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DECENTRALIZED MEDICINE #56: THE DAWN OF CONSCIOUSNESS | Dr. Jack Kruse

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Introduction: Evolutionary Timescales and the Dawn of Consciousness

The evolutionary journey of life on Earth can be envisioned as a "Spaceship Earth," a solar collector orbiting the sun, harvesting approximately 2×10^{-14} solar masses annually—accumulating 30 Earth masses over 4.6 billion years. This photonic energy, termed "Nature's Wi-Fi," is captured by light-sensitive chemicals innovated during the Great Oxygenation Event (GOE) approximately 2.4 billion years ago, including blood porphyrins, DNA/RNA, melanin, water, nitric oxide (NO), oxygen (O), docosahexaenoic acid (DHA), and chlorophyll.

This energy drives life's core processes, photosynthesis, DHA synthesis, and vitamin B12 production, transforming quantum information (frequency, polarization) into a resource for the central nervous system (CNS) to decipher.

Before consciousness could emerge, the brain needed to capture this information via mitochondrial DNA (mtDNA), timestamp it with circadian mechanisms, and harvest its data to evolve from sleep, the default state of the first two domains of life (bacteria and archaea), to a primitive wakefulness driven by light signaling.

Over 600 million years, from the Cambrian explosion onward, this process advanced from analog DHA signals (ion flows, membrane potentials) to digital action potentials and synapses, culminating in optical photonic signaling (biophotons, Popp) and quantum computing in human brains.

Hydrated DHA membranes, optimized by cytochrome c oxidase (CCO) and EZ water (Pollack, Del Giudice, and Preparata), sync with B12's photoreception (300-550 nm), melanin's semiconductors (100-3100 nm), and the POMC-leptin pathway (UV, 100-300 nm) to build the CNS as a solar-powered quantum optical computer. Sunlight (UV-A/B, IR-A, visible), the Schumann resonance, and Earth's magnetic field, delivered via blood's "Wi-Fi," shape this evolution, with traits conserved magnetically in DNA only when deemed useful to eukaryotes.

The endosymbiotic integration of mitochondria, a preconscious step, introduced *mitoception*, the brain's sensory mechanism to monitor mitochondrial energy status, setting the stage for the recursive loop of the Somato-Cognitive Action Network (SCAN),

melanin, and sunlight to awaken consciousness from the GOE's slumber, sparked by the electrical resistance of oxygen. This chapter is deeply rooted in my decentralized thesis, and it explores mitoception's role, integrating insights from the cytokine Growth Differentiation Factor 15 (GDF15) and mitochondrial dysfunction in neurodegenerative diseases (Wang et al., 2022), to illuminate the quantum path from endosymbiosis to sentience

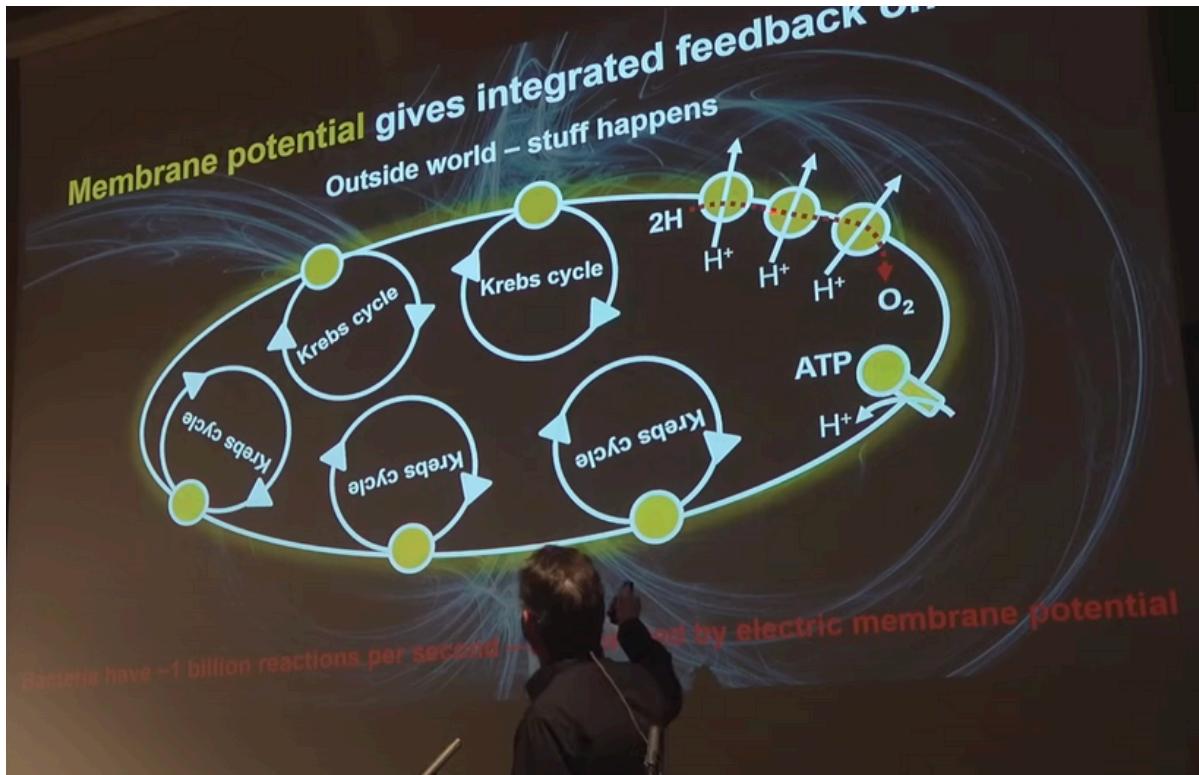


Core Concepts and Their Integration

Post-Endosymbiosis Integration and Mitoception Birth

The evolution of heme proteins during the GOE approximately 2.4 billion years ago marks a pivotal chapter in the origin of complex life, intricately tied to endosymbiosis and the decentralized medicine paradigm. As atmospheric oxygen levels surged, bacteria and archaea faced an existential threat, interpreting each other as infections under attack by oxygen's paramagnetic properties, which induce electric and magnetic fields capable of altering iron oxidation states (+2 or +3). To counter these Debye electrical gradients in membranes, these primordial organisms innovated heme proteins, notably cytochrome c oxidase (CCO), to protect cellular integrity while pioneering apoptosis, a controlled cell death process to eliminate damaged cells. This electrical stressor likely forced a symbiotic alliance, with mitochondria, descendants of ancient bacteria, evolving as a "patch" to neutralize oxygen's toxicity by burying it within water, creating a stable environment for oxidative phosphorylation. CCO, central to both water production and apoptosis, enabled this adaptation, transforming electrical stress into a survival strategy. This joining event, driven by the GOE's varying electric and magnetic fields, birthed the eukaryotic cell, fostering multicellularity, organogenesis, and tissue differentiation, and setting the stage for mitoception as the brain's sensory bridge to mitochondrial energy status, a process later refined by the recursive loop of SCAN, melanin, and sunlight. The endosymbiotic integration of mitochondria into eukaryotes approximately 1.5 billion years ago

transformed cellular energy dynamics, marking a preconscious state where rudimentary metabolic processes prevailed.



