The glaring discontinuities among even ‘simple’s life forms

The Vital Question: Energy, evolution, and the origins of complex life
Nick Lane
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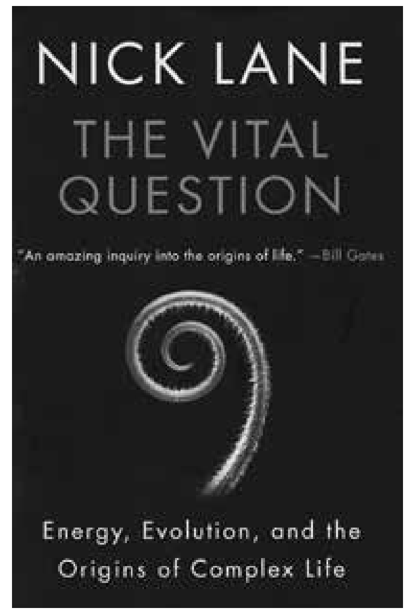

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The author is a biochemist at University College London. He is the winner of the 2015 Biochemical Society Award for his contributions to the molecular life sciences. He has written a number of books, including *Life Ascending*.[1]

This work is significantly more technical than most other evolutionary works intended for a general readership. It emphasizes biochemistry. The first part of this book examines different evolutionary origin-of-life hypotheses, and the remainder is a rather arcane presentation of the structure and capabilities of prokaryotes and eukaryotes.

Discredited evolutionistic origin-of-life hypotheses

Those readers who were in school decades ago can recall how they were taught, as fact, that the earth once had a reducing atmosphere and that life arose in a chemical soup in this Jupiter-like atmosphere. This notion was consonant with the famous Urey–Miller experiment of 1953, which showed that simple organic compounds (such as amino acids) could be generated from hydrogen, methane, and ammonia (p. 95).

As so many other things once taught as ‘fact’ by evolutionists, this, too, has been abandoned. The atmosphere of the early earth is no longer thought to ever have been Jupiter-like. Instead, it may have been dominated by volcanic gases, especially nitrogen and carbon dioxide. This eliminates the possibility of life having originated from a chemical soup.

In addition to all this, the ‘chemical soup’ hypothesis is chemically and geologically implausible (p. 104). In taking this position, Lane is merely repeating what creationist biochemist Duane T. Gish had said decades ago.

The author rejects panspermia—that life originated elsewhere. The reason is straightforward. Panspermia simply relocates the problem. It does not explain how life arose from non-life in the first place.

Some evolutionists have toyed with the idea that clay minerals could have served as the first replicators of what eventually became life. Lane dismisses this idea, pointing to the superficial capabilities of clay minerals, "Yet that solves little, because minerals are too physically clumsy to *encode* anything that approached an RNA-world level of complexity, although they are valuable catalysts [emphasis in original]" (p. 97).

The author touches on some of the problems of the RNA-world hypothesis, not the least of which is the fact that it is already quite a leap, from 'dumb' chemicals to RNA itself:

> "Today, life uses proteins—enzymes—but RNA also has some catalytic capabilities. The trouble here is that RNA is already a sophisticated polymer, as we have seen. It is composed of multiple nucleotide building blocks, each of which must be synthesized and activated to join together in a long chain. Before that happened, RNA could hardly have been the catalyst. … The idea that RNA somehow invented metabolism by itself is absurd, even if RNA did play a key role in the origins of replication and protein synthesis" (p. 100).

Lane revives the work of Ilya Prigogine on dissipative structures, such as the convection currents in a kettle of boiling water. However, he does not explain to the reader what substantive relevance such dissipative structures had for the putative spontaneous origin of life.

