

The Evolution and Sustenance of Life

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Abstract

"An experiment with liquid nitrogen gave anomalous results, I proposed proton-ordered ice had contracted to accommodate water molecules' irregular tetrahedral shape. Recent reports of ice XIc at 72 K, below the ferroelectric transition temperature, confirmed it. Temperature fluctuations on primordial Earth's poles released ice XIc's latent energy as ~4 m infrared laser light. After reflection by ice in clouds and on Earth's surface, it energized deoxynucleotides, turning Darwin's warm tropical waters to DNA noodle soup.

"tRNA analogues, transport DNAs lined proto-cell membrane pores with H-bonds. Laser light drove a ratchet pump mechanism, concentrating substrates and promoting synthetic reactions within. Replicate t-DNAs marked life's origin. They elude detection, chromosomal DNA masks ~2,000/cell. A report of DNA particles around the entry of sperm to ovum might be verified. Differentiation DNAs selecting tDNAs determine tissue cell diet and metabolism, c.f. mRNAs selecting tRNAs for protein synthesis. Adequate trace elements tDNAs employ govern survival.

"Twenty-one flat protein hairpins bind 189 base-pairs forming a ring, nine rings complete a minion. Minions pack chromosomes and ensure error-free replication. Their roles as biological clocks and chips in the brain explain psychology. Computers modeled on them promise human-friendly intelligence. They control nine metabolic pathways, predating enzyme synthesis. Adequate trace element nutrition promises better mental and physical health and longevity, public assurance of their safety is vital.

"ATP's Pi-Pi bond stores ~4 m wavelength energy, e.g. sarcomeres form ½-wave resonant cavities for muscle contraction. Oscillating H-bond chains accelerate protons along adjacent minion tunnels fast enough to fuse with obstructing nuclei. Trapping the g-rays released could provide clean power, resolving global warming. My proposals restore the simplicity and public trust in science prevailing c 1900 AD, reinterpreting quantum weirdness and cosmology would redirect funds to conservation, humanitarian projects and diplomacy, ensuring a happy future."

Keywords: Minion; Sensitivity; Excretion; Nutrition

Repeating My Original Observation

As a Cambridge undergraduate in 1967, I conducted an experiment confirming the Clausius-Clapeyron relation. A silica helium thermometer immersed in liquid nitrogen gave anomalous readings. I suggested a proton-ordered variant of ice Ic crystallizing on its surface had deformed it. Sixteen ice structures are now known, recent reports of a phase transition in ice

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XIc [1] corroborate my proposal. All records of the observations made on that occasion were lost or destroyed. Examining laboratory records or anyone who might remember the episode after half a century could cause offence. Ice XIc is reputed to crystallize extremely slowly but FIG. 1, includes sufficient information to replicate my observations.

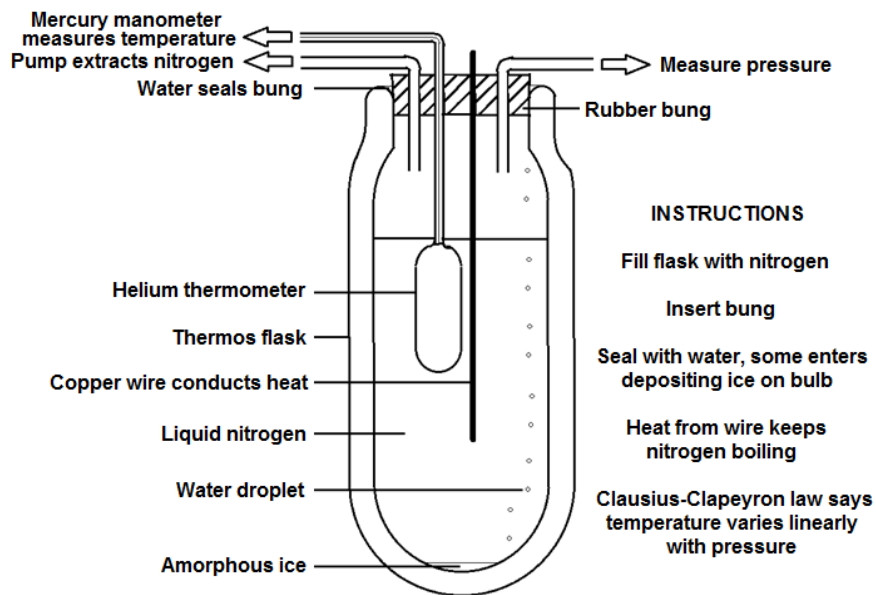


FIG. 1. Basis for original proposal.