The TCA Cycle and Its Dependence on Sunlight and Oxygen

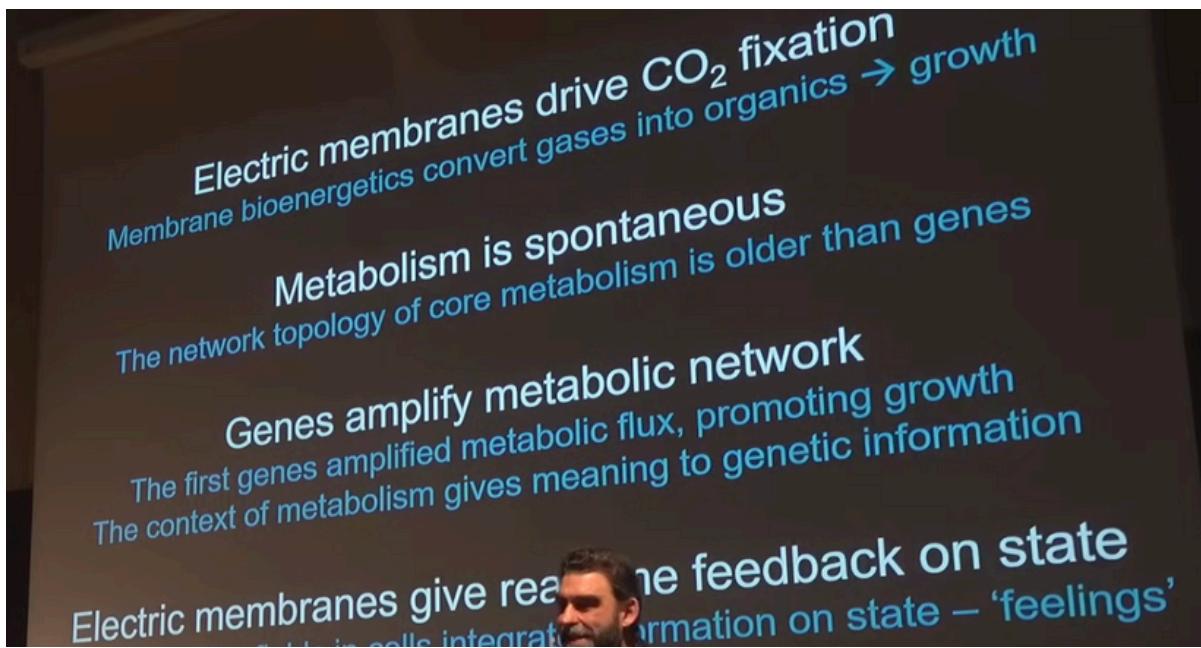
The TCA cycle typically runs in the forward (oxidative) direction under aerobic conditions, oxidizing acetyl-CoA to produce energy intermediates (NADH, FADH₂) that feed the ETC for ATP synthesis. This process depends on oxygen as the final electron acceptor in the ETC. Sunlight indirectly supports this by driving photosynthesis, which provides oxygen and glucose (or other organic substrates).

Without sunlight:

Photosynthesis halts, reducing oxygen and organic substrate availability.

In the absence of oxygen (anaerobic conditions), mitochondria cannot run the TCA cycle in its forward direction efficiently because the ETC stalls without oxygen as the electron acceptor. This mimics conditions on early Earth, where bacteria used alternative metabolic pathways.

Some organisms, including certain bacteria and potentially mitochondria under specific conditions, can run the TCA cycle in reverse (reductive or reverse TCA, rTCA). The rTCA cycle fixes CO₂ and uses H⁺ to synthesize organic molecules, effectively turning "gases into life." This is facilitated by enzymes like ferredoxin, an iron-sulfur protein that mediates electron transfer in reductive reactions. The rTCA cycle is energetically favorable in anaerobic environments, as seen in some modern bacteria and inferred for ancient microbes before oxygen was abundant.



With sunlight:

Sunlight enables photosynthesis, producing oxygen and glucose, which support the forward TCA cycle in mitochondria. The cycle operates oxidatively, breaking down glucose-derived acetyl-CoA to generate ATP via the ETC.

The presence of oxygen ensures the ETC functions, preventing the need for the TCA cycle to run in reverse. Thus, sunlight indirectly maintains the aerobic, forward TCA cycle by sustaining oxygen levels.

Mitochondrial Survival and Their "Vested Interest"

Mitochondria are not autonomous entities with a "will" but are highly integrated organelles shaped by billions of years of coevolution with their eukaryotic host. Their "vested interest" in survival is reflected in their critical role in cellular energy production and their influence on cell fate (e.g., apoptosis). The question of whether mitochondria "bend the will of Nature" or "bend at the knee to light and oxygen" is metaphorical but highlights their dependence on environmental conditions:

Light and oxygen dependency: Mitochondria rely on oxygen (from photosynthesis, driven by light) for efficient ATP production via the forward TCA cycle and ETC. Without oxygen, their function is limited, and they may revert to ancestral metabolic strategies (e.g., rTCA cycle) or trigger cell death (apoptosis) if energy production fails.

Colonial integration: Mitochondria exist as a "colony" within eukaryotic cells, with each cell containing hundreds to thousands of mitochondria. Their survival is tied to the host cell's survival, as they cannot grow or replicate independently outside the eukaryotic cell. This interdependence suggests they are not bending understanding the role of light and oxygen in shaping mitochondrial function requires recognizing their evolutionary history. Mitochondria, descendants of free-living bacteria, have been sculpted by endosymbiosis

to rely on the eukaryotic cell's resources. Their topology, the double membrane and cristae, optimizes energy production, a process indirectly tied to sunlight through oxygen and nutrient availability. The cristae is the new generation of ferrodoxin. Both contain Fe-S cores.