The author tacitly admits that Prigogine's dissipative structures do not, at least by themselves, explain how life originated from non-life, as he critiques the hypothesis that life originated in the black smokers of deep-sea hydrothermal vents:

> "Organics either remain bound to the surface, in which case everything eventually gums up, or they dissociate, in which case they are flushed out into the open oceans with unseemly haste, through the billowing chimneys of the vents. … While they are truly far-from-equilibrium dissipative structures, and certainly solve some of the problems of soup, these volcanic systems are too extreme and unstable to nurture the gentle carbon chemistry needed for the origin of life" (p. 106).

Life originating at alkaline hydrothermal vents?

The author is enamored with the idea of life originating in the relatively placid alkaline hydrothermal vent systems. He has done simulation experiments, on their supposed capabilities, at University College London (p. 111). Probably the best known of alkaline hydrothermal systems is the one at Lost City, in the mid-Atlantic Ocean (figure 1).

So what can alkaline hydrothermal vents do? Lane answers:

> "Very few natural environments meet the requirements of life—a continuous, high flux of carbon and usable energy across mineral catalysts, constrained in a naturally microcompartmentalised system, capable of concentrating products and venting waste. While there may be other environments that meet these criteria, alkaline hydrothermal vents most certainly do, and such vents are likely to be common on wet rocky planets across the universe" (p. 287).

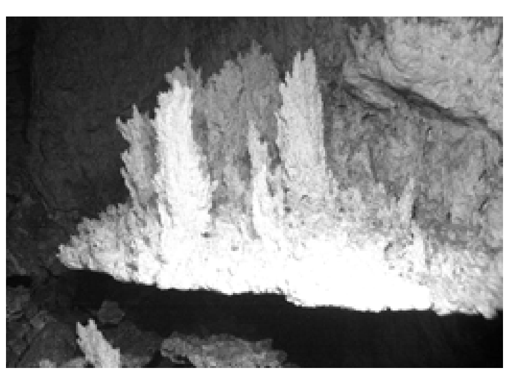

Figure 1. The Lost City alkaline hydrothermal vent. The author excitedly thinks that vents such as this 'solve' the problem of the evolutionary origin of life.

On a chemical level, Lane proposed that the seawater was acidic from dissolved CO_2 on the early earth, while alkaline water flowed through the vents and was separated by pores. This would have supposedly acted like an electric battery. So can he even demonstrate that any voltage or current can turn CO_2 and H_2 into even simple organic molecules?

Let us elaborate on the mechanisms which are supposed to make the origin of life especially likely at alkaline hydrothermal vents. The mechanisms, in and of themselves, are of a largely speculative nature. Lane quips:

> "The serious problem is that these vents are rich in hydrogen gas, but hydrogen will not react with CO_2 to form organics. The beautiful answer is that the physical structure of alkaline vents—natural proton gradients across thin semiconducting walls—will (*theoretically*) drive the formation of organics. And then concentrate them. To my mind, at least, all this makes a great deal of sense [emphasis added]" (p. 120).

Then we should see some evidence that any voltage or current can turn CO_2 and H_2 into even simple organic molecules. None has been forthcoming.

Lane adds, "Organics such as nucleotides can *theoretically* concentrate up to more than 1,000 times their starting concentration by thermophoresis, driven by convection currents and thermal diffusion in the vent pores [emphasis added]…" (p. 287). Notice Lane's repetitive use of the word *theoretically*! From a physico-chemical perspective, thermoporesis is more likely to sort by molecular mass. That would mean it would concentrate molecules of similar mass. But that would enable destructive cross-reactions, a major nemesis of all chemical evolutionary theories.

Lane adds that "Such vents constrain cells to make use of natural proton gradients, and ultimately to generate their own" (p. 154). Notice Lane's fast-and-loose, in fact, magical, thinking. He would have us believe that the natural proton gradients at alkaline hydrothermal vents somehow became self-functioning entities that either gave rise to life or became incorporated in the earliest forms of life. But in one of his original co-authored papers, he is forced to admit in the abstract:

> "How such gradients could have powered carbon reduction or energy flux before the advent of organic protocells with genes and proteins is unknown."[2]

The alkaline-hydrothermal-vent hypothesis, like all previously proposed evolutionary origin-of-life hypotheses, suffers from this fatal flaw: it does not explain how the specified complexity, necessary for life, originated spontaneously. Rather, Lane is drawn to this as a desperate expedient because all the other theories are so bad, as the above paper stated:

> "Over the last 70 years, prebiotic chemists have been very successful in synthesizing the molecules of life, from amino acids to nucleotides. Yet there is strikingly little resemblance between much of this chemistry and the metabolic pathways of cells, in terms of substrates, catalysts, and synthetic pathways."

