

What's Life got to do with It

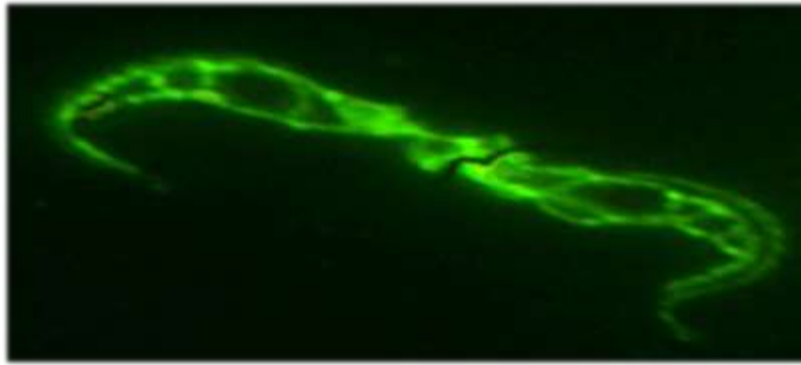
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This remarkable miracle we call Life, insofar as the scientific evidence shows, got up and running as soon as it was able, meaning—of course, the *potential* for Life was here first. Gradually coalescing from the hot spin-offs of a condensing star, the Earth started out as a molten mass of mostly rock and heavy metal. As it cooled water began to accumulate. The water was coming from the frequent impacts of icy "meteors", the farthest flung remnants of the solar system forever in pursuit of their gravitational center. In fact, we likely owe our very existence to having been in their way to the Sun, for these ballistic intruders not only deposited water, infused within were a host of "organic" compounds.

Slowly rotating in the warm radiance of its native star, fertilized with dirty ice raining from beyond, the Earth was soon awash with all of Life's precedent ingredients. And deep within these natural elements, in their innermost "atomic" arena, a dynamic affinity was at play: matter was mixing it up. Matter spontaneously interacts because an "electrostatic force" *impels* it to do so. The 'negatively' charged perimeter electrons of every atom are attracted to the 'positive' nuclei of adjacent atoms, and thus, as a matter of course, incessantly seek to close the distance. Whenever together is more stable, that is, closer to "thermodynamic equilibrium" than is their separate adjacency, atoms unite. Because equilibrium is their preferred state, more stable means longer lasting. This intrinsic propensity for matter to persistently combine meant ordered *complexity*, of ever longer *duration*, when and wherever possible, was for certain. In other words—it was *supposed* to happen.

Thus, whenever conditions are favorable, by simple proximity, the natural elements engage in "chemical synthesis". They attract and interact, connect and coalesce, forming evermore stable "macromolecular" compounds. Furthermore, when molecules conjugate, bonding energies are discharged and exchanged producing electrical pathways that further enhance polyreaction potentials. Induced to expand along their electrical charge-gradients, these "metabolic" cascades test every available adjacency, proceeding to extend, wherever possible, into regions of even greater stability. And with every extension, as the topological complexity expands, the combinatorial range of bonding possibilities expands as well, exponentially—it *grows*.

What we find, then, is that ordinary matter spontaneously imports from *within* a dynamic affinity to organize into evermore complex, durable arrangements. But there's more: By their very nature, oily organics and water don't mix, they form "cells", within which metabolic activities can incubate. And so it was, given a warm juicy planet hosting an expanding number of opportunistic combinations, just a matter of time before a miracle happened—multiplication by division!



That's all the initiation of "Life" would require: The dynamic division of an "auto-catalytic"⁽¹⁾ cell along a symmetrical axis, such that its potential to do so—its *seminal symmetry*, is conserved in both. As this symmetrical break was coincident in its development, the one—now two, resume their regenerative activity until this fission point reappears, whereupon, under similar circumstances, the cycles of division are repeated. The world, however, is a dynamic tumbler, deviation and variation forces present at every stage of development, and only the best reproductions survive. It followed that those cells most able to reliably repeat—accurately encode—their regenerative functions, became the most successful reproducers. The result was that the most stable, highly reactive variations featuring the fastest reaction gradients—those demonstrating the most "dynamic kinetic stability"⁽¹⁾, became the most prolific dividing multipliers.

Mixing it up, mating and mutating, absorbing one another, utilizing the useful and discharging the rest, these "autopoietic"⁽²⁾ organelles began to establish evermore stable symbiotic associations with one another. Each evolving "species" became a veritable experiment testing its longevity and powers of prolificacy. While most variations appeared briefly and faltered, the fittest remained, "selected" to continue its lineage. In conformal correspondence with its resource environment, leaving no opportunity untested, Life proceeded to probe and occupy every habitable space. And with each new generation, as the competition for requisite resources became evermore challenging, the advantage soon went to those capable of consuming the production of *others*.

Now, recognizing that Life, in effect, selected to consume *itself* to advance its expansion, purports a profound implication. It means that whatever 'primal impetus' may be empowering the synthesis of matter, and by extension the autopoietic processes of Life, must be entirely indifferent regarding *which* of its particular variations succeeds. Each in every new generation survives simply because, and only because, it proves to be more proliferant and durable than the other competing candidates. What this means is that when you get right down to it, Life isn't really about the players at all—it's a *process*.