The TCA cycle's ability to run in reverse under anaerobic conditions reflects an ancient bacterial strategy to survive without oxygen, using ferredoxin to facilitate CO₂ fixation. However, mitochondria's genetic autonomy is limited; their 16.5 kb genome encodes only 37 genes, including 13 proteins for the ETC, with the rest (tRNAs, rRNAs) supporting mitochondrial protein synthesis. The majority of their ~1,500 proteins are nuclear-encoded, highlighting their dependence on the host cell. This precise molecular coordination between mitochondrial and nuclear DNA ensures efficient energy production, with apoptosis eliminating dysfunctional cells and natural selection favoring optimal configurations. Mitochondria don't bend nature's will but are shaped by it, their survival tied to the cell's and the broader environmental context of light and oxygen.

Mitoception emerged as the brain's ability to sense the balance between energy demand (burn rate) and mitochondrial oxidative phosphorylation (OxPhos) capacity, a sensory adaptation critical for monitoring this new organelle born during the GOE. The GOE, by increasing atmospheric oxygen, enhanced ROS production, forward spin of the TCA/Urea cycle driving melanin's evolution as a light-absorbing, charge-separating molecule that generates massive ultraweak photon emissions (UPEs). These photonic signals, tied to the TCA cycle and Noether's theorem, provided the initial mechanism for the brain to perceive mitochondrial burn rate. Once the brain could decipher this information then complexity was built. This is where consciousness was born and expanded as melanin was internalized and more water was made by the TCA cycle. The TCA cycle creates the most water from beta oxidation.

If a eukaryote see the AM sunrise you can then use the TCA and urea cycle. = you can make the heat sink required to make the highest quality UPEs your cell needs to do all the amazing things if does. Complete combustion of 100 gms of

FATS = 110 gms of DDW from CCO

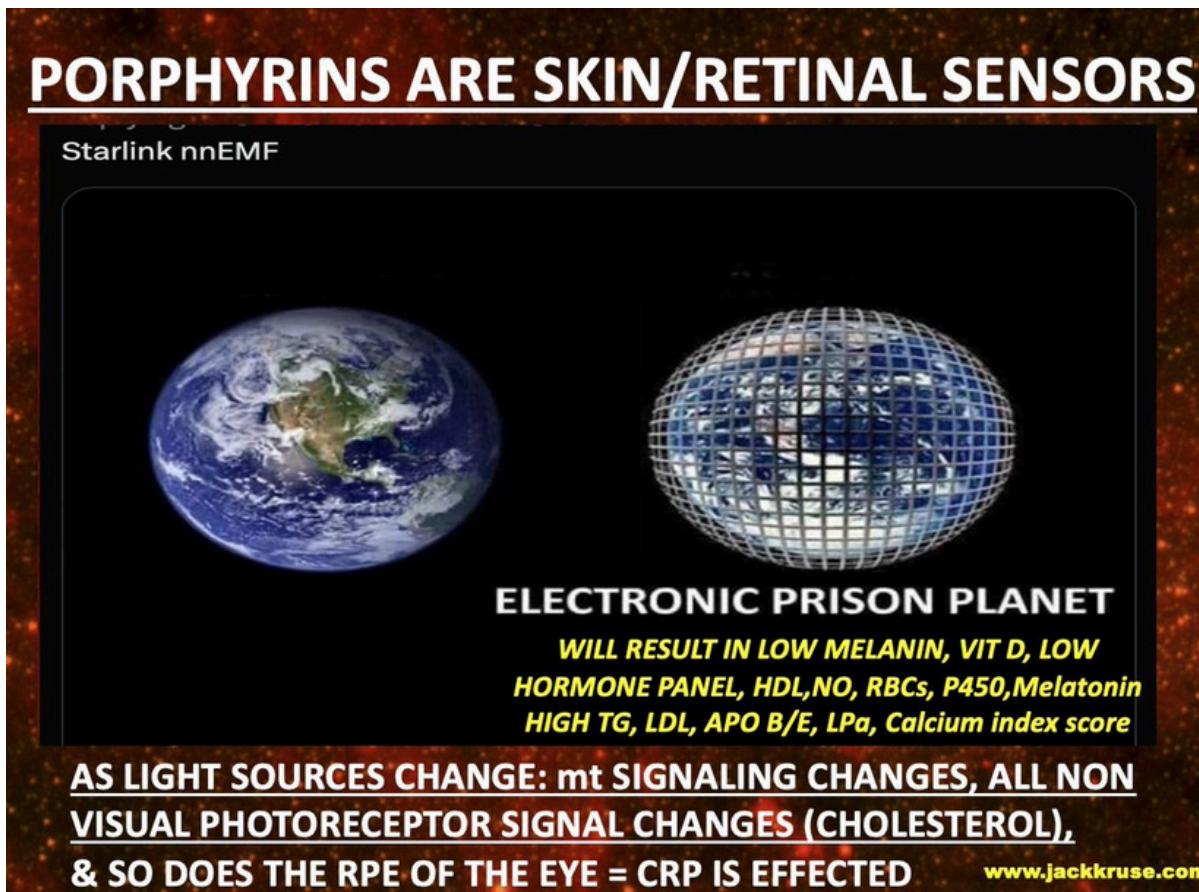
Protein = 75 = 75 gms of DDW from CCO

Carbs = 55 = 55 gms of DDW from CCO

Wang et al. (2022) noted that mitochondrial dysfunction, including mtDNA mutations and impaired OxPhos, is a hallmark of neurodegenerative diseases, suggesting mitoception's evolutionary role as a checkpoint for energy homeostasis, a prerequisite for the consciousness enabled by SCAN and sunlight.

Mitoception as an Electromagnetic and Photonic Sense of Mitochondria

My decentralized thesis redefines mitochondria as electromagnetic antennas resonating with light and environmental fields, challenging the biochemical paradigm that exists today. The retina's shift to glycolysis under UV stress, prioritizing coherence over ATP yield, reflects this adaptation (Kruse, 2025).



Mitoception extends this idea, allowing the brain to sense mitochondrial "field health" via the ability to sense galactic Birkeland currents, extraterrestrial light sources, adjacent UPEs, charge gradients of adjacent semiconductors (hydrated proteins), and membrane potentials (lipid Debye potentials). Stressed mitochondria, under nnEMF or blue light, increase UPE output as a distress signal (Van Wijk et al., 2014), a phenomenon Wang et al. (2022) link to oxidative stress in Alzheimer's and Parkinson's. Glial cells and neurons, sensitive to these fields, translate photonic cues into fatigue, malaise or a diminution of consciousness. Collagen nanotubes and microtubules act to amplify UPEs with structured EZ water, facilitate nonlocal communication, aligning with my quantum optical model.