Overall, like most chemical evolutionists, when it comes to origin of life, Lane is confusing *necessary* conditions with *sufficient* conditions.

Almighty natural selection—not God

Author Nick Lane's attitudes towards a designer are unambiguous. In describing the ATP synthase, which is driven by the proton-motive force embedded in the cell membrane, he sees the evidence for a Creator, but walks away from it. He calls the ATP synthase "the most impressive protein nanomachine of them all", and adds:

> "This is precise nanoengineering of the highest order, a magical device, and the more we learn about it the more marvelous it becomes. Some see in it proof for the existence of God. I don't. I see the wonder of natural selection. But it is undoubtedly a wondrous machine" (p. 73). (In reading this, I could not help but think of Romans 1:19–20.)

On another subject, the author adheres to endosymbiosis theory, whereby the mitochondria were once stand-alone cells that became engulfed by, and a functional part of, another cell. He believes that most mitochrondrial genes were lost or transferred to the nucleus of the host cell, but that some remained in the mitochondrion, not as vestiges of the mitochondria's onetime status as a separate cell, but as a means of essential local control of the enormous electrical potential of the mitochrondrial membrane (p. 243). Without this local control, the mitochondrion would probably destroy itself before corrective commands arrived from the distant nucleus. Lane, even while recognizing the fact that the genes in the mitochondria are not vestigial, cannot escape getting caught up in his boundless faith in natural selection:

> "This is the basis of our mosaic respiration chains—blind selection. It works. I doubt that an intelligent engineer would have designed it that way; but this was, I hazard, the only way that natural selection could fashion a complex cell, given the requirement for an endosymbiosis between bacteria" (pp. 244–234).

Note that, unlike some other evolutionists, Lane does not even bother to tell the reader why he supposes that the system he describes is 'bad design'. Instead, his reasoning appears to be completely flippant.

Survival of the fittest does not imply arrival of the fittest

Throughout this work, Nick Lane stresses that evolution occurs because of 'first principles', which includes the premise that alternative solutions to those seen in nature would not work. However, showing that alternatives do not work is not synonymous with explaining how they came into existence in the first place! It is like merely pointing out the obvious—that automobile motors have oil because oil-less motors would overheat from friction and soon destroy themselves. However, this elementary fact hardly explains how a putative spontaneous, non-intelligent process could give rise to an automobile motor in the first place.

The flaw with the author's reasoning is clear, and is quite common to evolutionists. He is confusing survival of the fittest with the *arrival* of the fittest. For example, the ATP synthase seems to be necessary for a self-reproducing cell to exist, and, without reproduction, there is no natural selection. The same objection applies to his idea of "evolution of active ion pumping" to explain the first living cells.

The *ad hoc* nature of the author's reasoning is evident in his taking both sides of the question as to whether the outcomes of evolution are governed by constraint, or if they are governed by contingency. Regarding the former, he conjectures that extraterrestrial life would probably be similar to that on Earth, because all forms of life have to resist the gravity of the planet they live on, and because life may necessarily have to be cellular in order to function. As for contingency, Lane suggests that, were the Cambrian explosion to be re-run, the world's land masses could today be dominated by giant terrestrial octopuses.

The notion of 'structural constraints' soon degenerates into evolutionary speculation and storytelling. This is obvious from Lane's following statements:

> "There is something about the physical structure of eukaryotes that is fundamentally different from both the bacteria and archaea. Overcoming this structural constraint enabled the eukaryotes alone to explore the realm of morphological variation …. There is nothing radical about the idea of structural constraints, *but of course there is no consensus on what those constraints might be* [emphasis added]" (p. 158).