Origin of Life

Water's a fascinating molecule, all sixteen types of ice accord with Laue's classification and obey the ice rule-each tetrahedral water molecule hydrogen bonds with four neighbors-creating the beautiful shapes of snow-flakes. Linus Pauling showed the entropy of ice Ih persists on cooling to 0 K [2]. Life may either be treated as a collection of entities or as a process. My argument presumes the pre-existence of a dilute solution of atoms and ends describing how life assembles them-it's circular. Lightning maintained dynamic equilibrium in the primordial soup before intra-cellular metabolism evolved. Life's essential prerequisites are an energy source matching H-and Pi~Pi bonds and its products accumulating for eons, FIG. 2.

Alexander Oparin [3] proposed life began in primitive cells he called coacervates. Miller and Urey simulated lightning in a primordial atmosphere containing methane and ammonia, it yielded chemicals including amino acids. Cairns-Smith proposed clay surfaces afforded an interface for molecules to congregate. Evaporation concentrates chemicals in puddles and hot hydrothermal vents promote chemical reactions but they're isolated and temporary. RNA world advocates propose ribosomes arose spontaneously [4], RNA being a better catalyst than DNA, they ignore the need for substrate concentration. Panspermia doesn't address the question of its origin. Protein synthesis is a complex process unlikely to emerge spontaneously. Creationists calculate probabilities and demand *in vitro* proof.

The observed surface temperatures at Mercury's poles and on the moons of Jupiter [5] are consistent with pools of liquid nitrogen forming on Earth's poles during a primordial ice age. Snow, rain and hail fell into them and crystallized as ice XIc. Its cubic structure resembles diamond, H-bonds are individually weak but strong when aligned. Temperature fluctuations drove its phase transition at 72 K [6], accommodating the irregular tetrahedral shape of water molecules. The water

molecules are aligned electrets, making it ferroelectric so their coordinated rearrangement releases latent energy as infrared laser light, ice-light with wavelength $\lambda \approx 4 \mu$.