GDF15 as the Primary Signal of Mitoception

GDF15 has been shown to be a valuable marker for mitochondrial diseases, particularly those involving muscle involvement. Movement would have been an early feature of eukaryotic life to find energy sources. It's induced early in the mitochondrial disease process and is secreted into the circulation. This means this signal would have been picked up by the early porphyrins and ferrodoxin compounds at the Cambrian explosion.

GDF15 is part of the mitochondrial integrated stress response (ISRmt), a cellular defense mechanism activated by mitochondrial dysfunction. I think ferredoxins might have been the GDF15 of the GOE that was used to signal electrical stress from rising and falling oxygen tensions in the environment. Mitochondria's ability to reverse the TCA cycle via ferredoxin reflects an ancient survival mechanism, active without oxygen or sunlight conditions favored CO₂ fixation. Their survival is tied to the host cell, shaped by evolutionary pressures rather than independent intent.

Evolution of the Structure of Ferredoxin Based on Living Relics of Primitive Amino Acid Sequences

Abstract. The structure of present-day ferredoxin, with its simple, inorganic active site and its functions basic to photon-energy utilization, suggests the incorporation of its prototype into metabolism very early during biochemical evolution, even before complex proteins and the complete modern genetic code existed.

The information in the amino acid sequence of ferredoxin enables us to propose a detailed reconstruction of its evolutionary history. Ferredoxin has evolved by doubling a shorter protein, which may have contained only eight of the simplest amino acids. This shorter ancestor in turn developed from a repeating sequence of the amino acids alanine, aspartic acid or proline, serine, and glycine. We explain the persistence of living relics of this primordial structure by invoking a conservative principle in evolutionary biochemistry: The processes of natural selection severely inhibit any change in a well-adapted system on which several other essential components depend.

RICHARD V. ECK

MARGARET O. DAYHOFF

National Biomedical Research
Foundation, 8600 16th Street,
Silver Spring, Maryland 20910

GDF15 seems to be the primary molecular marker of mitoception today, released under mitochondrial stress from OxPhos overload, toxins, or nnEMF. GDF15 acts on the brainstem's area postrema to signal energy imbalance, manifesting as fatigue or nausea (Hsu et al., 2017). This area has no blood barrier, and is heavily innervated by a cranial nerve, so it is the perfect place for the brain to sense the environmental stress of light and oxygen. Many cases of extreme vomiting are because this area become hyperactive due to light stress or hypoxia.

Wang et al. (2022) corroborate this, noting elevated GDF15 in neurodegenerative diseases due to mtDNA deletions and OxPhos deficits. In the decentralized framework, GDF15's release reflects electromagnetic disruptions, with nnEMF reducing ATP by 30% and increasing ROS (Pall, 2018), and blue light stressing the endocannabinoid system [ECS] (Di Meo et al., 2025). Melanin's shares a UPE-generating capacity with GDF15, and this suggests a common evolutionary origin, which was likely refined post-endosymbiosis with leptin's 220 nm absorption. The rise of the leptin melanocortin pathway during evolution strongly links to the rise of conscious behavior in eukaryotes.

Integration with Interoception and Immunoception

Mitoception complements interoception and immunoception, extending the brain's sensory network. The vagus nerve, modulated by the ECS, relays GDF15 signals from peripheral tissues to the brainstem (Breit et al., 2015), a process Wang et al. (2022) link to neuroinflammation in MS. The vagus nerve innervates the area postrema in the brain. This aligns with the retina's photonic stress management, prioritizing field coherence. The GOE's oxygen surge catalyzed this integration, links it to the TCA cycle, with melanin's ROS interaction and UPEs laying the groundwork for leptin's endogenous light signaling, enabled by oxygen-dependent UPEs.

Light, nnEMF, and Environmental Modulators

Full-spectrum sunlight, rich in UV and infrared, supports mitochondrial coherence by photoinhibiting CCO and boosting ATP efficiency (Hamblin, 2017), reducing GDF15. Wang et al. (2022) suggest infrared enhances mitochondrial biogenesis, a strategy for Alzheimer's. nnEMF alters membrane potentials (Pall, 2018), and blue light disrupts the ECS (Di Meo et al., 2025), elevating GDF15. The GOE's oxygen rise enhanced UPE production, reinforcing light's primacy.

Mitoception in Disease Contexts

ALS: Mitochondrial dysfunction drives progression, with nnEMF worsening oxidative stress and GDF15 elevation (Beaulieu et al., 2020; Wang et al., 2022). Mitoception signals fatigue, potentially alleviated by CB2 agonists.

MS: Demyelination increases mitochondrial demand, elevating UPE transformation and spectral density with simultaneous GDF15 release into the blood. (Witte et al., 2014; Wang et al., 2022). Full-spectrum sunlight supports ECS repair.

Alzheimer's and Parkinson's: mtDNA mutations and OxPhos deficits increase GDF15 (Kim et al., 2018; Wang et al., 2022). Infrared light with UV restores health in these cases.

Mental Health, Consciousness and Gut-Brain Axis: Gut mitochondrial stress from nnEMF elevates GDF15, signaling depression due to demyelination and microtubule dysfunction (Coll et al., 2020; Wang et al., 2022). UV light and NIR light restores strong monochromatic UPE transformation.

Practical Strategies to Enhance Mitoception

Full-Spectrum Light Exposure: Sunlight aligns mitochondrial function, reducing GDF15 (Wang et al., 2022).

Minimize nnEMF and Blue Light: Reduces mitochondrial stress and GDF15 levels.

Circadian Alignment: Boosts melatonin, lowering GDF15.

ECS Support: CB2 agonists reduce inflammation, lowering GDF15.

Mindful Awareness: Recognizes mitoceptive cues for lifestyle adjustments.

The Quantum Mitoceptive Framework

Mitoception, a quantum sensory mechanism, enables the brain to feel its own mitochondrial stress status via critsae alignment and its ability to transform UPEs and electromagnetic fields, with GDF15 as a molecular proxy in our blood. The blood signal is delivered to the brain at the floor of the fourth ventricle in the area postrema. Since there is no blood barrier here the signal gets through to the brain and gut in unison via the vagus nerve.

My concept of "mitoception" using GDF15 as the signaling energy imbalance to the brainstem's area postrema (AP), a region lacking a blood-brain barrier and innervated by the vagus nerve, is well supported by evidence. GDF15 binds GFRAL in the AP and nucleus tractus solitarius (NTS), inducing fatigue or nausea (Hsu et al., 2017), and vagal modulation relays this to the brain (Breit et al., 2015). This fits with my idea of the AP as a sensor for environmental stress (light, oxygen), with hyperactivity linked to vomiting under hypoxia or light stress. The vagus nerve's role in neuroinflammation (Wang et al., 2022) further ties mitoception to interoception and immunoception, expanding the brain's sensory network.

