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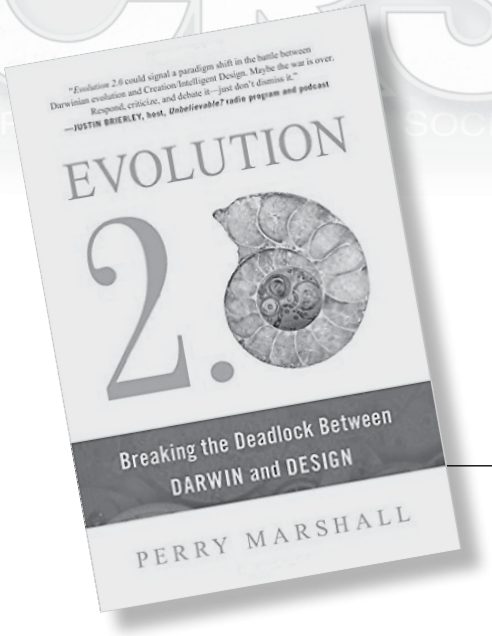

Evolution 2.0: Breaking the Deadlock Between Darwin and Design

by Perry Marshall

BenBella Books, Inc., Dallas, Texas, 2015, 374 pages, $24.95

Review Article—
Evolution vs. Design: Wrong Assumptions Cannot Produce a Correct Model[1]

Royal Truman*

Much is promised by the author of this book, who assures the reader, "If you're a person of faith, and you've been struggling to integrate scientific evidence with your core beliefs, this book is a great start" (p. xxv) and claims it will "resolve age-old tensions." He identifies himself multiple times as a former young-earth creationist (YEC) and a Christian (e.g., pp. 248, 255, 265). The book is well-structured, easy to read, and includes a good index and many good references.

The author shares the intellectual journey he went through in a very honest and personable manner. Warning signals appear, however, already in the introduction. Under the heading "Who Should Not Read This Book?" we are informed, "If you're a staunch six-day Creationist; if you hold a firm conviction that the universe is young, and no other interpretation of ancient texts is permissible; if evolution seems an impossible hoax; then you will find this book threatening" (p. xxv). His implication appears to be that anyone holding to the idea of a young creation is either uneducated, fearful, or both. Considering the number of degrees and professions represented in

[1] Editor's note: Book reviews generally are carried in the Media Reviews section of the *Quarterly*. However, this greatly extended review of an important book is warranted. For another review of this title, see Robert Lattimer's review in the Summer 2016 issue of the *Creation Research Society Quarterly* (53:79–80).

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the young-creation "side," that is a little hard to swallow.

Our expectations are whetted by the promise that this book will "reveal a century of unrecognized research and discoveries" (p. 374). And as an incorrigible glutton for origins-related scientific data that needs to be reinterpreted, I hungrily searched for new tidbits with a collection of highlighters handy.

The book can be summarized in a paragraph: We are offered an excellent analysis of the dependency of life on genetic codes, which require a divine designer at some point, but common ancestry from a single-cell organism is assumed. It is shown that rapid and massive biological changes can occur through nonrandom mutations, but inexplicably the author throws in vast periods of time between these putative evolutionary jumps. These notions are standard doctrine of advocates of the punctuated equilibrium theory and Evo-Devo scientists.

As far as the actual science is concerned, it became clear that the author thinks he is banging his head against an open door with most of his intended audience. The ID (intelligent design) community has discussed extensively the notion of front-loaded and information-driven biological processes. And for decades the YEC community has researched biological factors that are able to produce a wide variety of species derived from a small number of roughly family-level animals that debarked from Noah's ark about 2500 BC.

For a scientific newcomer to the topics, interesting biological facts are discussed. I suspect the author would be astonished, however, to discover that if he would attend one of the annual creation-science biology conferences I attend, the YEC PhDs and professors in attendance could explain to him in vast detail all the biology and information science presented in this book. In fact, this book could have been written by referring exclusively to the YEC and ID literature, supplemented by insights of knowledge common to these experts.

I asked myself why, after roughly ten years of research, this intelligent, motivated, and honest author (who identifies himself as a former young-earth creationist) fell so far short of what he set out to accomplish.

Old-Earth Assumptions Determine the Model

The author has a university degree in electrical engineering and is a gifted business consultant and software entrepreneur. His marketing skills were instrumental in developing such a formally well-crafted and carefully structured book. He shares his doubts and struggles openly and leads us through the path that led to the conclusions that, he wishes to persuade us, provide a resolution between theism and science.

As a starting point, Marshall decided that if God is real, if there is design in the universe, one shouldn't need a holy book or blind faith to know this. Design in nature ought to be detectible (p. 8), since whatever one puts his or her faith in shouldn't contradict obvious verifiable facts (p. 9). This sounds fair enough unless we reflect carefully on Will Durant's warning in *The Story of Philosophy* that "we find no new truth because we take some venerable but questionable proposition as an indubitable starting-point" (Durant, 1974, p. 132).

If the past could be interpreted using error-free facts and perfect logic, we could delegate the grunt work to a computer program. The evolutionary assumptions Marshall treats below as facts proving an ancient earth did not prevent him from concluding God indeed had some role in nature, but his data now needs to be reexamined to arrive at a better model.

If only ten thousand years or less is being considered, it is impossible to come up with compelling scientific data to explain the origin of existing biological features if only naturalist forces are permitted. To demonstrate this, attempt to do so for all known, but far simpler, current technologies under those same constraints. It can't be done. The lack of intelligent agency must be compensated for somehow, and deep time is used. Inadequate causal factors cannot produce a correct model. Therefore, those providing the data, or rather, assumptions that Marshall feels compelled to work with, have hopelessly prejudiced his search for truth.

Marshall needs to reevaluate the so-called facts that led him to reject the YEC position. He is astute enough to recognize that diehard junk-DNA advocates like Larry Moran possess an antireligious bias (p. 273). I urge him to reflect more carefully about the biases of those like Charles Lyell and the establishment, die-hard evolutionists, who have a not-too-well-hidden agenda to establish an old age for the earth and naturalism in order to deliberately discredit the Bible.