Inquire further and one's comfort-zone sensibilities are soon challenged by an even greater apprehension: The *cosmic* contingencies that have shaped the course of Life on Earth have also been entirely indifferent—with regard to its very existence! Numerous cataclysmic meteoric and volcanic events, as evidenced in the mineral fossil records, have periodically reduced earth's biological complex to

its most primitive forms, erasing nearly all that natural selection had so laboriously produced. If the emergence of Life on this most hospitable planet was a 'given', that is, supposed to happen, then it certainly wasn't selectively granted by Grand design. The implacable truth is that unconditional adversity, periodically and randomly applied, has been Life's 'tool and die'.

So what are we left with? Everything! Apparently, billions of years of natural selection selected for *us*. We human beings represent the highest order of autopoietic complexity on Earth because our species proved more capable and resourceful than any other. It wasn't because we were physically the biggest, strongest, fastest, or the most sensate; adaptation provided many other species with greater physical capabilities than ours. Nor did we reproduce fast enough to win over with numbers-of-kind like the microbes and insects did. The reason we out-performed all the other evolutionary candidates is because the nexus of our senses—our brain, multiplexed into a vastly superior processing organ.

It appears that beyond the durable reproduction of biological complexity, even beyond sensate awareness, the process of Evolution has been selecting for *intelligence*. While all organisms to varying degree have the ability to process intelligently—selectively respond to, the challenges of an ever-changing environment, our kind fast-tracked on the rapid path to ever greater processing power. The result was that as the proliferating neurons in our neo-cortex began to "network", we became enabled with the capacity to not only download sensory perceptions into memory, but *reflect* upon them, fashioning a meaningful understanding from past experience. Humankind ascended because "conscious cognition" conferred upon our species the winning adaptive advantage.

This aptitude for "insight" made it possible to mentally project into the future, imagine possible outcomes, and reduce risk by planning in advance. We envisioned the manufacture of tools to shape our environment and designed instruments to enhance and extend our senses. Most importantly we developed symbolic language to record and convey what we learned with one another. Over time this global network of shared knowledge and experience proved sufficiently durable such that humankind not only assumed dominion on Earth—but is *transcending* it.



Have you ever observed a flock of birds and marveled at how they seemingly move as one "superorganism"? It appears that human beings weren't the first or only species to develop a demonstrative "collective intelligence". In fact, long before we happened on the scene, animal herds, insect colonies, and even bacterial biofilms were engaged in collaborative behaviors that enhanced their mutual success. Some posit that this coherent "organizing principle" is *the* defining attribute of Life. After all, every living thing, or distinguishable group thereof, is bound by the same binding sense of *unity* the somehow identifies everything "within".

That's why on first sight "flocking" behaviors—bird clusters, schools of fish, animal stampedes—may appear to be a 'top-down', global phenomena, informed in some centralized fashion. Slow motion analysis, however, reveals that nothing 'super'natural is involved. When slowed frame to frame these group expressions are seen to be the radiating recurrence of *local* initiating inputs⁽³⁾. Flocking behaviors manifest locally from within, 'bottom-up', when an individual action—the tip of a wing, the flick of a fin, an animal's startle reflex—causes a reaction wave to propagate across the population.

When a "quorum threshold" is exceeded whereby independent adjacent actions begin to resonate and feedback on one another, second generation harmonic effects are often produced that can both amplify and modify the original waves. These are "emergent" expressions, coherent outcomes no longer directly attributable to specific initial actions. What gives a flock its superfluid appearance is that these secondary harmonics actually propagate faster than the sum of the group's individual reaction times.⁽³⁾ Such secondary "epiphenomenal" expressions, however, are *consequently* a synchronous collaboration. The illusion of a group agency at work is just that. The actual causal agents are autonomous *individuals* comprising the group's "vanguard".

The species-characteristic traits exhibited by this leadership vanguard are not privileged to them, rather, these are genetic endowments belonging to the group as a whole, inherited more or less by all, and effectively expressed in a standard "bell-curve" distribution. Because the most successful expressions are more often the most productive, effective change agents also tend to be the most well endowed. In fact, every adaptive advantage, innovation, or new idea, was necessarily introduced into the collective mix by an "exceptional" individual. Truly, our entire existence is the cumulative result of *their* every success.

That successful group outcomes are the cumulative expression of individual successes is a Life lesson that could provide a reasoned and principled approach to matters of governance and economics. Policy intentions would focus on equality of opportunity, rather than outcomes, with the understanding that a variable outcome distribution is not only natural and nominal, but unavoidable—even necessary, in order for any success-selecting evolutionary process to advance. It follows that meritocratic, free-enterprise economies amenable to the unencumbered success of the best among us, in every variety of productive endeavor, should over time prove the most prosperous for all. If the economic health of a nation is a function of the combined strength of all its members, then strategies promoting personal initiative, resourcefulness, and responsibility would be to

everyone's benefit. Likewise, the nation's health fitness would be enabled by returning the onus-locus of everyone's health to each and every individual. Surely better lifestyle choices would follow were each of us held more directly accountable for the true cost consequences of our behaviors.