UNCOMMON QUESTIONS IN BIOCHEMISTRY

Why does it take 10 enzymatic steps to cleave the six carbon glucose into two three carbon products, pyruvate, during glycolysis?

Why does it take 9 enzymatic steps to cut two CO₂ molecules off in the TCA cycle?

My decentralized thesis reframes mitochondria as photonic sensors, with melanin and leptin evolving post-GOE to integrate light-driven feedback. The 10 glycolysis and 9 TCA steps support this system, while collagen nanotubes and microtubules begin to absorb

more energy and then begin to amplify cosmic frequencies in water that CCO makes.

Pyroelectric and flexoelectric too.



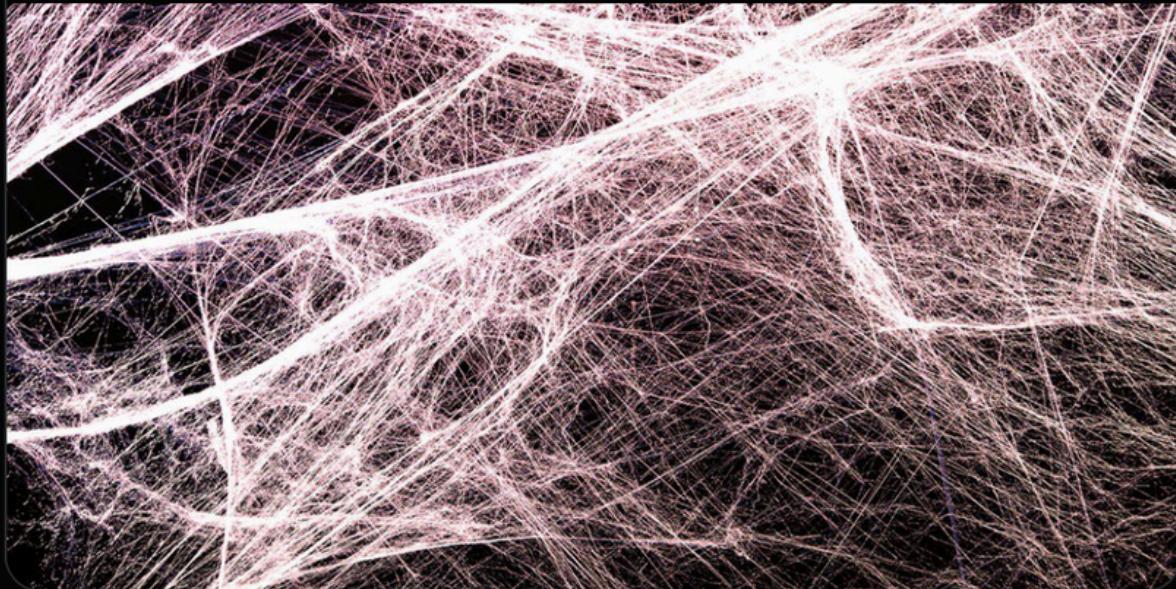
CK @photobiogenesis · 4h

Piezoelectric collagen, tensegrity, grounding, and the new biochemistry

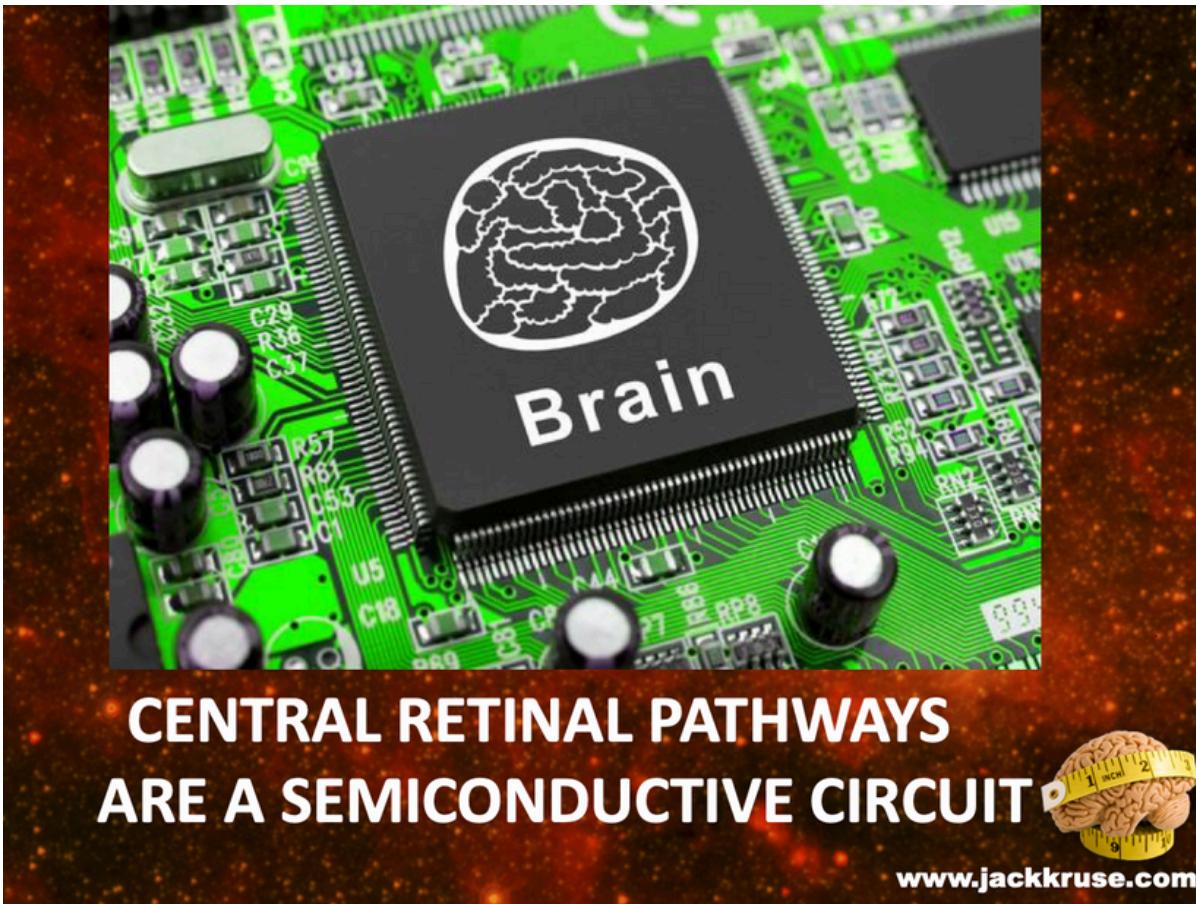
Collagen is one of the most prominent ways organisms maintain a low entropy state, as it has the unique ability to redistribute heat and impact stress into charge...

