Darwin's dirty fossil secret

Darwin's Doubt: The Explosive Origin of Animal Life and the Case for Intelligent Design

Stephen C. Meyer

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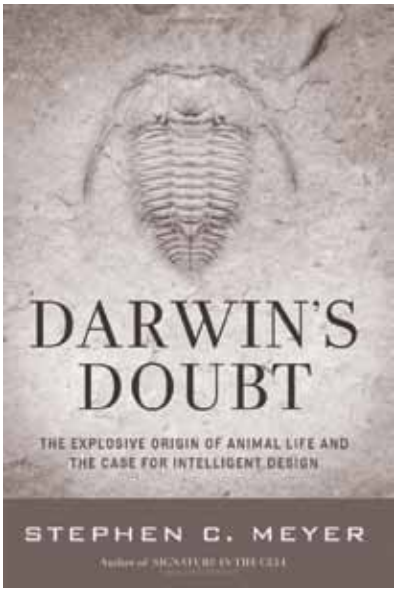

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This book is really three books in one. The first one is on the Cambrian explosion. The second one is on evolutionary biology in general. The third one is on the scientific nature of Intelligent Design (ID). This entire work is supported by detailed documentation from scientific sources.

The diagrams are neat but freehand, which gives the book a personal touch. Many of the diagrams illustrate complex matters such as statistics. The book also has an attractive selection of photographs of Precambrian and Cambrian life.

Clarifying basic concepts

The origins controversy is fraught with misrepresentations and misconceptions, and Meyer presents many lucid illustrations and analogies to make his points. The author makes it clear that Intelligent Design is not just a religious belief. It is an empirical observation. All observations teach us that only intelligent acts lead to an increase in information. Just as clearly, non-intelligent causes do not lead to an increase in information.

Because the term 'evolution' has different meanings, and evolutionists commonly try to smuggle molecules-to-man evolution under the rubric of trivial changes in populations of living things, Meyer examines this term as he comments:

> "That term has many meanings, and few biology textbooks distinguish between them. 'Evolution' can refer to anything from trivial cyclical change within the limits of a preexisting gene pool to the creation of entirely novel genetic information and structure as the result of natural selection acting on random mutations" (p. x).

Moreover, some evolutionists themselves have noted the changes observed in living creatures are qualitatively different from the information-increasing changes required by particles-to-people evolution.

Natural selection is commonly referred to as the 'survival of the fittest'. That is not the real issue. The real issue is actually the 'arrival of the fittest'. 'Order' and 'complexity' are commonly confused, and some evolutionists still say that things like salt crystals prove that order can arise spontaneously in nature. This is nonsense. To clarify all this, Meyer lists the following sequences:

1) Na-Cl-Na-Cl-Na-Cl-Na-Cl;
2) AZFRT<MPGRTSHKLKYR;
3) Time and tide wait for no man.

The first sequence has simple order (a repetitive unit), and the information content is trivial (simply Na-Cl, repeat three times). The second sequence is complex in that there is no repetitive pattern, and the simplest way to present its information is to write out the complete sequence itself. However, the sequence itself has no function. The final sequence not only has information that cannot be simplified beyond listing the sequence itself, but also has information that performs a specific function. It is *specified complexity*. The information content of living things is analogous to that found in sequence 3.

Who criticizes evolution? Certainly not only those with a religious 'axe to grind'. In fact, Meyer consistently supports his anti-evolutionary contentions by reference to evolutionists who had earlier voiced the same criticisms.

The Cambrian explosion—old objections

The author introduces the Cambrian explosion, which is the sudden appearance of many phyla, each based on different Bauplans (body plans), within a short stratigraphic interval in the Cambrian. The Cambrian explosion also includes a quantum increase in complexity of living things. Meyer quantifies complexity through a lucid illustration (p. 162). Complexity is measured through such things as organ grade, tissue grade, and cellular grade—as manifested, for example, by number of cell types.

For a long time, the main argument against the validity of the Cambrian explosion was the supposition that the transitional fossils had not *yet* been found. This reasoning may have been cogent during Darwin's time, but certainly not today. Numerous new fossils have been found. Not only have they *not* closed the gaps; they have *widened* them, and created new

gaps. Meyer gives the analogy of a bag of marbles. The person reaches into it and picks out a white marble and red marble. He hopes to pick out a pink marble. Instead, all he gets is additional white and additional red marbles, but still not any pink marbles. (If anything, he may pull out a green marble, which introduces an additional set of discontinuities between that and the earlier-known marbles.)