Unicellular and multicellular life: a series of chasms

As we have seen, there is still no evidence that life could come from non-life. The forms of life known to us are of no help to evolutionary theory either. Lane 'gives away the store', at the very beginning of this book, as he lays out the situation:

> "Indeed, bacteria have remained simple in their morphology (but not their biochemistry) throughout 4 billion years. In stark contrast, all morphological complex organisms—all plants, animals, fungi, seaweeds, and singled-celled 'protists' such as amoeba—descended from that singular ancestor about 1.1–2.0 billion years ago. This ancestor was recognizably a 'modern' cell, with an exquisite internal structure and unprecedented molecular dynamism, all driven by sophisticated nanomachines encoded by thousands of new genes that are largely unknown in bacteria. There are no surviving evolutionary intermediates, no 'missing links' to give any indication of how or why these complex traits arose, just an unexplained void between the morphological simplicity of bacteria and the awesome complexity of everything else. An evolutionary black hole" (p. 2).

Let us elaborate. The author follows Eugene Koonin in the division of eukaryotes into five 'supergroups': the Chromalveolates, Plantae, Excavates, Rhizaria, and Unikonts. The hypothetical 'missing link' was LECA (the last eukaryotic common ancestor), shown in the diagram in the book (p. 41) as a black hole. Lane quips:

> "I like the symbolic black hole at the centre. LECA had already evolved all the common eukaryotic traits, but phylogenetics gives little insight into how any of these arose from bacteria or archaea—an evolutionary black hole" (p. 41).

Here are some of the specifics of the suddenly appearing eukaryotic traits:

> "The last common ancestor of eukaryotes was a complex cell that already had straight chromosomes, a membrane-bound nucleus, mitochondria, various specialized 'organelles' and other membrane structures, a dynamic cytoskeleton, and traits like sex. It was recognizably a 'modern' eukaryotic cell. None of these traits exist in bacteria in anything resembling the eukaryotic state. This phylogenetic 'event horizon' means that the evolution of eukaryotic traits can't be traced back in time beyond the last eukaryotic common ancestor" (p. 160).

Unicellular and multicellular life—a violation of all evolutionistic nested hierarchies

There is no evolutionary connection between even 'simple' forms of unicellular life. The author rejects what he calls the "famous but misleading" three-domain tree of life, which sorted out the relative origins of bacteria, archaea, and eukaryotes (p. 124). In actuality, the genes between the three groups deploy in an inconsistent fashion.

Let us elaborate. Lane frankly acknowledges:

> "Around three quarters of eukaryotic genes that have prokaryotic homologues apparently have bacterial ancestry, whereas the remaining quarter seem to derive from archaea. … That much is incontestable. What it means is bitterly contested. Eukaryotic 'signature' genes, for example, do not share sequence similarities with prokaryotic genes. Why not? Well, they could be ancient, dating back to the origin of life—what we might call the venerable eukaryotic hypothesis. These genes diverged from a common ancestor so long ago that any resemblance has been lost in the mists of time. If that were the case, then eukaryotes must have picked up various prokaryotic genes much more recently, for example when they acquired mitochondria. This hoary old idea retains an emotional appeal to those who venerate eukaryotes. *Emotions and personality play a surprisingly big role in science* [emphasis added]" (p. 162).

Lane then brings up other explanations to explain (or explain away) these incongruities. He conjectures that eukaryotic genes evolved faster than other genes, thus losing the similarities with their putative ancestors. He points to the fact that the 'bacterial' genes in eukaryotes join with different bacterial groups (p. 163), and then struggles to account for the pattern that has emerged. He first entertains gene transfer, but then realizes that the pattern is inconsistent with an ongoing transfer of genes.