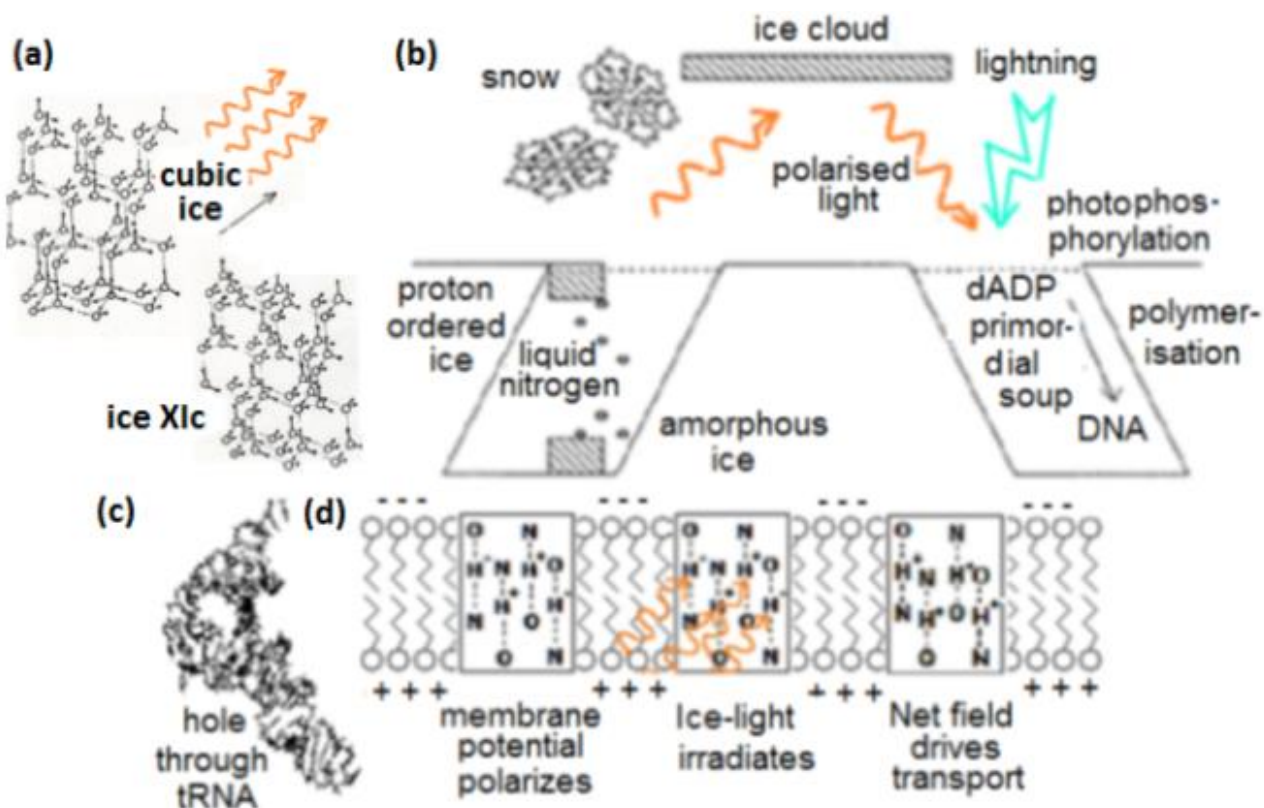


FIG. 2(a). Phase transition in ice XIc releases $\sim 4\mu$ laser light. (b). Crystallizing in liquid nitrogen, it created DNA. (c). tRNA has an H-bond-lined ‘hole’. (d). Transport DNA’s ratchet mechanism.

When $\lambda \sim 4 \mu$ laser light was used to de-ice aircraft wings, it was reflected. Reflection by ice in clouds and on Earth’s surface like Marconi’s trans-Atlantic radio signals transmitted polarized laser light from ice XIc to Darwin’s warm tropical waters. In the oxygen-free atmosphere they coexisted with extremely low polar temperatures. It’s now known they contained deoxyribonucleic acids [7] (DNA’s greater stability than RNA [8] favors it as life’s precursor and RNA doesn’t form minions). Ice-light matches both phosphodiester, Pi~Pi and hydrogen, H-bond energy. Its polarization restricted its absorption to one enantiomer, polymerization formed a chiral DNA noodle soup, life’s emergence on Earth was inevitable. Substrate concentration is prerequisite to metabolism – order emerged from chaos.

Life started when nucleotides polymerizing within coacervates replicated transport DNAs, tDNAs (tRNA analogues). Their requirements determine life’s atomic alphabet and a molecular vocabulary of carrier-substrate complexes underlying all biological systems and the inviolable rules of active transport. Until photosynthesis took over, a tDNA feeding protons to nicotinamide created our oxygenated atmosphere and fixed nitrogen, fostering amino acid synthesis. Protein synthesis and enzyme catalysis evolved later. Now, kinase and cyclase enzymes replace ice-light, they release life’s energy currency from ATP’s phosphodiester bonds as $\lambda \sim 4 \mu$ light. Barrels of α -helices opening and closing complement sixty-four yet undetected

tDNA variants. On some alien planet with a different climate, another natural laser source energizing other chemicals might create a parallel life-form.

3. Minion Structure and Function

DNA uncoils, retaining B-helical spacing and overlap and binds to anti-parallel β -pleated sheet hairpin proteins with alternate neutral alanine, leucine, isoleucine or valine and basic lysine or arginine residues, an asymmetric proline U-bend creates a $\sim 17^\circ$ angle between adjacent units. Twenty-one nine-base-pair units form a coil, (readily degrading to a nucleosome core particle). More protein hairpins bind nine coils together, forming a minion (connoting mind and subservience). Histone analyses are consistent with their amino acid content. The D-phenyl-alanine residues of bacterial protein Gramicidin S are analogous to DNA bases, FIG. 3.

