology because it *is* carbon-based nanotechnology" (p 43, original emphasis). The evidence is certainly, and massively, in favor of this conclusion. Adding to this the observation that our ability to recognize life as designed depends on our own technological development, leads to the following prediction:

> as our technology improves, as we design things that are smaller, more complex, and more sophisticated, I would expect our understanding of how life works to improve accordingly. (p. 53)

The fourth chapter is devoted to the genetic code.

> When I first learned about the genetic code I was totally struck by the fact that biologists behaved as if they had discovered something ordinary. In philosophy and other areas of science, people would comment on the uncanny implications of the Big Bang or quantum physics. But that life is encoded raised no one's eyebrows. (p. 70)

Curious indeed, once you think about it. At first nobody had any idea of how special this code was; it was thought to have become "frozen" into the fabric of life by accident: any of a million other possible codes would have done as well. As it turned out,

> [t]he code protects against the deleterious effects of mutations much better than anyone anticipated. In the late 1990s, powerful computer analyses were used to compare the natural genetic code with a large assortment of randomly generated codes. . . This analysis showed that the genetic code we observe in just about every cell is extremely resistant to deleterious errors, such that only one in a million randomly generated codes was more error-proof. (p. 74)

In 2000, a more robust and sophisticated analysis confirmed these findings. The researchers concluded that "the canonical code. . . appears at or very close to a global optimum for error minimization: the best of all possible codes." (p. 75) Since the canonical code is too optimal to be attributed to chance and too conventional to be attributed to physicochemical necessity, it must have been selected. Could natural selection have done the job? This would require precursors, of which there is no evidence. "It is startling to realize that there is not a trace of [any] pre-Universal Optimal Code organisms, or their codes, existing anywhere on this planet" (p. 76), even though there seems to be no reason why some of these organisms, if they existed, should not have found niches that would have allowed them to survive to this day.

> Both the universality and the optimality of the genetic code fit well with the hypothesis of Intelligent Design. The code is optimized to resist potentially deleterious mutations as a consequence of intelligent foresight. It is universal because this single, optimal solution was implemented by the designer. These are the type of data we would expect from Intelligent Design. After all, what if the code was thoroughly sub-optimal? Would this not be a popular argument against Intelligent Design (and rightly so)? (p. 77)

When a cell divides, the program contained in its DNA is replicated and passed on so the new cells will have a copy of this program. When genes are expressed, the nucleotide sequence of the DNA is transcribed to make an RNA molecule with a complementary nucleotide sequence. And when proteins are synthesized, ribosomes translate the nucleotide sequence of the RNA into an amino acid sequence. Every step of information transfer is proofread with amazing fidelity.

> What is most intriguing about this process of DNA replication and proofreading is its elegant sophistication when faced with a very difficult problem. This machinery must discriminate between four different nucleotides which are extremely similar... To use an analogy, the replication machinery is not reading a template string of red, green, white, and black beads. It is reading four beads that are closely continuous shades of gray. Yet it discriminates between these shades of gray at a rate of 500 beads per second while making a mistake only once every 10 billion beads. (p. 79)

What is more, the proofreading mechanisms employed at different stages are similar without owing their similarity to common descent.

> We see an abstract engineering-like principle at work here, where the same basic logical strategy (a dynamic competition between synthetic and editing functions) is being employed in different proteins carrying out different processes. It is difficult to resist the subtle implications of design, where not only is proofreading itself an echo of design, but the same basic logic of a proofreading mechanism, found in different contexts, amplifies this echo. (p. 80)

And again, studies have shown that artificial nucleotides — other than the four (A, G, C, T) in DNA or those (A, G, C, U) in RNA — can be reliably used and replicated by polymerases. So why did nature not use any other nucleotides? Because the use of other nucleotides would have made DNA more prone to error.

> Whether it is the choice of codons or the choice of nucleotides, the theme of minimizing errors repeats itself in a fractal pattern. This is a theme that may expose a vulnerable place in the non-teleological point of view, where frozen accident after frozen accident gives way to a deeper logic behind life. (p. 82)

One way to distinguish between an intelligent designer and natural selection is that the former has foresight, while the latter is myopic. Very early on, life became obsessed with error correction. The error correction capabilities of the DNA chemistry are essential to the complex life forms that came into existence hundreds of millions of years later. Ergo...

The fourth chapter also contains an excellent *empirical* refutation of the frequently heard claim that Intelligent Design is a scientific dead-end inasmuch as it discourages research by proposing that "the designer did it." (What about those "frozen accident" explanations, which do little to encourage further research?)