Archeologists, detectives, forensic examiners, and other experts who attempt to decipher the past have vast flexibility in adjusting parameters to come up with explanations. The community Marshall has relied on for his interpretations of ancient history admit being "forced by our a priori adherence to material causes to create an apparatus of investigation and a set of concepts that produce material explanations, no matter how counter-intuitive…. Moreover, that materialism is absolute, for we cannot allow a Divine Foot in the door" (Lewontin, 1997, p. 31).

Historical science methodologies make no attempt at, or claim, a full coverage of the facts before deducing interpretations. Instead, usually an intuition or theory is conceived, funds are obtained, and then the research is guided to confirm the thesis. Therefore, the naturalist community is not falling over itself to analyze reports of intact tissue in dinosaur bones (Anderson, 2016) or the mitochondrial evidence for a

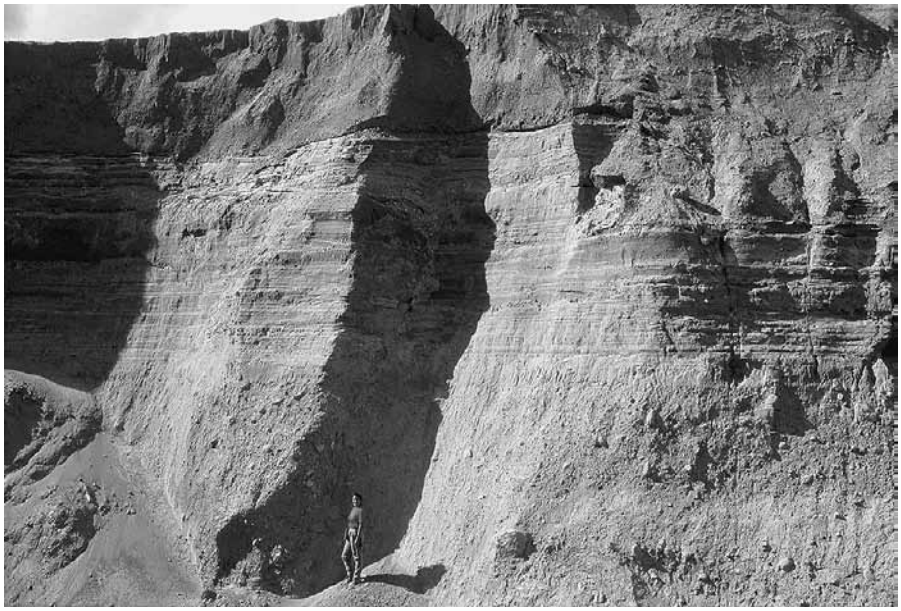

Figure 1. Fine layering was produced within hours at Mount St Helens on June 12, 1980. (Photo by Steve Austin. Used by permission of Institute for Creation Research.)

single female common ancestor split up into three female branches, as reported recently by Carter and Lightner (2016). As such, Marshall's statement that "further investigation becomes impossible if a miraculous event cannot be reproduced in the lab" (p. xxiii) overlooks that laboratory experiments are never used to replicate events from the distant past, and one should not discard the evidence of a reliable witness.

Reasons for Believing the Earth Is Very Old

Marshall shares his reasoning for assuming the earth is billions of years old. On page 3 he simply claims that "there are millions of fine layers of sediment in the Earth's crust, deposited year by year." No references for such an important statement are provided. Presumably he is referring to varves, but current research debunks the need for millions of years for them to form (Oard, 2006). Dr. Walker explains:

> The assumption that each couplet always takes a year to form is wrong. Recent catastrophes show that violent events like the Flood described in Genesis can deposit banded rock formations very quickly. The Mount St Helens eruption in Washington State produced eight metres (25 feet) of finely layered sediment in a single afternoon! (Walker, 1999)

Figure 1 shows Mt. St. Helens layers that were rapidly produced.

Next, by accepting macroevolutionary claims, Marshall makes the unwarranted assumption of long time periods. He claims that the small set of bones at the back end of whales "are obviously a set of minimally formed feet and legs . . . remnants of an earlier ancestor having been some other type of mammal" (pp. 13–14). He then raises doubts about his own argument two pages later (and again later in the book) by freely admitting those bones might serve some function. It would have been better if he had reviewed the creation research literature, where these "remnants" are shown not to be useless at all but helpful in strengthening both the male and female reproductive organs. It is not clear why atrophied legs would demonstrate vast times.

On page 16 Marshall boldly states, "If whales and blind mole rats are descended from other mammals, then it might seem to follow that humans are merely primates." Well, moles do have a useful membrane that covers their eyes, protecting them from dirt while digging, having no use for eyesight deep under the ground. Their eyesight seems adequate to sense light at the surface, and there is no compelling reason to believe their design is deficient for their lifestyle underground (Weston and Wieland, 2003).

The biblical "kind," or *baramin*, is roughly equivalent to the family level of our current zoological classification—the felines, equines, canines, bovines, etc.—and they were to multiply and fill the earth (Genesis 1:28; 9:1). A great deal of genetic variation and adaptability had to be built in *ab initio*. Loss of some features occurred in the same cases for some lineages over time, as they rapidly adapted to special environments. In addition, the survivors of the Flood would not have carried the full genetic potential originally distributed among the different members. There is no justification for believing the current traits of moles represent millions of years of devolution. Snakes and fish also have protective membranes.

Much is made of the claim that there are small bits of data (pseudogenes) shared only by humans and primates and allegedly found nowhere else in the animal kingdom (pp. 19, 190). This bold claim was based on a paper published in 1992, when very few higher organism genomes had been sequenced. In reviewing that paper, I wanted to see what data actually had been examined. The relevant segments of CYP21 genes were collected, 2 from human, 3 from

chimpanzee, 3 from a gorilla, and 4 from an orangutan. This data set was absurdly too limited to claim "nowhere else in the animal kingdom." As I suspected, the authors of the study did not even make this statement or anything resembling it, nor does the paper provide any support for such an absurd extrapolation (Kawaguchi et al., 1992).