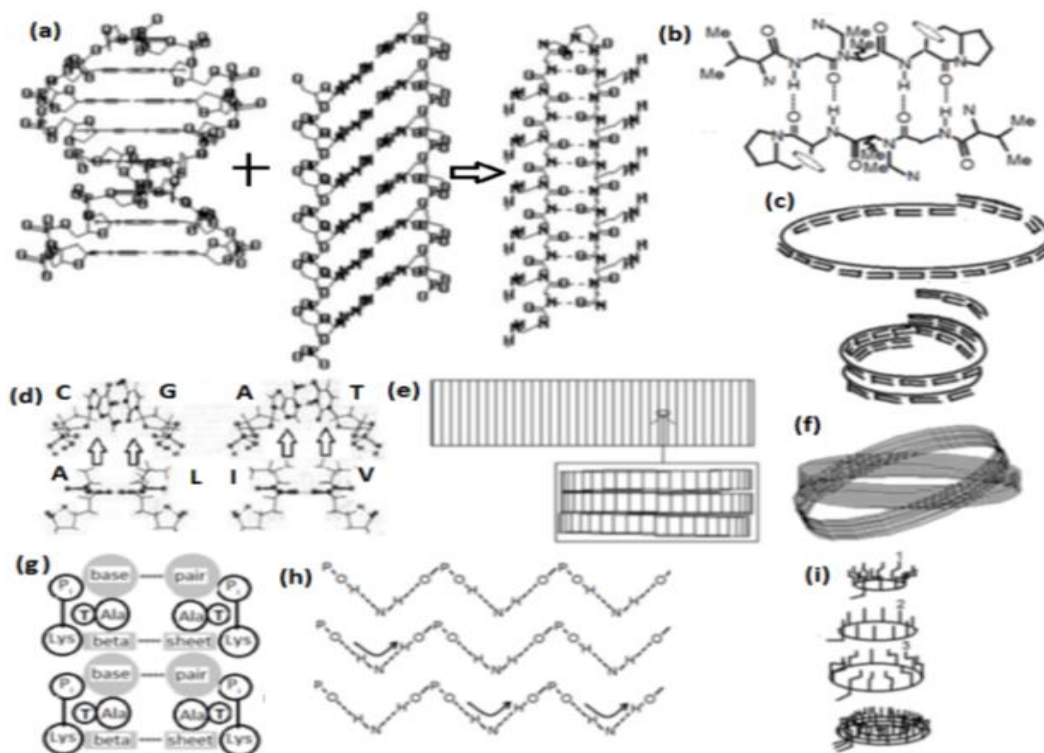


FIG. 3(a). Uncoiled B-helix binds to β -pleated sheet. (b) Gramicidin S. (c) 21-unit coil degrades to nucleosome core article. (d) A|L|I|V fit C|G|A|T. (e) Minions stack to fit chromosome. (f) Minion replicating. (g) End view shows tunnels, T. (h) Oscillating H-bond chains. (i) Dekatron™ structure.

Minion architecture involves three sets of H-bonds: between DNA bases, across β -pleated sheets and connecting ω -amines to phosphates. Amino acids A, L, I and V binding to bases Cytosine, Guanine, Adenine and Thymine conserve critical DNA sequences, mnemonic A LIVE CiGAreTte. Pairs of small interfering RNAs, siRNAs bind palindromic DNA sequences, affording another analogous structure. Super-coiled minion stacks pack chromosomes better than nucleosome core particles. They replicate 1,701 base pairs without uncoiling and recoiling, helicase enzymes can introduce errors. One proton ordered H-bond between R and K ω -amines and DNA phosphates is reversed for electrical neutrality.

The cyclic collapse of those H-bonds resembles a row of dominoes, it constitutes an eighteen-handed biological clock, DNA’s chirality determines the direction of time. That for light to pass thrice around a coil:

$$\tau = 3 * 189 * 7.37 * 10^{-10} / 3 * 10^8 \approx 1.39 * 10^{-15} \text{sec}$$

Where 3 reflects Dekatron™ logic [9], 189 base-pairs per coil, 7.37 Å is β-sheet spacing and 3*10⁸ is the velocity of light. τ limits our perception; 63^N τ, N=1 to 18, calculates coil periods, N=11, 13 and 18 predict day-length, Sun-spot cycle period and the age of the universe [10] respectively. Zero, times <τ or >63¹⁸ τ and infinity are unreal. Minions are coiled abaci with eighteen 63-bead rungs, counting from 1 to 63¹⁸ (2.4 * 10³²). An infants’ first breath burns a reference datum on all its minions, determining their personality, all neurological, psychiatric, philosophical and astrological types are embraced,

TABLE. 1.

#	Quality	Period	Color	mass	Discipline
-9	Unity	8.7 F-Sec	Red	M _e /7	Quantum Mechanics
-8	Justice	5.5 P-Sec	Silver	M _p /7	Physics
-7	Stability	350 P-Sec	Blue	2 * Base Pairs	Chemistry
-6	Progress	22 N-Sec	Violet	8.3 N-Gram	Computer Processing
-5	Love	1.4 M-Sec	Bronze	0.033 P-Gram	Biochemistry
-4	Peace	87 M-Sec	Yellow	130 P-Gram	Genetics
-3	Beauty	5.5 M-Sec	Pied	0.51 M-Gram	Biology
-2	Truth	350 M-Sec	Gold	2 M-Gram	Engineering
-1	Goodness	22 Sec	Green	8.1 Gram	Psychology
+1	Goodness	23 Min	Green	32 K-Gram	Psychiatry
+2	Truth	1 Day*	Gold	130 Ton	Head Hunting
+3	Beauty	9 Week	Pied	0.5 M Ton	Sociology
+4	Peace	11 Year*	Yellow	2000 M Ton	Politics
+5	Love	685 Year	Bronze	8 G Ton	History
+6	Progress	43 K-Year	Violet	31 P Ton	Archaeology
+7	Stability	2.7 M-Year	Blue	1.8 Moons	Paleontology
+8	Justice	170 M-Year	Silver	84 Earths	Astronomy
+9	Unity	11 B-Year*	Red	Sun	Cosmology

TABLE 1. Qualities associated with minion coils.