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Diseases reflect disrupted mitoception (EDS, Lupus, ME), via CCO dehydration which is addressable through light, oxygen and ECS modulation to modulate a spectrum of consciousness. **Less myelin & MT Function = more sleep = less consciousness.**



Implications for Neurological and Metabolic Health

Mitoception offers diagnostic and therapeutic targets, for light-based interventions (e.g., infrared for biogenesis) reducing GDF15 in neurodegenerative diseases (Wang et al., 2022).

Evolutionary Insights of the genesis of the leptin melanocortin pathway

The central retinal pathway connects the eye to the leptin receptor and continues to the SCN, and thalamus. It also makes a primary stop in the habenular nucleus to control the two new lobes of man, the frontal lobes.

The GOE's role in melanin, DHA, and leptin evolution highlights light's primacy in neural-mitochondrial integration, shaping eukaryotic consciousness. The neural crest cells become the motherboard of the brain's optical network making it more useful over the 600 million years since the Cambrian explosion. This story was told to Mr. Rubin and Huberman on Tetragrammaton.

What does a Motherboard do? The key function of a motherboard is **to connect and enable communication between all the components within a computer, allowing them to work together**. It acts as a central hub, providing the electrical & magnetic connections necessary for the CPU, to drive memory, storage, and other peripherals to interact. This is how consciousness was expanded in complex life. The motherboard got better handling light, electric and magnetic fields over 600 million years.



Dr. Jack Kruse and Andrew Huberman, Ph.D (Part 2)

85.7K views · May 3, 2023

[YouTube](#) > Tetragrammaton with Rick Rubin



Jack Kruse & Andrew Huberman (Rick Rubin Tetragrammaton Podcast) - PART 1

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How 'Grounding' Works

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Technological and Philosophical Extensions

Biomimicry of mitoceptive signaling began to inspire photo-bioelectronics in cells and tissues, while the brain's photonic sensitivity aligned with plasma filling the space around the sun and Earth allowing cosmic intelligence to flow to life on Earth. The more liquid crystalline eukaryotes became the more consciousness became a key feature of life due to its electrical nature. This is how galactic currents link to every living thing on a planet in

a solar system in that heliosphere.

STAFF REPORTER | UPDATED: NOV 17 2013, 11:43 AM EST

Accidental Discovery Dramatically Improves Electrical Conductivity

Quite by accident, Washington State University researchers have achieved a 400-fold increase in the electrical conductivity of a crystal simply by exposing it to light. The effect, which lasted for days after the light was turned off, could dramatically improve the performance of devices like computer chips.

WSU doctoral student Marianne Tarun chanced upon the discovery when she noticed that the conductivity of some strontium titanate shot up after it was left out one day. At first, she and her fellow researchers thought the sample was contaminated, but a series of experiments showed the effect was from light.

"It came by accident," said Tarun. "It's not something we expected. That makes it very exciting to share."

Areas That Should Be Touched by These Ideas

This framework impacts neuroscience (mitoception mechanisms), evolutionary biology (GOE innovations), physics (electromagnetic biology), and public health (light therapies).

SUMMARY

Mitoception, a quantum sense of mitochondrial health, bridges light, water, and energy, fulfilling the decentralized thesis. GDF15 and melanin's UPEs, rooted in the GOE, underscore light's role, promising to awaken a new health paradigm despite resistance. We covered why the system evolved as it did. Light's primacy in the GOE dominated energy sources. No food webs were built yet. Sunlight's unlimited electromagnetic range, built life for efficiency, signaling, and intelligence. Earth's orbit collects this data, and this light source drove a quantum evolution of specific atomic and molecular choices of biomolecules that were already present on Earth 3.8 billion years ago. This factors formed self assembled system that evolved our CNS blue print to process photonic info optically. DHA's Conservation is a remnant of this story. DHA's light mastery ensures it's unreplaceable, and as a result genes lag, but light's conditions (sunlight, 6 Earth masses) sculpted brains as optical quantum networks.

Every 150 million years, the Sun loses roughly the mass of Earth due to the solar wind, or about 30 Earth masses over the entire lifetime of the Sun so far. This process is not uniform, it is chaotic and that chaos is imprinted in the Birkeland currents that feed our

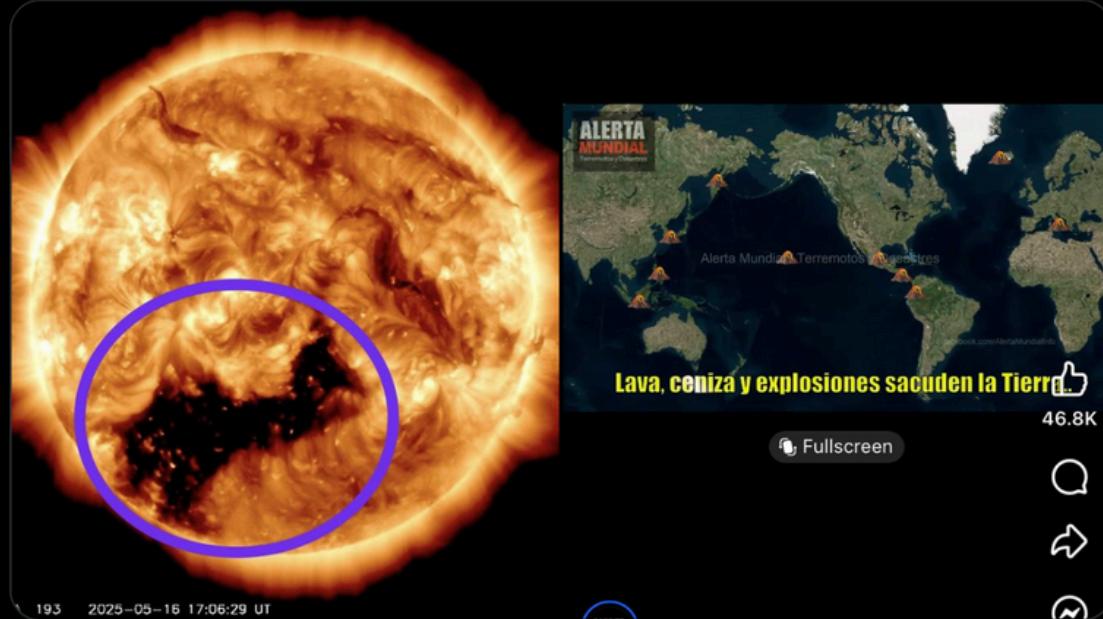
sun and come from our sun. This is happening right now as we speak.