The following observation by Paul Davies epitomizes the fifth chapter:

> Miniscule tweezers, scissors, pumps, motors, levers, valves, pipes, chains, and even vehicles abound. But of course the cell is more than just a bag of gadgets. The various components fit together to form a smoothly functioning whole, like an elaborate factory production line. The miracle of life is not that it is made of nanotools but that these tiny diverse parts are integrated in a highly organized way. (p. 90)

It simply boggles the mind:

> The spliceosome, which is currently considered to be the most complex molecular machine, is composed of over 140 proteins and five RNA molecules. The function of the spliceosome is to cut the RNA into pieces, remove the sequences that are not part of the instructions for protein synthesis and splice the instruction pieces back together. The editosomes are protein machines with more than twenty parts which function to carefully select and precisely edit the protein synthesis instructions inherent in the RNA molecule. Degradosomes and exosomes, comparable to molecular paper shredders, degrade the RNA molecules when there is a problem with the instructions or they are no longer needed. (p. 91)

Dawkins thinks of living bodies as "designoid": they "look designed, so much so that some people — alas, most people — think they are designed." (p. 117) In the sixth chapter MG introduces the complementary concept: an "evolvoid" feature is one that appears evolved, but is not. We live in a world were evolved things can look like they were designed, and designed things can look like they were evolved. (Think of the "evolution" of the Corvette.) Given such thorough ambiguity, MG proposes an alternative to the traditional *either/or* perspective: the *both/and* perspective.

When Darwin proposed his theory of evolution by natural selection, he created a perceptual matrix with which to interpret the biological world around us. Borrowing Joseph Jastrow's well-known bistable figure known as the "duck-rabbit," MG refers to this non-teleological matrix as the Duck. Because the Duck offered a novel perspective that allowed scientists to formulate a variety of testable hypotheses, the Duck quickly replaced the previously more commonly held teleological matrix, the Rabbit. The discovery of life as carbon-based nanotechnology, complete with coded information and sophisticated machinery, however, suggests that the Duck may simply have had an investigative head start.

In the seventh chapter MG introduces his theory of designed evolution. Its central hypothesis is a single act of intelligent intervention — the design of the first cells that inhabited our planet. MG gives five reasons for this choice:

1 *Significance.* The origin of life is undoubtedly the most significant unanswered question in biology. "In comparison, the rest of biology is a footnote."

2 *Testability*. Creating cells in the lab "does not appear impossible over the next century or so (a small blip considered against the backdrop of our ancient universe)."

3 *Evidence*. By far the most important clues are biological universals: features shared by all living things. If all of today's species are indeed the descendants of originally designed cells, then there is no evidential basis for inferring design beyond the first life forms.

4 *Parsimony*. Constraining the design inference to the origin of life is a compromise between Occam's Razor and the direction the clues point.

5 *Practicality*. The hypothesis places design at or near the simplest life form on the planet, the bacteria, which are the easiest to study.

Unlike natural selection, artificial selection depends on an intelligent agent intervening from outside. MG speculates that it may be possible to design cells with intrinsic "selectors" mimicking the purposeful intervention of an intelligent agent. "In some cases, what we may think of as natural selection could really be more like artificial selection from a temporal distance." (p. 146) This is *front-loading* — the use of evolution to carry out design objectives.

There is one problem. Suppose you, the designer, endow some of your original life forms with globin to be used millions of years later in the blood of some mammal-like organism.

> Unless globin serves your original microbes, it is functionless. If it is functionless, natural selection will not remove the mutations from the population of microbes. Effectively, your globin gene could be called junk DNA and would decay rapidly into oblivion. So how do you preserve the globin for hundreds of millions of years so that it is present when the biosphere is ready to evolve mammal-like organisms? (p. 160)

The answer is: "moonlighting." The list of known moonlighting (or multi-functional) proteins is getting larger every day. Because of their telic utility, from a front-loading perspective one can predict that multi-functional proteins will turn out to be commonplace. This chimes in with the observation by paleontologist Simon Conway-Morris that

> the diversity of life is, in molecular terms, little more than skin deep. Most, perhaps all, of the basic building blocks necessary for organismal complexity were available long before the emergence of multi-cellularity. (p. 171)

Concluding this chapter, MG points out that

> Many people have strange notions about design and evolution. If evolution was designed, it should not be so messy. It should not be characterized by so much contingency. There should not be so many extinctions and there should be a clear and distinct trend that leads specifically to humans. (p. 179)