Qualities vary with frequency range, ± correspond to introvert and extravert personalities, periods=63^N τ, colors feature in metaphors, masses are in ratio 63², m_e/m_p=electron/proton masses, substituting μ=√M for M makes E=Mc² symmetric: E=μ²c², * connotes approximation.

Inter-coil comparisons correspond to ratios and percentages, justifying our use of exponents and logarithms [11]. The H-bond settings of ω-amine-P₁ bonds store an 18-character word using a 64-character alphabet. Minions serve as chips in the brain,

they span eighteen frequency bands, 103-octaves and the electromagnetic spectrum, a greater range than neural networks. As Piet Hein wrote: Things Take Time, untargeted evolution has taken human intelligence beyond silicon chip technology. The 1.8 M minions in any human cell nucleus could remember the Bible, Koran and Shakespeare's works. Copies are distributed throughout the brain like a holograph so memories can survive brain damage.

Integrating neurologists', psychiatrists' and philosophers' personality classifications suggested nine personality traits: goodness, truth, beauty, peace, love, progress, stability, justice and unity. The gold, bronze and silver caskets corresponding to truth, love and justice in Shakespeare's Merchant of Venice prompted an investigation of the psychology of color, those used by political parties, in national flags and metaphors contributed. Academics' personalities reflect characteristics typifying their interests. Negative and positive traits correspond to introversion and extroversion respectively.

Our fingers, ears, tongues, eyes and noses encode touch, taste, hearing, sight and smell inputs. The way synesthetes substitute senses suggested adding instinct, belief, aesthetics and joy to the physical senses. Evidence for minions' bases 9 and 63 includes:

- Gray's Anatomy uses 9 colors for brain regions
- The musical staff's 5 lines and 4 spaces
- The QWERTY keyboard's 26 upper/lower-case alphabet + 10 digits + space
- The history of calendars: 7 days/week despite Napoleon trying to impose 10
- 60 for time keeping
- The ancients introducing zero for base-10 arithmetic is compatible

We translate experiences into essays, pictures and symphonies; libraries, galleries and concerts exhibit them, they reflect the characters of their authors, whose masterpieces date from one of nine seven-year periods:

1. 0-7 infants are good, 63-72 retirees enter 2nd childhood
2. 7-14 children learn truth, 72-81 oldies resume education
3. 14-21 teens enjoy beauty, 81-88 pensioners are content
4. 21-28 adults respect ethics, 88-91 elders impart wisdom
5. 28-35 parents conform, dotage, 91-98 revives memories
6. 35-42 workers advance their careers
7. 42-49 in middle age, they invest savings
8. 49-56 citizens advise and publish
9. 56-63 leaders govern

Thought transference between coils explains the lateral thinking underlying creativity, it's equivalent to transposing keys in music. Minions play chords corresponding to their stored word, others storing similar words either locally or connected by nerve fibers resonate, ring a bell for memory recall. Axons and dendrites are equivalent to optic cables, they serve as wave-guides, distributing signals throughout the brain.

The neural network model doesn't explain the recovery of childhood events in old age, partial matches suggest compromise, we learn from our mistakes. The synaptic junctions in differentiated brain regions act as filters deploying different neurotransmitters. Most activity involves repeating established behavior, new ideas arise during sleep, enabling adaptation to survive change. Turing [12] envisioned computers emulating human thinking, asking: Can machines think ... play the ... imitation game?

AI with base-9 hard-or soft-ware modelled on minions promises to satisfy his criteria to:

- Forge diplomatic peace treaties
- Enable scientists to cross disciplinary boundaries
- Help matchmakers find partners
- Facilitate medical diagnosis
- Teach gamblers to distinguish cardinal from ordinal numbers

s, p, π electron orbitals and $-$, $=$, \equiv , \dots chemical bonds usurped the simplicity of Michael Faraday's positively charged electric particles. Plato's perfect solids inspired a set of nine polyhedrons in FIG. 4, Nested, they predict the chemistry of the elements in Mendeleev's periodic Table [13]. Oscillating H-bonds between K/R ω -amines and DNA P_i accelerate protons along tunnels, T with sufficient energy to fuse with obstructing nuclides:

$$\frac{1}{2} p_m (c/189)^2 \approx 13,000 \text{ eV}$$

where proton mass, $p_m = 1.67 * 10^{-27} \text{ kg}$.