This is what Lane suggests:

> "A simpler and more realistic explanation is that there was a single endosymbiosis between and archaeon and a bacterium, neither

of which had a genome equivalent to any modern group; and subsequent lateral gene [transfer] between the descendants of these cells and other prokaryotes gave rise to modern groups with an assortment of genes" (p. 165).

Elaborating on the origin of eukaryotes, Lane invokes a complex pattern of bacterial endosymbiosis and a onetime episode of lateral gene transfer, calling it a 'possible scenario' (p. 167). His choice of words is appropriate.

'Ecological spectra' should not be confused with evolutionary transitions

The author uses the term 'ecological spectrum' to refer to all the different kinds and sophistications of organismal systems found in nature, and tacitly recognizes (as long noted by creationists) that an ecological spectrum is not the same as a series of evolutionary transitions. (p. 45). To make this even clearer, Lane comments:

> "An ecological intermediate is not a true missing link but it proves that a certain niche, a way of life, is viable. A flying squirrel is not closely related to other flying vertebrates such as birds and bats, but it demonstrates that gliding flight between trees is possible without full-fledged wings. That means it's not pure make-believe to suggest that powered flight could have started this way" (p. 48).

The evolutionary storytelling may not be pure make-believe, but it is close enough.

'Advanced' eukaryotes did not originate from 'primitive' eukaryotes

Let us now apply the distinction, between evolutionary transitions and ecological intermediates, to the presumed evolution within eukaryota. Lane writes:

> "More significantly, there is very strong evidence that the intermediates were not, in fact, outcompeted to extinction by more sophisticated eukaryotes. They still exist. We met them already—the 'archezoa', that large group of primitive eukaryotes that were once mistaken for a missing link. They are not true *evolutionary* intermediates, but they are real *ecological* intermediates. They occupy the same niche [emphasis added]" (pp. 47–48).

No evidentiary basis for the evolutionary origin of the human eye

Although this book is not about the evolution of organs and organ systems, the author briefly mentions some of them in the context of ecological intermediates which, as we have noted, should not be confused with evolutionary intermediates. Author Nick Lane repeats the standard scenario of the vertebrate eye evolving, step-by-step, to its presently seen complexity. He then 'gives away the store' by admitting that there is no evidence that the eye did (or could) evolve step-by-step (or, for that matter, via 'hopeful monsters'). He writes, "*We do not see the historical steps in the evolution of eyes*, but we do see an ecological spectrum [emphasis added]" (p. 45).

The author conjectures that we do not see transitional forms of vertebrate eyes because these have been driven to extinction by their currently existing successors. All we can see now is the 'survival of the survivors'. Evolution has (conveniently) obliterated the very evidence of its occurrence. Moreover, given the fact that evolutionary theory accepts the premise that a less-derived state *can* co-exist with a more derived state, the evolutionary copout is nothing more than *ad hoc* reasoning to save the theory. In any case, the prima facie evidence is unambiguous: There is no proof that the vertebrate eye did, or could, evolve from pre-existing ever-simpler forms of eyes.

Conclusion

The author is obviously an enthusiastic evolutionist. While freely acknowledging the flaws of all previous evolutionistic origin-of-life theory, he fails to provide convincing evidence that his pet theory—alkaline hydrothermal vents—in any way accounts for the spontaneous origin of specified complexity.

Both prokaryotes and eukaryotes show huge gaps between them, and a contradictory pattern of potential nested hierarchies. The reader who is willing to 'think outside the box' is well-founded to doubt the fact of evolution entirely.

References

1. See review, Woodmorappe, J., Evolutionary speculations, yet no 'badly designed' vertebrate eye, *J. Creation* **29**(3):23–27, 2015.
2. Sojo, V., Herschy, B., Whicher, A., Camprubí, E. and Lane, N., The Origin of Life in Alkaline Hydrothermal Vents, *Astrobiology* **16**(2):181–197, February 2016 | doi:10.1089/ast.2015.1406.