Some evolutionists have contended that the environmental conditions were not right for the fossilization of the ancestors of the Cambrian novelties. However, following standard uniformitarian paleoenvironmental reconstructions, the relevant part of the Precambrian was at least as suitable for fossilization and the preservation of fossils as the later fossiliferous Cambrian.

Others have suggested that the relevant ancestral forms were not preserved because they were soft-bodied. Meyer cites studies that show that many of the hard-bodied phyla have shells or other hard parts that are inherent components of the very anatomical structure of the respective phyla. Consequently, they could not have been later evolutionary add-ons. Finally, numerous soft-bodied Precambrian and Cambrian fossils have been found, so any putative soft-bodied ancestors should have also fossilized—had they existed. They do not.

In the past, some evolutionists had suggested that the punctuated equilibrium concept could account for the Cambrian explosion. However, the inferred rapid evolution of new species within small populations may theoretically explain the non-transitions between *species*, but does not explain the relatively sudden emergence of numerous new *phyla* in the Cambrian explosion.

The magic wand of defining away

Some evolutionists have suggested that the gaps are an artifact of taxonomy. If anything, the opposite is more likely to be true. Taxonomy can at least as easily blur gaps as accentuate them. If anything, rank-free taxonomy tends to bring the Cambrian explosion into sharper relief than conventional taxonomy (pp. 418–419).

Oddly enough (or perhaps, not so odd), some evolutionists have effectively defined away the Cambrian explosion by lumping it with preceding and successive adaptive radiations, thus bloating this 'event' (*sensu lato*) to 80 Ma. This is disingenuous. Bloating the time through redefinition in no way changes the fact of the sudden, abrupt appearance of the relevant Cambrian forms in a relatively short time, which may be as brief as 5–6 Ma on the evolutionist's timescale (p. 72). (I like to think of this defining-away as saying that there was no car accident because there are thousands of cars, on the same road, that had experienced no collisions.)

Still others have attempted to discount the explosive appearance of Cambrian life-forms through the contention that 'sudden' appearances of life-forms—such as certain mammals—occur in the fossil record all the time. That is precisely the point! The fact that 'sudden' appearances occur, to a lesser extent, throughout the fossil records only *adds* to the argument. Evolutionists are in a position of defending evolution (as in the Cambrian) by assuming evolution (elsewhere)! Clearly, evolutionary theory consistently suffers not only from its inability to explain the origins of complex features but—even worse—to explain it—furthermore repeatedly, within time intervals of a few million years or less. Once again, the fact that 'sudden' appearances occur elsewhere in the fossil record does not invalidate the fact that large numbers of taxa, and novel Bauplans, unmistakably appear during the Cambrian explosion.

Most bizarre of all is the evolutionistic contention that an appearance of numerous life-forms, over merely several million years in the Cambrian, is a non-issue because 'evolution can occur very rapidly', as manifested, for example, by the appearance of pesticide resistance among insects over a few generations. What could be more ridiculous than the implied equation of a trivial change within an insect population with the emergence of radically different Bauplans and life-forms?

Finally, the experiences of Chinese paleontologist J.Y. Chen are instructive. He has thoroughly studied the world-class Cambrian deposits of south China, and, based on his observation, has come to doubt the Darwinian explanation. He even said that "In China, we can criticize Darwin, but not the government. In America, you can criticize the government, but not Darwin" (p. 52). Now if Chen does not understand the Cambrian explosion properly, then *who does*?

The Ediacaran fauna accentuates the Cambrian explosion

Other evolutionists have said that the features of modern phyla appeared much earlier, among the Ediacaran fauna. This is a somewhat unusual line of argumentation in view of the fact that paleontologists have customarily been highlighting the unusual nature of the Ediacaran fauna.

Even so, some evolutionists have seized on poorly understood Ediacaran faunules and, generally based on superficial appearances, elevated them to quasi-ancestral states of the later-appearing Cambrian phyla (whether in the sense of being linked to them by common ancestors or as independent 'anticipated' appearances of certain later Cambrian Bauplans).

Meyer examines them and, again strictly based on evolutionist opinions, finds them completely unconvincing (pp. 78-on). For example, *Spriggina* had once been enlisted as an annelid polychaete worm owing to its segmented body. However, its candidacy as an ancestral annelid is nullified by its lack of annelid traits. It fails as an ancestor to the arthropods, notably trilobites, for the same reason. In addition, upon close examination, *Spriggina*, and *Dickinsonia*, lack bilateral symmetry.