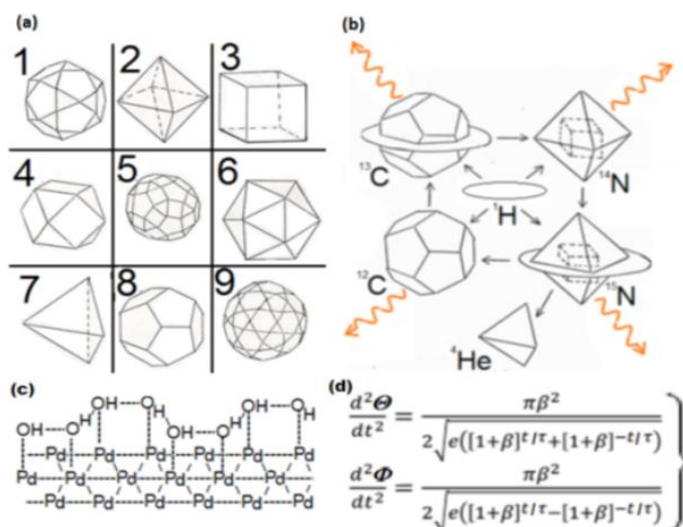


FIG. 4(a) **Nine plane combinations.** (b) **Carbon-nitrogen cycle.** (c) **Water bound to palladium.** (d) **Tyger relativity equation.**

Human's $\sim 10^{28}$ minions, $\sim 30 \text{ Mt}$ of chromatin suffice to replenish the H, C, N, O, S and P on which life depends. Surprisingly, the $\frac{1}{2}$ -lives and wavelengths of γ -rays emitted by ¹²CO₂, ¹³CO₂, ¹⁴NO₂, ¹⁵NO₂, ¹²CH₄, ¹³CH₄, ¹⁴NH₄ and ¹⁵NH₄ recoiling from the carbon-nitrogen cycle correlate with those of pulsars¹⁴. Blake's What immortal hand or eye dare frame thy fearful symmetry? [15] inspired the Tyger equation, a hyperbolic function allowing for wrap-around counting 'errors' $\alpha=1$ in 63^{18} and $\beta=1$ in 63^9 , it compensates for our distorted perception of a light beam's path.

The Tyger equation predicts γ -rays follow a boomerang-like path and DNA diffracts them at source. It's as counter-intuitive as the quantum mechanics it replaces. When Michelson and Morley measured the speed of light, the omnipotence of science was challenged. Heisenberg's uncertainty [16], Einstein's relativity [17] and Lemaître's big bang cosmology [18] fill gaps. Using particle accelerators, telescopes and rockets to test them diverts research funds from humanitarian projects.

The relativity between perception and conception only affects particle physics and cosmology. The conundrums arising from new physics can be resolved by substituting τ for Planck's constant [19], replacing plane surfaces with spheres and treating time as imaginary. They're simpler than quantum mechanics and account for Einstein's spooky action at a distance, Earth's curvature and gravitation. Verifying the minion structure could restore public confidence in science.

Tanks of bacteria performing molecular scale nuclear fusion emit γ -rays, trapping them could generate clean energy to resolve global warming. Water films on palladium crystals [20], neutron emissions from electric storms and collapsing bubbles also conduct cold fusion. Scientists and engineers must abandon the searches for fundamental particles, alien life and quantum computers and engage in this venture. My proposals make many correct predictions but my logic needs reappraisal.

Homo sapiens, the wise man, built pyramids and other symmetrical religious monuments at great expense, Karl Marks' Religion is the opium of the people invited religious tolerance, free speech and human rights. Astrological cycles correlate with those of minions, explaining the recurrent realization of prophecy. Sharing a common origin, all biological clocks are in synchrony, accounting for telepathy. They're in phase, contradicting Heisenberg's uncertainty. The Western and Chinese zodiacs and ~2000-year astrological Great Ages are consistent with minion logic and provide a framework for understanding history.

4. Calculations

Using these parameters and coordinates of water molecules in ices Ic and XIc:

Parameters:

- H-bond length: $h = 1.75 \text{ \AA}$
- OH-bond length: $b = 1.01 \text{ \AA}$
- Tetrahedral angle: $\theta_a = 104.5^\circ$
- H-O-H bond angle: $\theta_b = 109.5^\circ$
- Charge cloud angle: $\theta_c = 120^\circ$
- Dipole moment: $\mu = 1.27 * 10^{-29} \text{ coulomb-}$
- Dielectric constant: $\epsilon = 3.1$
- Space dielectric: $\epsilon_o = 8.85 * 10^{-12}$
- Planck's constant: $h = 6.63 * 10^{-34}$
- Avogadro number: $N = 6.02 * 10^{23}$
- Velocity of light: $c = 3 * 10^8 \text{ m/sec}$

Differentiation DNAs, dDNAs recruit tDNAs, determining cell diet, analogous to messenger RNAs selecting transfer RNAs for protein synthesis. At cell division, tDNAs feeding from blastocysts and gastrocysts are starved of nutrients and overheat. Guanyl replaces adenyl cyclase, synthesizing hook proteins, determinants of tissue architecture. 1 hook pairs gametes, 2, 3, and 4 hooks form spirogyra, sponges and simple worms respectively; 5 hooks suffice to build all natural forms, 6 allow tumors and cancers to grow. 1-hook immune cells bind to the extra hook, preventing their proliferation.