Ever more biological uses for "pseudogenes" are being reported, being typically used by other cellular genetic codes for regulatory purposes, such as coding for miRNAs and increasing variety through chromosome crossover when producing gametes. Furthermore, the potential for statistical coincidences at mutational hotspots among populations undergoing a genetic bottleneck has been discussed in the YEC literature (Truman and Tarborg, 2007). It is easy to selectively report examples without mentioning the counterexamples, and thereby draw incorrect conclusions. Instead of looking at similarities, differences need to be considered to decide if common ancestry is plausible. To illustrate, a recent comparison of 16 similar cyanobacterial strains reveals they shared only 660 genes, whereas on average 869 genes are unique to only one strain (Beck et al., 2012). As ever more genomes are being sequenced, investigators are finding that the number of "orphan genes" continue to increase faster than possible homologs in other taxa (Beiko, 2011). Darwin's predicted tree of life is not being confirmed.

Many independent studies by YEC researchers have confirmed that very significant differences exist between the chimp and human genomes (Bergman and Tomkins, 2012a, 2012b).

Hebrew *Yom* Interpreted as Time Periods

Unsurprisingly, a Christian who believes in the Bible and an origin of life billions of years ago has some serious hand waving to do. The fistful of arguments reviewed in this book are all well-known from decades of jousting with our progressive creationist brethren. Marshall brings up the matter of the apparent illusion of history if the universe is recent (p. 319) with no mention of any of the last 20 years or so of YEC scholarship on this manner. There is no consideration anywhere in this book of biblical miracles implying quick fixes, like water being converted into wine or instant healing. The experienced YEC reader knows where one will end up once one embarks on this slippery slope—as Marshall has—with a picture of an incompetent God who fails in over 99% of His evolutionary attempts to get new species to work and submitting His creatures to millions of years of agony, living in terror from predators and suffering sicknesses and death in His so-called "very-good" masterpiece. To grasp the horror of a fallen creation, one can view Youtube footages of lions not only killing but even eating each other.

Inescapably, Marshall tells us once more, "Day is a period of time, not 24 hours. The Hebrew word for day (*yom*) has a variety of meanings in Genesis" (p. 310). This has been competently answered by many experts in the YEC community. To be recommended is Dr. Sarfati's (2004) encyclopedic *Refuting Compromise*. The point Marshall fails to grasp is that languages, including Hebrew, provide the means to remove ambiguity when isolated words can assume different meanings, including the use of "day" or "days."

Since I am fluent in several languages and need to translate every day between them correctly, this is easy to recognize. For example, discussing health problems during the Middle Ages, a German speaker could describe that period as "bad days" (*schlimme Tage*), even though centuries are meant. On the other hand, in many languages, including German and English, saying I studied "all day long" is clearly narrowing the period to no longer than 24 hours. In Spanish, one can express "good morning" as *buenos días* (literally "good days"). Even though *días* is plural, the greeting must be repeated afresh the next day; it is only good for one day. This Spanish greeting is translated to the singular "good day" in Portuguese, Catalán, German, French, Australian English, Italian, etc. Virtually no one translating even notices because it is so obvious and automatic. There is no ambiguity, the meaning is clear.

There are many examples of words associated with time that can have different meanings when taken in isolation, but are never ambiguous to native speakers when used in normal discourse. In Spanish, *mañana* could mean "morning" or "tomorrow." The word can even be used jokingly in some contexts to postpone indefinitely and thus mean "never," but to fluent speakers there is never any confusion when used correctly in each context. Claiming ambiguity in the Hebrew word *yom* in Genesis reflects a poor understanding of Hebrew and the nature of languages in general.

Information in Biology Requires Divine Contribution

Having unceremoniously abandoned potentially new YEC allies (the traditional bulwark against atheism) who would have been thrilled to invite him in, Marshall then tries to see if the ID community is more pliable. In chapter 28 he points out that many of the greatest scientists were devoutly religious and makes a plea for people of faith to embrace scientific inquiry (p. 255). He reviewed the made-up war between science and religion, all topics that have been analyzed in the YEC and ID literature in great detail for decades. Out of the clear, blue sky, Marshall then informs the reader that he believes God breathed the breath of life into Adam and he became a living being (p. 258) and that He created human beings in His image (p. 265). We are not offered

any justification for these beliefs, since his investigative journey ignored the Bible *in toto*. Biblical content is thrown in as an afterthought.

I read chapters 5–9 with much interest, since they discuss information theory, in particular Shannon and Yockey's ideas, topics I have published about and presented at conferences and workshops over the years. We read about how mutations destroy information, but the seminal work of professor John Sanford (2008) is never mentioned. (Incidentally, Sanford is a former long-age evolutionist who became a YEC.)

Mr. Marshall's analysis of genetics needs some refining. For example, he claims that the instructions to build the whole body come from the chromosomes (p. 45). If this were the whole picture, then transferring chromosomes to a different environment, providing only the necessary nutrients and energy source, should produce a living cell.

Careful analysis by others, not only those in the YEC camp, has produced a view of the whole cell as being involved in providing informational guidance. Sometimes DNA functions as the active source of instructions (e.g., exons, to specify protein sequences), whereas other portions of DNA are passive (e.g., cis-regulatory elements), being activated and regulated by transcription factors. The physical organization of cellular and intercellular components also control outcomes, and a holistic model known as *Coded Information Systems*, developed by myself, integrates all these informational components.

Marshall mentions redundancy in codes and error corrections. Unfortunately, there is nothing in these chapters not already better understood among creation and ID scientists. I say "unfortunately" since much work lies ahead in understanding the huge number of cellular codes, and the interaction between them is still poorly understood. New insights would have been much appreciated. For more information on the topic of multiple genetic codes and implicit genetic languages, see my detailed analysis (Truman, 2016a, 2016b).

Usual scientific protocol is to review key published contributions of others preceding one's own work, for example Marshall would have greatly benefited from reading Truman (2012). Not even mentioned is the work of the giants in this field from the YEC and ID communities, household names like Kirk Durston, Steven Meyer, and Lee Spetner, all researchers with PhDs and many years of experience in this field. The work of YEC Dr. Werner Gitt is mentioned a couple of times superficially, and then only by mentioning a book written almost 20 years ago.