Finally, neither *Dickinsonia*, *Spriggina*, nor *Charnia* have a clearly defined head, mouth, bilateral symmetry, gut, sense organs such as eyes, etc. Much the same can be said about *Parvancorina*, a putative ancestor to the trilobites (p. 89). *Vernanimalcula*, once said to exhibit an early form of bilateral symmetry, not only may be no animal, it may not even be of organic origin (pp. 90–95)!

In fact, there are broad-based doubts among paleontologists as to whether the Ediacaran fauna consists of animals at all! They could be protozoans, lichens, etc. These doubts stem from the fact that the Ediacarans have only vague, outward similarities to modern groups. To add to this, the Ediacaran forms generally became extinct before the Cambrian explosion (given the evolutionary timescale), and this alone makes them poor candidates for ancestral states of any of the Cambrian phyla. Finally, the trace fossil record shows no unambiguous behavioural evidence that the relevant modern groups arose before the Cambrian explosion.

Ediacarans as poor gap-fillers

Let us, however, for the sake of argument, grant that the Ediacaran ancestral states are valid. A handful of ancestral, or even 'anticipated' morphological, features, common to the Ediacaran and Cambrian faunas, hardly soften, much less invalidate, the sudden appearance of numerous novel life-forms, and Bauplans, in the Cambrian.

Even then, if some of the Ediacaran faunas would qualify as ancestral states to Cambrian phyla, they, at best, would be gap-fillers only in the crudest and most superficial sense. Meyer comments:

> "But this creates a dilemma. If a fossilized form is simple enough to qualify as the common ancestor of later highly differentiated bilaterian phyla, then it will necessarily lack most of the important distinguishing anatomical features of those specific phyla. That means that all the interesting anatomical novelties that differentiate one phylum from another must arise along the separate lineages branching out from the alleged common ancestor well after its origin in the fossil record. Heads, jointed limbs, compound eyes, guts, anuses, antennae, notochords, steroeoms, lophophores (a tentacle feeding organ), and numerous other distinguishing characteristics of different animals must come later on many distinct lines of descent. Yet the gradual evolutionary origin of these characteristics is not documented in the Precambrian fossil record. These characteristics do not appear until they arise suddenly in the Cambrian explosion" (p. 94).

Ironically, not only does the Ediacaran fauna fail to nullify the Cambrian explosion; it actually accentuates it. Before the Ediacaran fauna, the only living things in existence were single-celled organisms and colonial algae. Thus, the evolutionist not only still has to explain the Cambrian explosion—he now also has to explain the earlier explosion of the distinctive Ediacaran fauna. Meyer calls the latter the Precambrian 'pow'.

Molecular clocks and evolutionary trees

Going beyond the fossil record, some evolutionists have claimed that the Cambrian explosion is no challenge to evolution because the modern phyla can unambiguously be grouped into a coherent evolutionary tree showing their relatedness, and, furthermore, molecular clocks can accurately date the time since the respective phyla had diverged from each other. Both premises are egregiously false.

Meyer shows that molecular clocks that purportedly date the divergence of the phyla are widely contradictory—even by hundreds of millions of years. Ironically, if taken remotely seriously, they only accentuate the Cambrian explosion, not solve it. They underscore the fact that the modern phyla must have existed for tens, if not hundreds of millions, of years before their first appearance as fossils in the Cambrian. This is deep divergence.

It is also far from true that the phyla can be placed into an evolutionary nested hierarchy. There are numerous conflicting hypotheses of evolutionary relatedness (figure 1). For example, according to the Coelomata Hypothesis, the existence of a body cavity (coelom) groups the arthropods and vertebrates into a clade, and with nematodes as an outgroup. The molting in nematodes and arthropods is treated as independent in origin (convergence). In contrast, the Ecdysozoa Hypothesis groups the arthropods and nematodes into a clade based on the shared synapomorphy of molting. The vertebrates then become an outgroup, and the appearance of the coelom is relegated to convergent evolution.

The foregoing examples can be multiplied, and this leads Meyer to conclude:

> "My point in summarizing these disputes is simply to note that the molecular and anatomical data commonly disagree, that one can find partisans on every side, that the debate is persistent and ongoing, and that, therefore, the statements of Dawkins, Coyne, and many others about all the evidence (molecular and anatomical) supporting a single, unambiguous animal tree are manifestly false" (p. 124).

He also realizes that explanations such as incomplete lineage sorting may explain some of the discrepancies, but it does not change the fact that they are devices to explain away the foundational evolutionary premise that similarity is an indicator of evolutionary relatedness (p. 432).