The trace elements magnesium, calcium, manganese, iodine, copper, fluorine, zinc, silver and selenium are often deficient in modern diets. Religious taboos, food processing, fertilizers, weed killers and pesticides, SO_x/NO_x air pollution, mercury poisoning, pharmaceutical waste and water purification reduce their availability. Government support for supplementing them would prevent or treat common mental and physical disorders. Food labelling, sell-by dates, organic farming, vegan diets, five a day, high fibre, avoiding saturated fat, eating oily fish and eschewing genetically modified crops distract attention from simple basic principles. Patient support groups for inherited disorders recommend dietary restrictions for their management when mineral supplementation or drugs targeting tDNAs would be more effective.

Initially, veterinary experience and the non-Mendelian inheritance of familial metabolic disorders guided my investigations. Clues emerged from traditional herbal remedies and drug side-effects. Trace elements' roles as enzyme cofactors often mask those as carrier components. Studies of siRNA hairpins support my proposals. Endocrinology and medicine can be better understood using trace element metabolism. Mitochondrial oxidative phosphorylation and Krebs cycle release ice-light energy, it's passed down the cytochrome chain, a cascade of porphyrin ring-metal ion complexes.

The notion that oxidants destroy free radicals is discredited. The following accounts highlight resonant cavities convert chemical to mechanical energy and conjugated single/double bonds, (-C-C=C-) _n transferring energy as solitons.

6. Motility

Biological systems deploy resonant cavities to couple chemical with mechanical energy and conjugated (-C-C=C-) _n bonds conduct energy as solitons [21], FIG. 5, Sulfur from glutathione is oxidized to sulfite, carrier for calcium/magnesium exchange. ATP's phosphodiester bonds have the same energy as ice-light, Mg controls their hydrolysis. Sarcomeres of striated muscle contract to form ½-wave cavities resonating with the ~4 μ infrared released, avoiding the thermodynamic inefficiency of Huxley's model [22]. For sustained muscle contraction, silver exchanges creatine for creatinine phosphate, replenishing ATP.

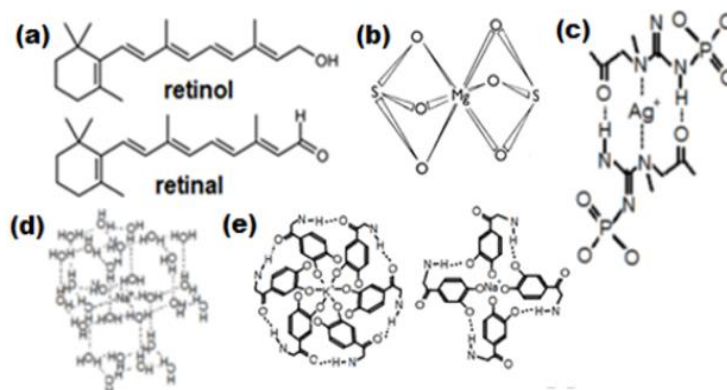


FIG. 5(a). **Retinal conducts solitons.** (b) SO_3^- binds Mg^{++} . (c) Ag^+ -creatine complex. (d) $\text{Na}^+ \cdot 28 \text{H}_2\text{O}$. (e) **Adrenaline forms 4-/6-member rings around Na^+ and K^+ .**

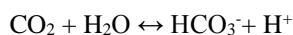
Oxidative phosphorylation in mitochondria commensurate with $\sim 4 \mu$ store the infrared they generate until the cytochrome chain converts it to chemical energy. Chloroplast grana absorb light wavelengths matching their dimensions for photosynthesis. Centrioles' nine peripheral rods also afford such cavities, spindle fibres' three α -helices provide nine conjugated bond paths. The energy they transmit drives proton currents round chromosomes' minion coils, rendering them alternating electromagnets. Resonance between chromosomes of equal length creates an alternating electric force causing their mutual repulsion at cell division.

7. Sensitivity

Nerves transmit pain, catecholamines [nor-]adrenaline and dopamine form four-and six-member rings around Na^+ and K^+ ions at synaptic junctions. They exchange sodium for potassium and change cell charge, enabling the passage of signals between minions. Morphine and codeine substitution creates larger complexes, they block tDNAs and prevent pain transmission. Pain sensitivity increases when more are recruited to compensate, accounting for addiction. LDopa counteracts Parkinson's disease. Na^+ ions have the same shape and size as H_2O and form such large hydrates as $\text{Na}^+ \cdot 28 \text{H}_2\text{O}$, rendering the cell sap viscous and reducing metabolic rate. K^+ ions bind less water, substituting them for Na^+ speeds reactions, explaining the reflex fight or flight response.