Marshall believes his challenge to produce a code naturalistically will impress the atheist community. Gitt has been challenging those people for some 20 years with a whole series of theorems he characterizes as "information laws of nature," which already explicitly include the inability of a code arising without intelligent guidance. Unfortunately, Gitt's complete edifice has been ignored in the secular literature by those adamantly committed to a universe without God. The reader interested in a thorough treatment of various topics in information theory is strongly urged to read the brilliant book, *Biological Information: New Perspectives*, based on a symposium held at Cornell University, with papers presented by several PhDs and professors, almost all of YEC and ID persuasion (Marks et al., 2013).

Message to the ID Community: Evolution Is Guided

Marshall's proposal for evolutionists is to replace the neo-Darwinian random mutation theory with that of goal-seeking and adaptive mutations (pp. 9, 259). He correctly points out that geneticists have been breeding fruit flies for sixty years all round the world (flies produce a new generation in about eleven days) but have not produced even a new enzyme (p. 31).

The fact that natural selection can slow entropy down but is powerless to reverse it (p. 292) is, of course, well known to YECs, who recognized long ago the statistical significance of Muller's Rachet.

Much is made throughout the book that there is no mathematical procedure for proving absolute randomness (e.g., pp. 74, 292). Marshall argues that there is some vanishingly small number of beneficial mutations that were generated by random accidental copying errors, but there is no way to be certain they were random (p. 75). Marshall concludes that this inability to determine whether mutations are random is the reason for "our deadlock between Darwin and Design" (p. 75). The significance that complete randomness in mutations cannot be demonstrated by evolutionists is overplayed, since no empirical models are expected to fully capture all aspects of nature. We cannot even prove that pi is a random number, or even prove that the second law of thermodynamics cannot be violated, no matter how unlikely we believe this to be.

Marshall offers five drivers to produce rapid evolutionary change. Once again, Marshall is apparently unaware that for many YECs with advanced degrees in science or medicine, what follows in his book is well known, has been often discussed, and is frequently published.

1. Transposition. This means that portions of chromosomes can change positions. Marshall claims this is performed by cells to adapt in a targeted manner (chapter 11). However, this means there must be a designated and defined target. What process designates this target? How does the cell know what specific transposition will achieve the necessary adaptation? What is the source of the encoded information that guides this targeted transposition? For an in-depth treatment, I recommend that the reader

digest publications by YEC experts, such as my colleague Dr. Tarborg (2009). Marshall also mentions mutations generated under starvation conditions. The notion of mutational hotspots is certainly well known to the YEC and ID communities, and conceptually is closely related to the topic of targeted mutations that mature B-cells as part of an immune system response (Truman, 2002).

2. Horizontal gene transfer (HGT). Vertical gene transfer is what happens from parent to child—heredity. Horizontal gene transfer is the exchange of genetic material between different organisms, often claimed to be due to a virus. Horizontal gene transfer is mentioned in chapter 12 as a way to speed up evolution. Carl Woese is the champion of the proposal that horizontal gene transfer was the dominant form of evolution before multicellular life existed (p. 96). The YEC position has been for many years that microorganisms provide a wide range of nutritional services, such as nitrogen fixation and digestion, necessary for higher organisms, and HGT is a designed means to adjust rapidly and to ensure the variety of genes necessary for the common ecological good.

Preexisting genes are already part of what Dr. Lee Spetner (1997) calls the biosphere and thus permit bacterial colonies to solve categories of anticipated challenges through a collaborative distribution of effort.

3. Epigenetics. This involves altering gene expression without altering the organism's DNA. Because epigenetics is unrelated to the universal genetic code, it provides a separate source of information within the cell. This topic is touched on lightly in chapter 14. For the reader interested in an in-depth overview, I recommend *The Handbook of Epigenetics*, a gold mine of new research data (Tollefsbol, 2011). I recognized the examples discussed by Marshall below from *The Epigenetics Revolution* written by Nessa Carey (2012). As an example, researchers in Canada discovered that pups licked by their mothers had a reduction in a specific type of gene expression in the hypothalamus. Methylation is an ingenious form of data compression, because portions of DNA can be used to generate different messages (p. 116). The point is that our bodies can adjust to external circumstances, such as by developing callused fingers from playing the guitar (p. 117).

Once again, this is common knowledge, since these kinds of effects were being sought long before Mr. Marshall or I were even born, inspired by YEC fundamental principles. These biblical lampposts produced various insights, so that even a non-biologist like myself could point out:

> Since after the completion of Creation Day 6 God rested, the individual organisms, and ecologies produced so far had to be adaptable to new contingencies in real time and across generations.... Visible benefits may occur within a second, such as rapid reflexive actions (removing a hand from a hot object). A reaction could also take a few seconds (sneezing), up to minutes (vasoconstriction of skin and limb blood vessels when temperature drops), or hours or months (such are resulting from varying hormone levels).... Other adjustments benefit future generations. Long periods of dryness cause spruce trees to sacrifice their seven-year-old needles by cutting off moisture and most nutrition to them, transferring the resources elsewhere in the tree. (Truman, 2015)

Tarborg (2008a, 2008b) discussed the idea of front-loaded higher organism baranomes—pluripotent, undifferentiated genomes with an intrinsic ability for rapid adaptation and speciation.