Front-loading is another way to view design in relation to evolution, and with it none of these objections succeed. In fact, compared with the conventional non-teleological perspective, the hypothesis of front-loaded evolution does seem to have an explanatory edge. It

> provides the ability to ask questions such as: Why does life reproduce? Why does life

> proofread? Why does evolution so thoroughly borrow from past functions? Why do proteins have multiple functions? Why is gene duplication the main means of generating new genes? Why, as the *New York Times* reporter noted, does the human genome seem to "have *almost too much in common* with many other kinds of animal genomes?" The design of life such that it front-loads evolution answers all of these questions and ties them together. Life reproduces to perpetuate the designs, which give form and constraint to evolution. Such constraint is not a form of determinism or predestination, but is instead an outflow of the manner in which the cards were stacked. (p. 180)

In the eighth chapter MG argues that, within the non-teleological paradigm, irreducible complexity of organic structures can only arise from cooption — a change in function by finding a new use for an existing feature. According to Ernst Mayr, this is "[b]y far the most important principle in the interpretation of the origin of new structures." (p. 170) In the ninth chapter MG looks for the kind of rationality and foresight that would be impossible to attribute to Dawkins's blind watchmaker. Consider:

> The cooption events that are needed to bring together distinct components and crystallize a new machine-like function are ultimately rooted in blind chance. That parts A, B, and C come together to provide an immediate benefit to the bearer of the complex means simply that ABC work better than having no ABC. It does not necessarily mean that ABC can then be fine tuned into something that looks like it was the product of a mathematical instrument maker. There is no reason to think ABC can necessarily be tweaked into something that would cause Dawkins's engineer friends to declare it a good design. (p. 245)

In other words, the blind watchmaker crafts functionally elegant features, arbitrary features, and dysfunctional features.

> It is both brilliant and stupid. That all the bases are covered allows an apologist to explain any biological feature in light of the blind watchmaker. However, this *ad hoc* explanatory power is purchased with the loss of predictive power, as the blind watchmaker mechanism cannot predict if a feature should be elegant or a hodgepodge. It predicts both and will always be verified. (p. 245)

MG's hypothesis, on the other hand, makes testable predictions, such as the ubiquity of rational specified complexity.

> *There are more ways of making things that work than there are of making them work in a rational fashion.* And since natural selection only cares if things work, and things that work are more common than things that work rationally (but still far less common than things that do not work), it is unlikely natural selection will consistently generate inherently rational specified complexity. In fact, the more examples of rational specified complexity we find, the more unlikely it is that the blind watchmaker masterminded them. (p. 247, original emphasis)

Again, whereas the blind watchmaker is likely to put something together that will need extensive change and improvement at a later time, a rational designer has the ability to create something that will not require further significant modifications. Here, too, the evidence favors a rational designer.

The final chapter introduces a method for scoring a particular feature according to four different criteria: analogy, discontinuity, rationality, and foresight. This "Design Matrix" helps to assess and quantify the force of a design inference. You can sort of guess at the results.

I must say, in conclusion, that I rarely, if ever, read a book about evolution that was (i) so thoroughly and honestly scientific — significantly more so than many Darwinist screeds — and (ii) so utterly thought-provoking.

I only have two quibbles. In the Introduction, MG writes that "[t]he vast majority of scientists do not view Intelligent Design as science and I happen to agree with them." In view of the arguments presented in his book, I find this profession of agreement disingenuous. Again, in the seventh chapter, MG defends his invocation of a human-like intelligence:

> If the intelligent cause is completely unlike human intelligence, how would an investigation recognize the signposts of its intervention? If the intelligence is completely unlike us, it would not think or design as we do. (p. 138)

I think this constraint is unnecessary. For one thing, if the intelligent cause is completely unlike human intelligence, we have no right to even call it "intelligent." For another, even if the origin of life (and mind) is beyond human comprehension, we should expect a continuity between that supra-rational origin and inanimate matter. This would complement MG's *explanatory* continuum with an *ontological* continuum featuring a *single* creative principle with a *spectrum* of modi operandi. At the supra-rational extreme, this would create with absolute freedom. (A rational being, relying as it does on the application of pre-existent laws, cannot operate in this way.) At the infra-rational extreme, it would subject its operations to physical laws. Since these laws appear to be humanly comprehensible, there seems to be at least one stop along this spectrum — the rational mind. Moreover, the comprehensibility of those laws suggests that rational processes not only take place in human minds but also contribute to the creation of our world. We would therefore have reason to expect evidence of rational design even if the original creative principle were supra-rational.