Mount improbable climbed—not

Richard Dawkins epitomizes the neo-Darwinian view. Complex structures do not evolve in one step any more than one proceeds from the bottom of a mountain to its top through one giant leap. Instead, one climbs

the mountain step-by-step, eventually arriving at the top. Thus, with evolution, anything is possible.

However, the evolutionist is in a Catch-22 situation. He needs incremental improvements, each of which can potentially be favoured by natural selection, without disrupting the function of the original feature. Put another way, the inferred evolutionary process must proceed from one fitness peak, through a valley, to another fitness peak. Meyer gives the analogy of a series of words in a sentence that first must be completely corrupted into nonsense before they can incrementally emerge as another sensible sentence. Clearly, incremental improvements will not work. (I think of the metaphor of the mountain surface being very slick. The climber slips right back to the bottom with every attempted step up.)

The author elaborates on proteins (figure 2), citing especially the work of Douglas Axe. The latter showed that proteins are very sensitive to disruption, and that functional proteins occupy only a tiny fraction of morphospace (theoretically possible proteins). This means that it is very difficult to produce any semblance of a protein, step-by-step, that would incrementally be favoured by natural selection.

What about the evolutionary process modifying an already-functional protein to make a novel functional protein? To begin with, this co-option explanation merely relocates the problem. One must first account for the existence of the first functional protein! In addition, it turns out that even proteins that are very similar to each other require several simultaneous changes in order to change from one functional protein (one fitness peak) to the other functional protein (another fitness peak).

Now consider genes. How about, instead of starting from an already-functional gene, the evolutionary process begins from a non-functional sequence of DNA? Thus, loss of fitness is not an issue. However, this, too, suffers from the extreme improbability of numerous fortuitous changes needed before the sequence would even be slightly favoured by natural selection. Once again, the challenge to evolution is not survival of the fittest, but the *arrival* of the fittest. Thus, Dawkins' gradual climb fails again, and he must effectively jump to the top of Mount Improbable in one grand leap.

Some evolutionists have tried to get around the problem by suggesting that gene duplication allows for the evolution of novelty. According to this thinking, the original gene retains its function, enabling the host to retain his fitness, while the new gene copy can freely undergo numerous mutational mistakes (effectively neutral mutations) without reducing the fitness of the host organism. Once the right sequence of mutations comes up fortuitously, natural selection then comes into play—favouring the retention of this specific sequence, and thus a new gene (and new genetic information) is born. This, too, suffers from the extreme improbability of the fortuitous required simultaneous changes that would have to occur before the new gene could confer even a meager selective advantage to its host. Once again, Mount Improbable has to be scaled in one leap after all.

'New' genes—assuming evolution to prove evolution

Evolutionists have claimed that new genes demonstrably arise through evolution because one can see multiple copies of essentially the same genes (in terms of sequence) in the same organism. These genes, they say, must have arisen from a common ancestral gene and/or been copies of one of the genes. After the duplication, the new gene copies evolved new functions, which we can clearly see manifested today.

This is circular reasoning with a vengeance—*assuming* evolution in order to prove evolution. The evolutionary origin of gene copies with divergent functions is an *inference*, not an observation. This is essentially a revival of the circular argument of homological similarities 'proving' a common evolutionary ancestry (for example, the bones in the human hand and the similar bones in the wings of a bat). In addition, one does not see genes 'in the act' of evolving new functions. Clearly, similarities between 'copies' of genes can be the products of a common design motif or engineering solution, not common ancestry. Thus, for instance, no-one suggests that the similarities of the engine in a car and the engine in a truck proves that one is a modified evolutionary copy of the other, or that they both evolved from some ancestral engine. The intelligent designers (engineers) who build both cars and trucks came up with the internal combustion engine, and modified its design according to the requirements of different motor vehicles. The same holds for 'copied' features *within* a vehicle (organism), such as the four active tires and the usually somewhat different spare tire.

Recent non-solutions

Meyer discusses several novel proposals that all begin with the tacit or stated inadequacy of conventional neo-Darwinian concepts. These include developmental gene regulatory networks, epigenesis and embryology, so-called self-organization, evo-devo, Hox genes, and neo-Lamarckism. Most of them suffer from the 'hopeful monster' problem—the appearance of

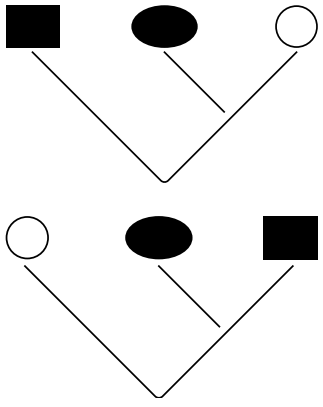

Figure 1. The phyla show contradictory similarities. Which similarities are purportedly the result of close evolutionary relationships, and which similarities are ostensibly the products of convergence?