4. Symbiogenesis. This theory, that eukaryotic organelles like mitochondria and chloroplasts are ingested, formerly free-living prokaryotes, is discussed in chapter 15. Professor Lynn Margulis from the University of Massachusetts Amherst strongly defended this theory,

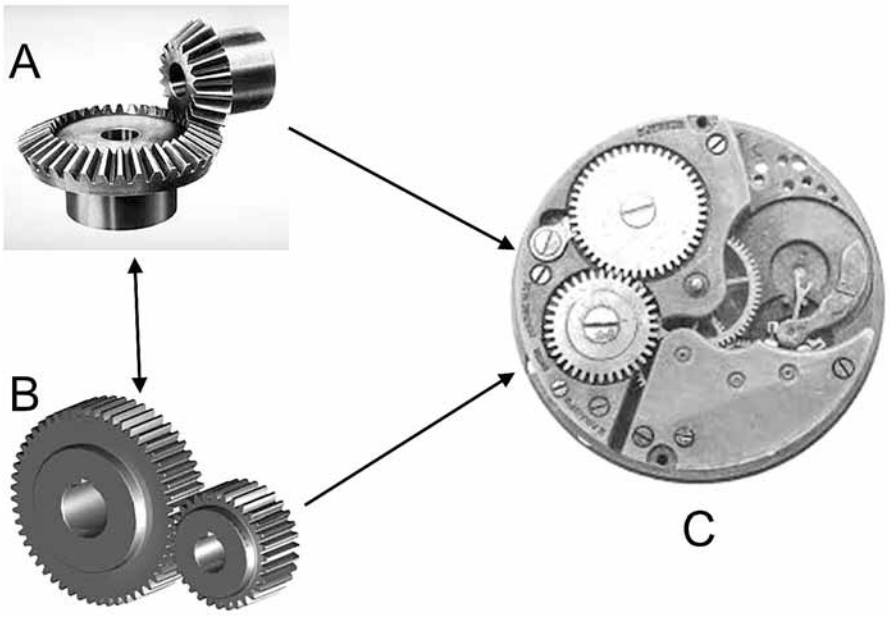

Figure 2. A similar conceptual solution need not imply an evolutionary common ancestor, such as between A and B. Furthermore, the presence of the same feature in more complex or multiple copies does not imply a step-wise evolutionary relationship, such as A or B becoming C.

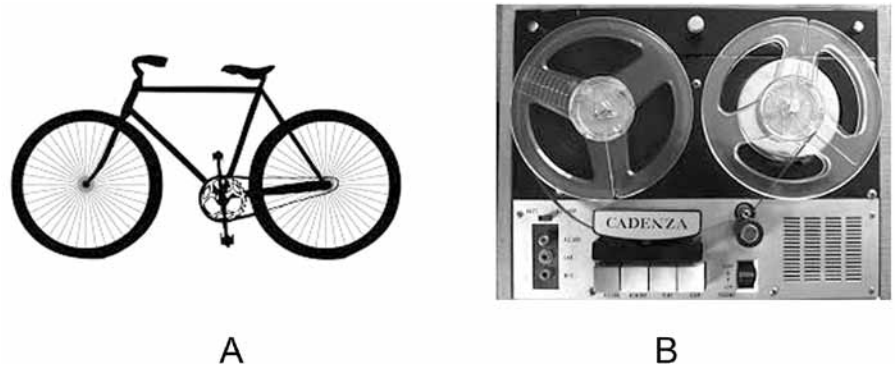

Figure 3. Object A and B share a conceptually similar solution for how to move a round object via another round object using a ribbon-like connector. An intelligent agent was responsible for the similarity of solution, one object was not physically converted into the other.

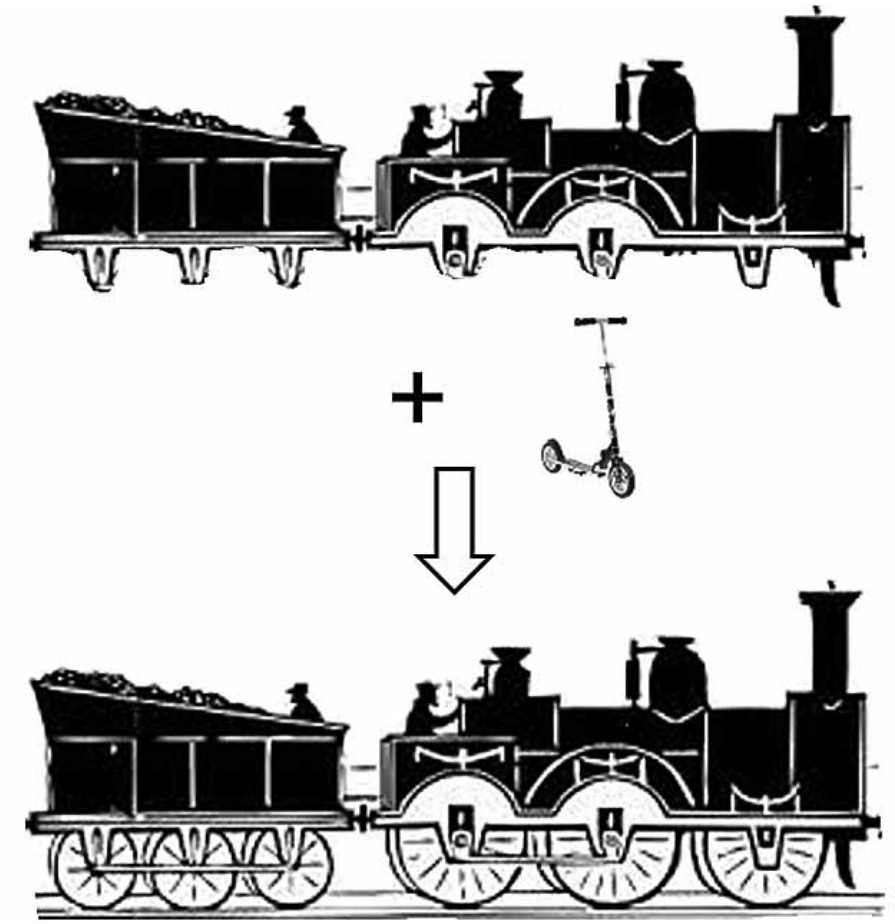

Figure 4. The symbiogenesis theory resembles having a functional train lacking wheels integrate an independent, functional scooter and replicate the wheels to produce a dramatically improved train now having a multitude of wheels.

which was accepted uncritically by Marshall.

Marshall claims that there is nearly universal agreement that organelles originated through symbiogenesis, firmly established by ribosomal RNA sequencings (p. 124). Designers, however, often reuse a conceptual inspiration for many purposes, and finding the same pattern in multiple places need not mean parts were physically brought together, as explained in Figures 2 and 3. Marshall (p. 127) unwittingly provides an example that corroborates this point:

> It's like finding the same chassis in two cars, the Toyota Camry and the Lexus, with only minor differences in the mounting brackets, and striking similarities down to the most trivial details. One would naturally conclude the chassis was only developed once, then the other car borrowed the design.