In terms of governance it suggests that *less* is better. It suggests that to the extent the natural auspices of the evolutionary process are permitted to freely exercise—from the bottom-up, will populations naturally tend to become more capable. Government command and control interventions, designed and implemented from the top-down, are destined to constrain freedoms of function and redirect resources, causing a collateral cascade of unintended consequences. The ruinous conceit of those who advocate for evermore centralization is to imagine that the prerogatives of any remote group of select representatives can pull the bureaucratic levers of regulatory redirection fast and smart enough to out-perform the extemporaneous creativity of Nature's grass-roots endowment trust. In the long run it usurps the vital volition of Life itself.⁽⁴⁾ The truth is, our future is being secured moment to moment, as it always has been, by the innovative vanguard of motivated individuals emerging naturally from *within* the evolutionary impetus of the Life process itself.



We previously observed that beyond sentient awareness, the trajectory of biological natural selection has been selecting for intelligence⁽⁵⁾. From metabolic pathways in a vesicle to the alliance of cells in an organism, from ants in a termite mound to complex human civilizations, this intrinsic propensity to intelligently self-organize^(6,7) has been at Evolution's leading edge. This inherent "coherent synergy" is why Life's potential has always proven greater than its present state.

And so it was that with the advance of intelligence was imported a curious tropism toward *comprehension* that began expanding the depth and breadth of our perceptions. From simple sentience, conscious awareness has evolved well beyond biological complexity into a 'meta'-physical configuration space where intangible images, thoughts, and ideas take form. With the insight of our 'mind's eye' we're able to visualize subjects far beyond the scope of our given senses. This transformative phase-transition from actionable adaptive processing to the abstract world of mental imagery and symbolic reasoning enabled structured thought and creative thinking. It's where the boundless domains of mathematics,

theoretical physics, and the arts find residence, as do the more introspective subjects of morality and meaning. Some posit that these purely cerebral features should be considered part and parcel of a 'meta'mind—the accrued entirety of the human cognitive enterprise, feeding back upon and exponentiating the evolution of each new generation of minds.

Just as biogenesis has direct attribution to a seminal potential within matter itself, the potential for comprehension must also have been precedent within. So why would an intrinsic inclination toward conscious intelligence exist? One pretense to consider is were it not for the likes of "us", how then would the Universe be *known*? And while we may never know, fortunately, Life will most likely find its way, if we let intelligence be our guide, and learn to...

'dance with the one that brung us'



Less about the leaves



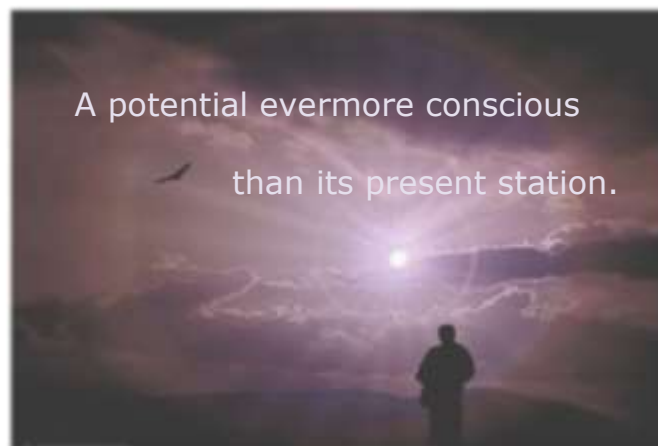
More about the tree



Less about us



The Big picture



References

- 1) Pross, Addy *What is Life? How Chemistry Becomes Biology* (Oxford University Press: 2012)
- 2) Margulis, Lynn; Sagan, Dorian *What is Life?* (Simon & Schuster: 1995)
- 3) Potts, Wayne K. 1984. "The chorus-line hypothesis of coordination in avian flocks."
http://stormy.biology.utah.edu/publications/1984_Potts_Nature.pdf
<http://www.straightdope.com/columns/read/2151/>
- 4) Schrodinger, Erwin *What is Life?* (Cambridge University Press: 1944 -'07) Pg. 116
- 5) Vertosick, Frank T.Jr. *The Genius Within* (Harcourt Books: 2002)
- 6) Wagner, Andreas *Arrival of the Fittest* (Current: 2014)
- 7) Kauffman, Stuart *At Home in the Universe* (Oxford University Press: 1995)
- 8) Davies, Paul *The 5th Miracle* (Simon and Schuster: 1999)
- 9) Goodsell, David *The Machinery of Life* (Springer: 2010)
- 10) deDuve, Christian *Vital Dust* (Basic Books: 1995)
- 11) Deamer, David *First Life* (University of California Press: 2011)
- 12) Ashcroft, Frances *The Spark of Life* (W.W.Norton: 2012)
- 13) Zimmer, Carl *At the Waters Edge* (The Free Press: 1998)
- 14) Sagan, Carl; Druyan, Ann *Shadows of Forgotten Ancestors* (Ballantine Books: 1992)
- 15) Scharf, Caleb; *The Copernicus Complex* (Scientific American: 2014)