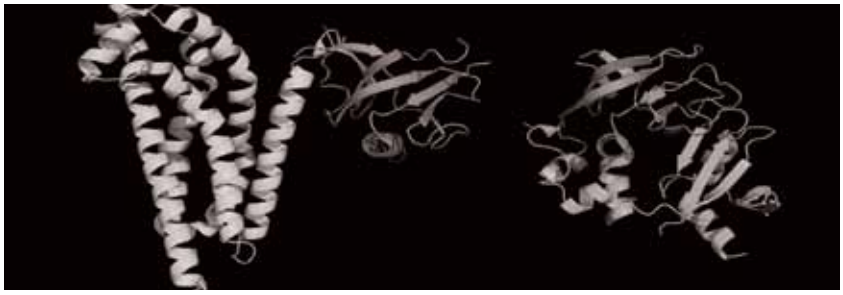

Figure 2. Proteins not only have very specific sequences of amino acids, but also have distinctive structural folds.

simultaneous fortuitous changes, none of which will be deleterious, and at least one of which will be beneficial. In any case, none of the new proposals have been shown to account for the origin of new biological information, much less account for the Cambrian explosion.

Responding to evolutionary critics

Not surprisingly, evolutionists have savaged and misrepresented the book. To begin with, some have cited US court rulings that have stated that ID is religious. This merely shows that US judges (including otherwise conservative ones) generally adhere to the several-decades-old template that aims to virtually completely remove all perceived traces of Christian heritage from public life. These decisions have no bearing on the scientific validity of ID; judges are not usually experts in science after all.

Some have said that the fact that Darwin doubted his theory is irrelevant to the factuality of evolution. To the contrary: it actually shows that Darwin was more intellectually honest than many evolutionists are today.

ID as science

Not surprisingly, the main objection to ID is that it is not science. Says who? Meyer points out that, to begin with, there is no set definition of science. For instance, some forms of science use lab experiments, while others use indirect clues gathered in the field. Some forms of science propose overarching theories, while others do not. Some forms of science emphasize the testing of predictions, while others test theories through their explanatory power.

It is also argued that the ID explanation is based on negative evidence. Meyer, instead, calls attention to the fact that 'negative evidence' is a matter of perspective. For instance, in solving a murder mystery, 'negative' evidence (ruling out a suspect) is just as important as 'positive' evidence (placing a suspect at the crime scene).

Finally, the ID explanation is mostly based on *positive* evidence. This includes historical inference. Thus, if ID resulted in the Cambrian explosion, one would expect to see suddenly appearing organisms with obvious discontinuities between them, and that is exactly what we find. Of course, this does not *prove* that ID is the actual explanation, but it is strongly *consistent* with it.

In addition, Meyer reiterates the positive fact that

> "In other words, our uniform experience of cause and effect shows that intelligent design is *the only known cause* of the origin of large amounts of functionally specified digital information. It follows that the great infusion of such information in the Cambrian explosion points decisively to an intelligent cause [emphasis in original]" (p. 361).

Other objections to ID carry very little weight. For instance, consider the argument that we know nothing about the designer. Consider the giant stone heads at Easter Island. We do not know the identity of the designer or the exact method(s) used to construct these heads. However, no-one doubts that they were formed by an intelligent designer.

Methodological naturalism

We often hear that only naturalistic explanations are permissible in science, and that ID explanations are unempirical. However, science at least provisionally accepts the reality of phenomena that cannot be empirically observed. These include forces, fields and quarks in physics, and mental states in psychology.

In the end, science is less a matter of following 'rules' than it is of uncovering the truth. Meyer comments:

> "Thus, philosophers of science generally think it is much more important to assess whether a theory is true, or whether the evidence supports it, than whether it should or should not be classified as 'science'" (p. 389).

Meyer adds that

> "Any rule that prevents us from considering such an explanation diminishes the rationality of science, because it prevents scientists from considering a possibility. … And the truth matters, not least in science. For this reason, the 'rules of science' should not commit us to rejecting possibly true theories before we even consider the evidence. But that is exactly what methodological naturalism does" (pp. 389–390).

Conclusion

This work is much more than its title implies. It presents a great deal of biology in one volume. It underscores the reality of the Cambrian explosion, the inadequacy of evolutionary theory in accounting for it, and the ability of Intelligent Design to account for it. It is even more unfortunate that so much of the science community is so closed-minded to ID.