Exactly right. The correct interpretation is that a principle had been conceived and then reused appropriately in different environments (cars), not that part of a Lexus had been assimilated by a Toyota model that had worked just fine before without a chassis. The symbiogenesis theory claims, however, that chloroplasts in plants originated when a protozoan ingested a cyanobacterium, and mitochondria originated when a complex cell ingested a bacterium (p. 124). The auto chassis illustrates exactly what YECs believe did not occur in nature; namely that all chloroplasts and mitochondria found in higher organisms allegedly arose from such singular events. Marshall is claiming a principle that would be similar to claiming that a fully functional train having no wheels ingested a scooter and then replicated the scooter's modified wheels to produce an improved train (Figure 4).

YEC Dr. Batten has pointed out that it is only to be expected that there would be similarities in many of the genes for photosynthesis or respiration between prokaryotes and eukaryotes—they

must achieve the same chemistry. A designer would obviously reuse a brilliant concept, suitably adjusted for the requirements of different multicellular organism. In addition, detailed studies of the DNA base sequences have shown that the pattern of similarity between eukaryote and prokaryote is not what would be expected from the endosymbiont hypothesis (Batten, 2000), but of course we can recognize that the same biological need was solved multiple times.

5. Genome Duplication. This theory, that various simpler organisms underwent genome duplications and then dramatically created new genes and regulatory networks, is discussed in chapter 16. It is certainly true that hybridization can occur in plants, and plant growers make hybrids at will (p. 142), but this produces only modified plants. Marshall once again uncritically swallows unjustified evolutionary claims, such as the origination of the hagfish via hybridization—the mating of two species of invertebrate sea squirt (p. 135). He does admit on page 143 that the transition from sea squirt to hagfish would have required massive cellular engineering, including construction of several new body parts, but he does not hesitate to assure the reader that the resulting creature was the ancestor of the world's first jawed vertebrate, which led to bony fish, reptiles, amphibians, birds, and mammals (p. 138).

Genome duplication *per se* can only work with what is already present, and the modified organism will not deviate significantly from the original or the potential already implied. New protein families will not arise, and neither will new cell types. This resembles comparing single- and double-barreled shotguns. One could reasonably argue that being able to shoot at separate targets without reloading offers novelty, in addition to some disadvantages (like greater weight and slower movement). But we can agree that finding a double-barreled shotgun would hardly justify the claim that we now know how a church organ, having multiple pipes, evolved from a single-barreled shotgun. This is the flaw of focusing on only the features shared in common between organisms when arguing for common ancestry, when there is absolutely no justification to favor this over other explanations.

Marshall's Five Tools Have Limited Scope

What do we make of these five "tools" that Marshall claims accelerate evolution? He even claims that these tools interconnect the entire tree of life, so that any point on the tree is connected to any other point (p. 144). If Marshall could have demonstrated this, he would have collected several Nobel Prizes by now. The genetic tools that Mr. Marshall describes certainly play a divinely planned role to facilitate adaptation, but they resemble the development of different business processes by rearranging existing elements such as contracts, ships, assembly lines, and suppliers. The origin of the elements tools themselves has not been explained, far less how the countless interactions could have been put into place step by step to produce vastly new organisms. This is the key message of *Evolution: Still a Theory in Crisis* (Denton, 2016). Denton conclusively demonstrates that there is no known or conceptually feasible path linking the top-level Bauplans (architectures) to each other, nor is there such a link among the thousands of specific taxon-defining biological features. There are thousands of examples of separate ensembles of features that jointly, unambiguously define discrete taxa.

Mr. Marshall, trained as an electrical engineer, can be forgiven for apparently being unaware of the vast unrelated specialized genetic infrastructure different classes of organisms use. Hundreds of thousands of orphan genes, thousands of novel protein families, vast networks of complex cis-regulatory logic, and multiple cell-type specific codes cannot arise from these five high-level drivers. A tractor can indeed be used to rapidly move large integrated functional elements around but not to produce new microcircuits.

Let us examine an example where the evolutionary novelties would be dramatically less than entire Bauplans. On page 109 Marshall discusses signal molecules used by bacteria as a communication language within and across species (Figure 5) (Bassler, n.d.). To work, various specialized protein sensors (able to identify a specific kind of molecule) and signal transfer pathways are needed by the different species. Where did these new specialized components come from? Did one species branch off and then have to evolve a new metabolic path to produce and process a different biochemical while still using the former scheme?

Marshall rightly critiques neo-Darwinism as being anecdotal, not empirical, and agrees that millions of years are too long to test. He reiterates that rapid change using rearrangement of existing factors has been demonstrated in 70-plus years of documented live lab experiments (p. 147). But none of the five novelty-generating factors mentioned—transposition, horizontal gene transfer, epigenetics, symbiogenesis, and genome duplication—would produce the new fine details necessary to process these individual signal molecules.

A Bit of Confusion

We are left with no idea what Marshall's historical model is. Did God create integrated ecologies *ab initio*, able to collaborate together, as YECs believe? If this is Marshall's concept of creation for prokaryotes, then why shouldn't integrated ecologies of plants and pollinating insects have been created also? Alternatively, did God intervene continually, slowly modifying a few nucleotides at just the right locations and times on

some members only? Or did He preplan these much smaller mutations to occur "naturally" by evolutionary accident in an almost, but not entirely, random manner along continuously viable paths to ever greater complexity up the tree of life? Such processes would have left a fluid record of change in the paleontological record, which everybody knows is not the case. The differences between "similar" organisms do not involve a mere chromosome change or two, but at a minimum typically many hundreds, or thousands, of very precise, different regulatory elements, plus novel proteins and developmental paths.