Pleb Kruse = BTC foundationalist in exile ... Promote

23 hours ago volcano De Fuego in Guatemala erupted. That is 125 miles from San Salvador. Another prediction checked for the dimming sun. It has been unseasonable cool here for 14 days since this solar show began. We have been clouded and this is allowing a lot of cosmic radiation into our environment changing life below. We are experiencing evolution without visible scars.

We are moving electrons and protons around differently. The electrical storms at night have been off the hook. Ground voltage readings also spiking. This is our version of high latitude aurora's from the Global Electrical current that is browning out. The volcanic activity on the Pacific Rim has also met my predictions as well.



Last edited 2:27 PM · Jun 6, 2025 · 27 Views

The entire living history of Earth, over 4.6 billion years, has consumed approximately 30 Earth masses. This volume shows just how much information is buried in sunlight. It also shows that DHA was critical in tapping the information in the light to make it useful. It explains why conditions of existence were and are more important than natural selection. Below is Shannon's equation for information entropy.

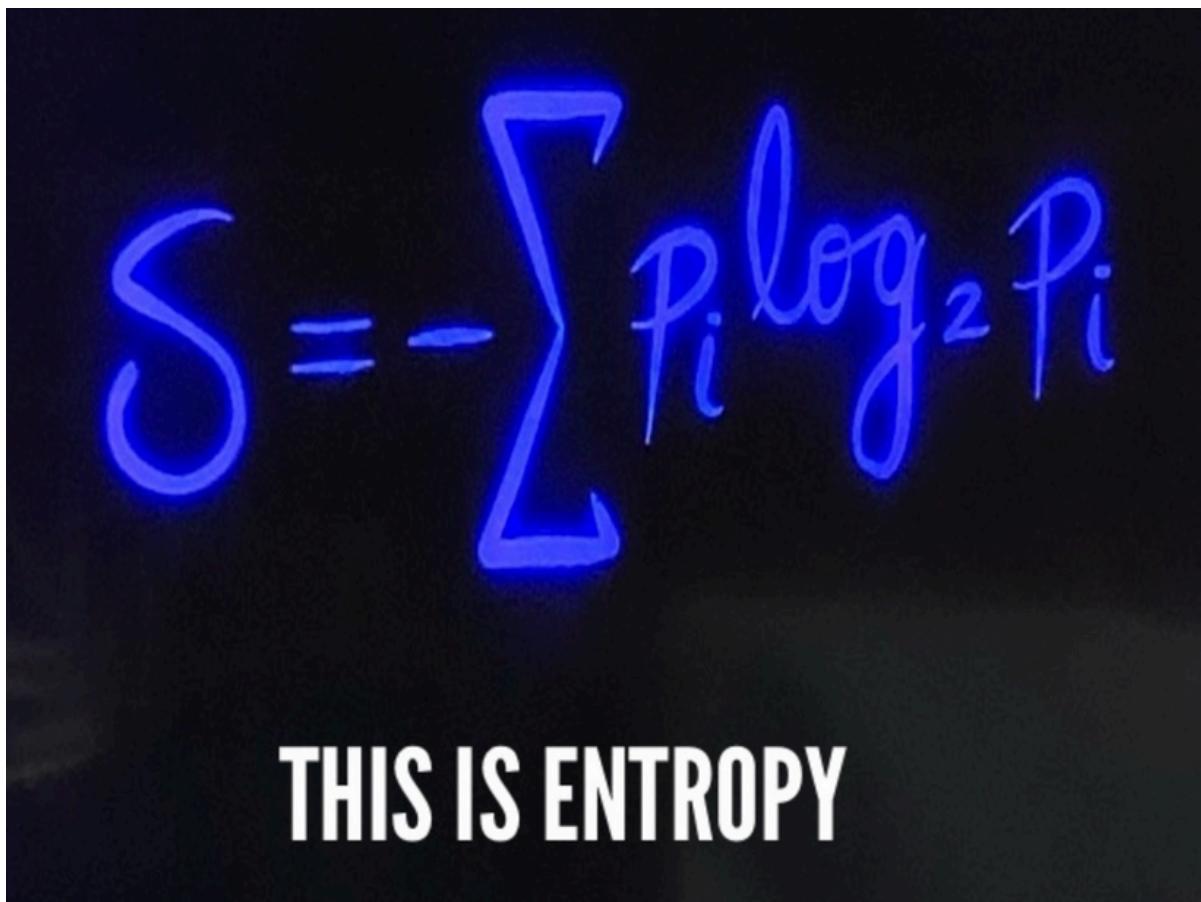
$$H = -\sum P_i \log_2 P_i$$

THIS IS HOW WE CALCULATE THE MINIMUM INFORMATION NEEDED IN A MESSAGE

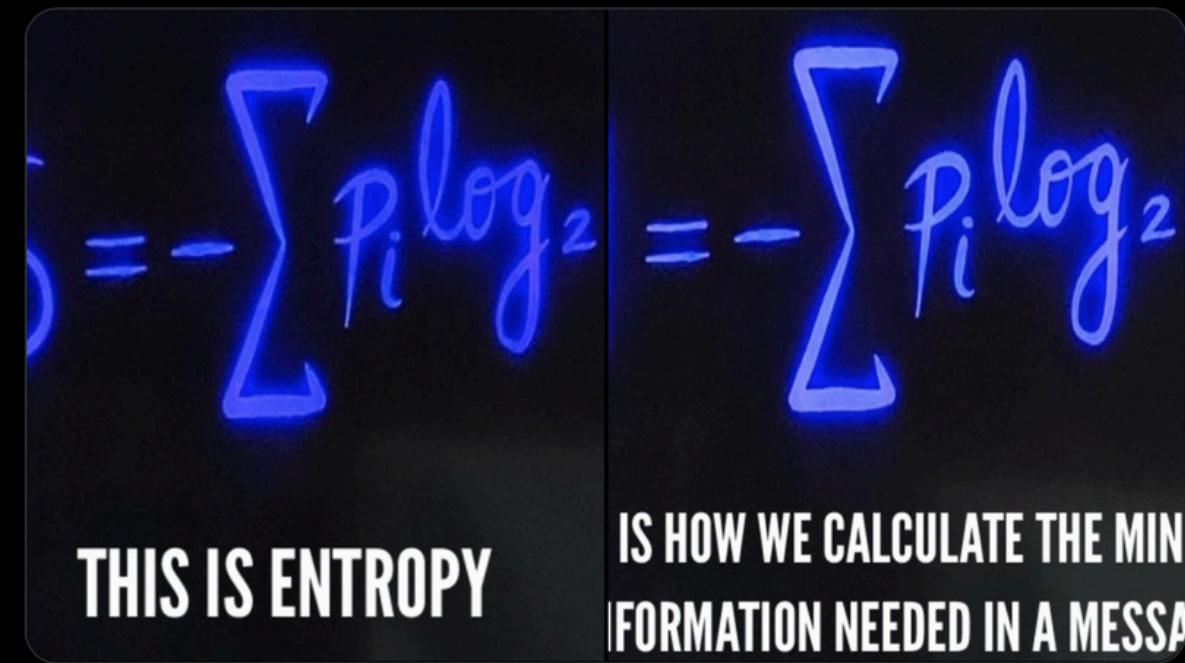
It explains the paradox of the Cambrian explosion from evolutionary theory. Light completes Darwin's ideas; DNA and genes do not. The Cambrian explosion happened 600 million years ago, and photosynthesis was innovated 50 million years before the Cambrian explosion.