I sincerely applaud Mr. Marshall's intense efforts to make scientific and theological sense out of the world we find ourselves in. He wisely states that his current interpretation of Genesis 1 and 2 and modern science have been presented provisionally, and they are not written on stone tablets (p. 330). I respectfully believe he still has much work ahead of him, and I fear his conclusions, theological and scientific, are seriously premature. Based on various peculiar statements, his grasp of some of the scientific areas he has been reading about appears to be weak. On page 10 he claims that "bioinformatics explores the deep parallels between genetic information and human-made systems." Where did he get that notion? This is not at all what bioinformatics students learn or what the practitioners work on professionally. On page 181 we read, "In DNA transcription and translation, in order to convert code to proteins, you need a ribosome to transcribe the message." Correction: DNA sequences are transcribed to RNA sequences, using polymerases (not ribosomes), and mRNA sequences are translated into amino acid sequences by ribosomes.

The discerning reader will realize quickly that there is a complete absence of any evidence that Marshall has had any recent, serious interaction with YEC or ID advocates who have more than a high school science education. We are assured there were hundreds of online debates (usually led by genetic novices), but we read nowhere about valid points made or of any of the reasonable and expert answers that are freely available.

On page 150 we read, "A frequent Creationist and ID claim is that there is no known observable process by which new information can be added to the genetic code of an organism." The reference is to a book written in 1997 by an engineer, but nothing is mentioned about the current literature available on this topic. During the 1990s, not much was known about information processing involving DNA beyond the ability to specify protein sequences. No competent creation scientist believes that bacteria, for example, cannot add DNA to their genome. Virtually all YEC scientists know that plasmids can be added and lost by bacteria, not to mention the multiple forms of HGT bacteria use. In a recent paper, Truman (2015) pointed out that sophisticated coded information systems are both open and adaptable.

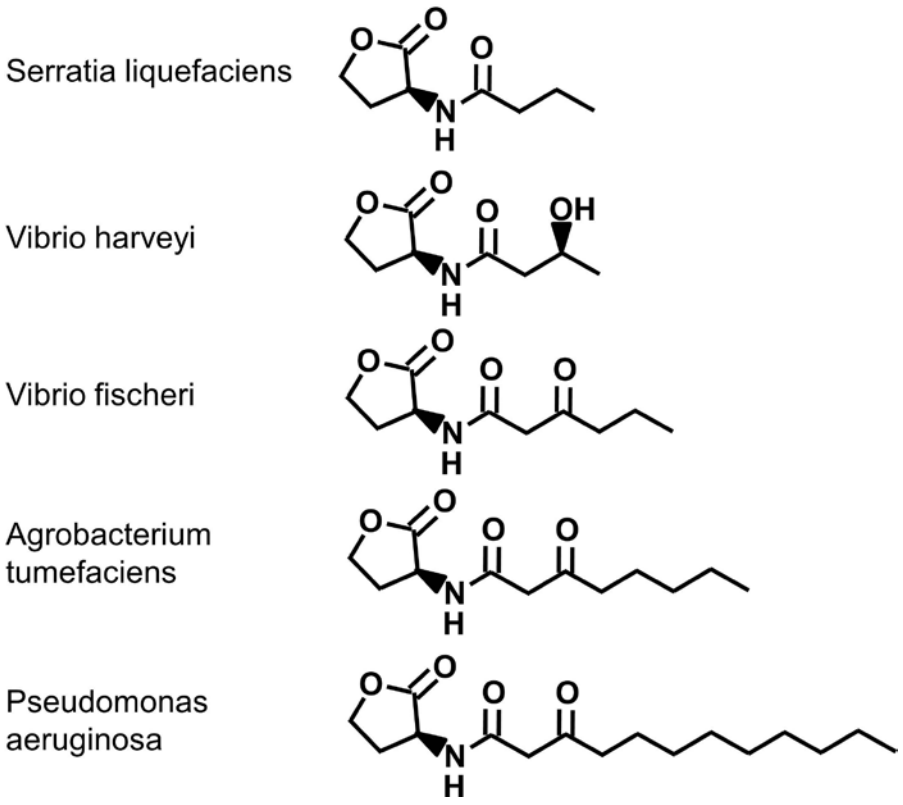

Figure 5. Signal molecules used by different species of bacteria.

Codes Cannot Arise Naturally

The main thesis of this book is presented up to the beginning of Part VI, after which different topics are introduced without the same clear structure seen previously. Nothing here is new to those following the YEC professional literature. Chapters 18–19 discuss DNA processing as a language, chapter 20 addresses irreducible complexity, and chapter 21 emphasizes that codes cannot arise naturally.

Chapter 23 presents a huge financial award to "the first person who discovers a natural process which produces a communication system without having to design the encoding and decoding rules in advance."

I am convinced that this is indeed a fool's errand, but evolutionists have shrugged off inconvenient details related to a naturalist origin of life for years. However, Marshall is leaving little if any way to identify truly creative acts. He frankly admits, "Half the thesis of this book is that randomness does not create codes . . . the other half of this thesis is that the origin of life required the creation of codes, and that non-random, linguistic adaptations of DNA continue to create codes and thus drive biological evolution" (p. 282).

Basing one's case on only this one central theme, without revealing the massive difficulties in far more detail, will not be enough. How often have single-punch, knockout-attempt arguments like this been deflected by evolutionist claims that the conditions billions of years ago were so different that we cannot know what happened and therefore need not worry about it. The excuses can even sound highly sophisticated, like the claim that such things are the "inevitable emergent ends of nature's deep structure" (Denton, 2016, p. 117).

In Barbieri's seminal book on biological codes, we read that "organic codes are there, that they have always been there, from the very beginning" (Barbieri, 2003, p. 7). But throughout this otherwise very illuminating book, I found no suggestion that this admission led the author to belief in a creator, far less the God of the Bible. After defining codes, Barbieri was then careful to inform his readers right up front that "this does not mean that a correspondence between two independent worlds must be the result of a conscious activity" (Barbieri, 2003, p. 5), and during the remainder of the book, Barbieri seemed to blithely assume the genetic code arose with no divine contribution.

As another example, in *The Implicit Genome*, Dr. Lynn Caporale claims that "protocols become an important substrate for evolution, and their appearance under natural selection is inevitable" and that "multiple examples in this book illustrate that natural selection can favour the evolution of whole protocol suites and their interactions, which in turn massively accelerates the acquisition and sharing of functional adaptive change" (Caporale, 2006, p. 297). Note that for her, codes are merely a subset of protocols.

The YEC approach has been to take a holistic view of the entirety of nature and God's creative activity. By foolishly abandoning the battle for a young earth and all evidence for direct divine fingerprints, those wishing to avoid scientific and theological conflict through a range of strategies from compromise to outright surrender have provided endless loopholes for atheists to avoid confronting many hard questions.

From chapter 24 to the end of the book, Marshall argues that intelligence must be involved at some point, or codes could not have arisen, but he also argues that essentially everything else in biology might be explainable through natural processes, some of which are discussed below. So, when he embraces the dualist view and asserts the human mind is nonphysical (p. 233), we are left with uncertainty as to what he is proposing. His model is not clear, since he thinks cells might be self-aware (chapter 19). How does Marshall's view differ from an apparent atheist like University of Cambridge professor emeritus Dennis Bray? In his *Wetware: A Computer in Every Living Cell*, Bray (2009) argues for a naturalist source of consciousness already present in single cells and simply attributes evolutionary refinement for its higher degree in humans.

Adaptability Is Not Evolution

YECs have argued for decades that God created the means to generate rapid variety, such as chromosome crossover when producing new gametes. How else would the rich variety we see have arisen from the animals that survived the Flood? YEC Dr. Lightner pointed out, "Within the context of creation, the development of genetic diversity has been a means by which God has enabled his creatures to adapt to the many different environmental niches they occupy today (Genesis 1:22; 8:17; Isaiah 45:18) . . . God designed meiosis in a way that naturally tends to increase diversity" (Lightner, 2013). YEC biologist and theologian Dr. Reinhard Junker with Wort und Wissen in Germany is a walking library on the topic of rapid adaptability. Worldwide, YEC scientists independently concluded years ago that high variety and adaptability reflect God's anticipatory, holistic design of nature.

As Marshall comes to the end of his book, I can't help wondering if he is comfortable that he is reasonably close to a satisfactory old-age model of creation. He challenges the reader on page 265, saying, "You can tell yourself stories of junk DNA and vestigial, or you can ask why those things are there," and then on page 275 we read:

> Another case in point is the matter of vestigial organs, the organ-in-your-body version of junk DNA. There is no such thing as useless organs; every organ in your body has a function, even if, like those whale legs, Evolution 2.0's Swiss Army Knife is saving it for a rainy day. Yes, even that troublesome appendix.

From the YEC point of view, the door is not only wide open, but we will roll out a red carpet toward anyone with such views.

After this long journey and soul-searching, if Marshall is now willing to believe whale legs are not useless after all, he should review his earlier premise that it proves whale evolution tens of millions ago from an earlier ancestor (p. 14)—even though we read again and again that Marshall knows that biological change can easily occur in a handful of generations. For example, on page xix he confirms that "weeds to wheat didn't

take millions of years, it might have only taken 100 generations to reach its current form," and on page 259 he states, "Evolution . . . isn't gradual; the majority of measurable progress occurs in short periods of time, followed by long periods of general stability."

Having now persuaded himself that his childhood beliefs in God were correct, Marshall would make quantum leaps in his progress and understanding if he would open himself up and let the Creator of the genetic code, who revealed his thoughts in the Bible, provide the conceptual guidance needed. The Bible speaks unmistakably of miracles that occurred almost instantly, despite giving an illusion of false history. When Jesus calmed a violent, life-threatening storm, the waves did not begin to subside in a normal, unremarkable process over the next hours; rather, there was suddenly a great calm (Matthew 8:26; Mark 4:39; Luke 8:24).

Marshall need not worry that irrational, blind faith is demanded by God and that he would have to abandon normal scientific reasoning and observation (p. 8). Belief in God and miracles is not a research killer, especially since we are talking about historical and not repetitive, empirical science here. One notices a general pattern in biblical miracles where there is often a preliminary buildup and anticipation before something happens, then a miraculous activity associated with some aspect of human experience makes the miracle at least comprehensible, and finally evidence remains that indeed something miraculous had occurred.

The reader can confirm this observation with miracles of their choice. In Genesis 19 God did not simply make Sodom disappear or have it deteriorate naturalistically over millions of years. Instead, Lot was warned the city would be destroyed, brimstone and fire then rained down from heaven, and then for years afterwards everyone could see the effects. In Exodus 7 Moses told Pharaoh in advance that God had instructed him to strike his rod upon the waters and they would be turned into blood. Afterward, everyone could see the effect of dead, stinking fish. The destruction of Jericho (Josh. 6) shows the same pattern.

In the pattern we see, some kind of action immediately precedes the miracle, as a kind of breakpoint to alert when the miraculous will be initiated. Yet the action itself has no causal effectiveness. Whether hitting water with sticks (Exod. 7:20), blowing trumpets before walls fall (Joshua 6:20), cursing bad young men (2 Kings 2:24), cursing a fig tree (Mark 11:21), or touching blind eyes (Mark 8:25), none of these actions mechanistically caused the miracle; they only provided a human reference point for the miracle.

Review John 2:1–11. If Jesus had instantly caused empty jars at the wedding to be full of wine, it would have been incomprehensible and difficult to recognize that a miracle had really occurred. But by having the empty jars first filled with water in front of everyone (John 2:6–7), the "break point" to the supernatural was prepared. Conversion of water to wine had at least the chance of being processed mentally, whereas producing wine instantly from nothing is such a stretch that most observers would suspect a trick (e.g., the jars were not really empty). Distributing bread to thousands of individuals made the miracle more comprehensible than if everyone suddenly had a full stomach (Mark 6:41). And the effects afterward of the miracles were then obvious for everyone to confirm, whether by viewing the baskets of bread left over or by being able to drink the wine.

No, God often generously leaves comprehensible footprints behind His miracles in our physical world that help confirm something very special has been done.

Evolution 2.0 does not mention Jesus, miracles, or salvation, so of course we cannot expect much in the way of groundbreaking insights. The author is strongly urged to reexamine his deep time evolutionary assumptions.

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