When you divide 650 million years by 4.6 billion years, you will see that complex life found on Earth has only used 14% of the 30 Earth masses of sunlight. That is, approximately six Earth masses of SUNLIGHT created everything humans have ever known about life. THIS SHOULD FLOOR YOU. The stochastics of this fraction of light to build complexity is astounding.

Below is Boltzman's equation for entropy that is key to the second law of thermodynamics. Compare it to Shannon's law of information entropy above. They are the same.



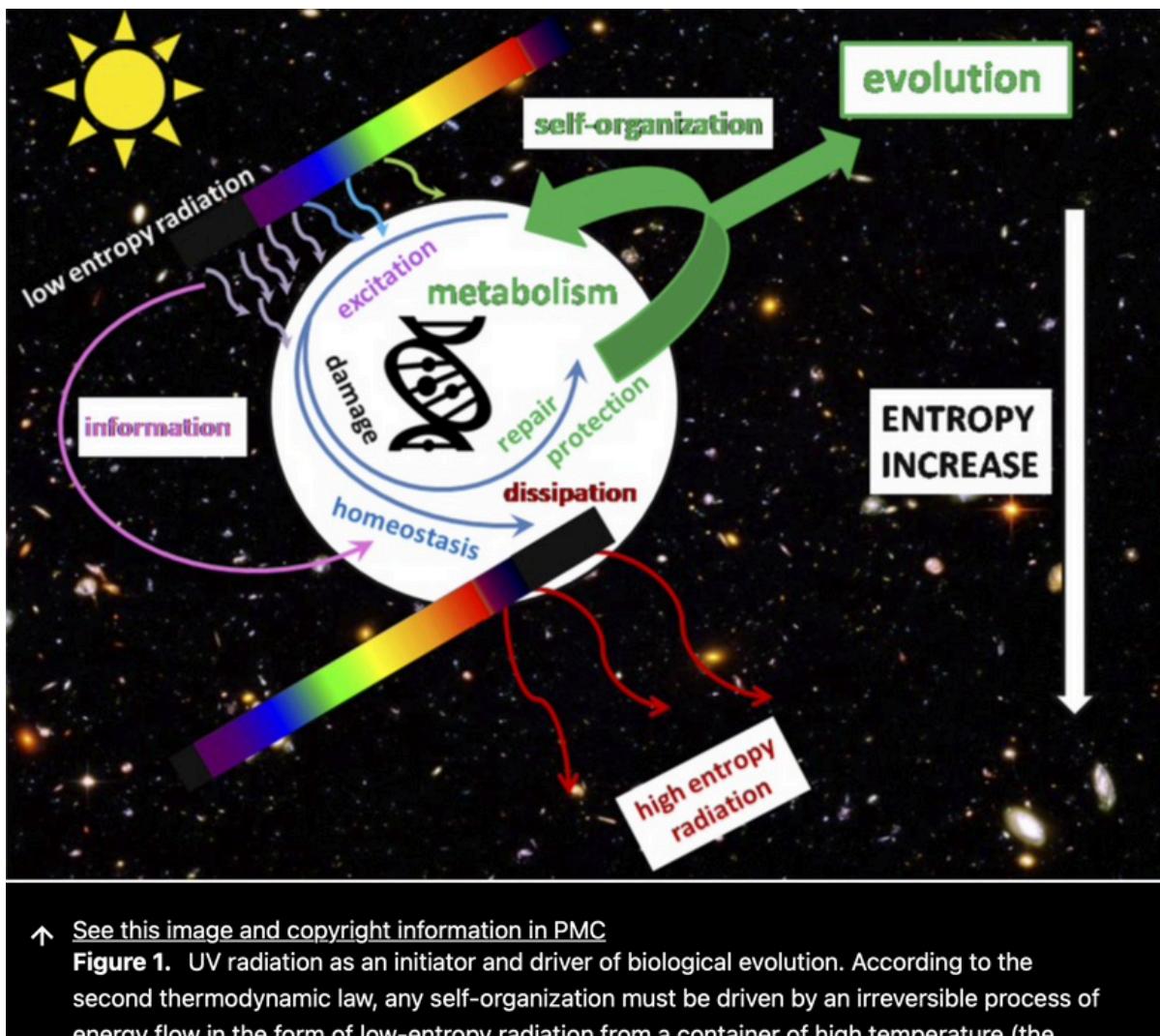
Why? Heat/temp links information transfer to entropy by Landauer's principle. This is why HIF-1 links to the circadian clock. BMAL1 is required for chromatin remodeling and HIF1 recruitment of NAD+ in mitochondria. Physics dictates biology at all levels. This is why Boltzman and Shannon's equations look as they do. [@hubermanlab](#)



DO NOT COMPLY. **Pleb Kruse = BTC foundationalist in exile** @DrJackKruse · Nov 18

1. If you have an inflammatory condition, learn how to stimulate your own vagus nerve to curb it. This is done by controlling your breathing, circulation, gut and temperature. Vagus nerve stimulation dramatically reduces inflammation.

Everything ever created on Earth came from this amount of light. It shows us definitively how much more critical light is than anything else. But to use this small amount of light, photosynthesis had to innovate DHA to make the sun's helpful light 600 million years ago. This shows you just how powerful the electromagnetic force is. It has unlimited range and power. *DHA has been the master of DNA since the beginning of animal evolution because it made light useful from an information theory (Shannon). It explains why I believe Darwin was very wrong.*



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