8. Excretion

Manganese forms chlorides: MnCl_3^- , MnCl_4^- and MnCl_6^{4-} , the tetra-chloride excretes salt in urine, sweat and tears, controlling ionic strength. Angiotensin delivers Mn, aldosterone, rennin, histamine and aspirin interact. Red blood cells transporting carbon dioxide to the lungs for excretion control pH. Zinc is cofactor for carbonic anhydrase, it catalyses the chloride shift, exchanging bicarbonate for chloride:



9. Respiration

Breathing exchanges carbon dioxide for oxygen, distributed bound to haemoglobin in red blood cells, O_2 can't diffuse through membranes. Thyroid glands load thyroxine with iodine, FIG. 6, a proton displaces iodonium, I^+ at target tissues.

Iodonium carries oxygen hydrate, $O_2 \cdot H_2O$, decaying to iodide for recycling. Oxygen transport protects littoral seaweeds from tidal O_2 fluctuations, their purple and yellow colours match those of I^+ and I^- .

tDNAs deliver protons to the amide/hydroxy groups of nicotinamide in NAD[P], bonding with nitrogen, oxygen, nitric oxide and ethylene, they drive parallel reactions:

- Hydrogen is released whilst fixing nitrogen [23]; more efficient than the Haber process, genetically modified bacteria could reduce pollution.
- Photolysis of water accounts for atmospheric oxygen [24]
- Nitric oxide controls vasodilation
- Cyanide and carbon monoxide poisoning

Iodine deficiency causes goitre, water accompanying iodine accumulating in the eyes exophthalmos. Bipolar disorder arises from mutant tDNAs disrupting nerve cell oxygenation, mania and depression correspond to excess and deficient oxygen respectively. Lithium, diagonally related to iodine in the periodic table, stabilizes the condition. One in seven sibs inherits it, this non-Mendelian inheritance explains the seventh son of a seventh son myth.

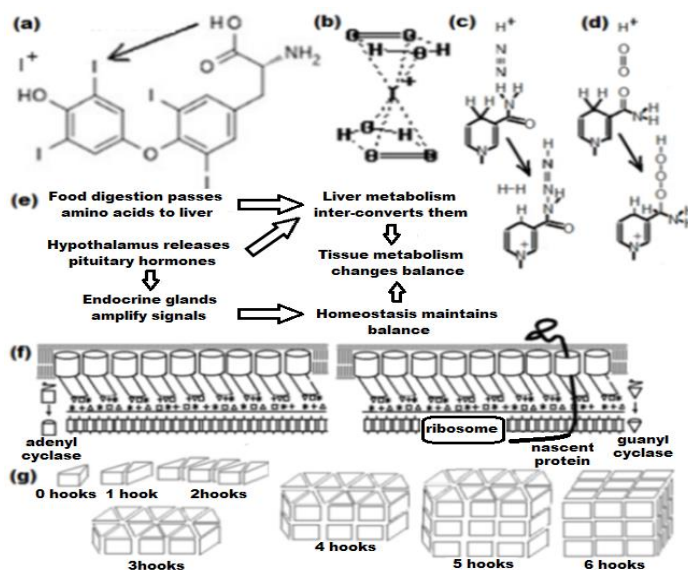


FIG. 6(a). Iodonium release. (b) I^+ carries O_2 . (c) Nitrogen fixation. (d) Oxygen release. (e) Liver balances amino acids. (f) tDNAs make *hook* proteins. (g) Hooks control morphology.

10.Growth

The Biuret test illustrates peptide bonds' high affinity for copper. tRNAs transfer amino acid complexes through the endoplasmic reticulum to ribosomes for protein synthesis, analogous to tDNA substrate transport through cell membranes. A cascade of hormones amplifies a single molecular signal, alerting all body cells: hypothalamic hormones stimulate anterior pituitary Cu distribution, they promote endocrine hormone production and it drives protein synthesis. Failures cause gigantism, dwarfism and acromegaly.

Differentiation DNAs binding tDNAs controls tissues' specialist functions, nuclear DNA is unchanged. At cell division, tDNAs feeding from gastrula and blastula are starved of nutrients and overheat. Guanyl cyclase replaces adenylyl-cyclase, synthesizing hook proteins binding daughter cells together, TABLE. 3, The Five hook theorem, 3D equivalent of the Four color mapping theorem needs proof.

Hooks	Morphology
0	Pluripototent stem cells
1	Gametes and leucocytes
2	Spirogyra filaments
3	Sponge sheets
4	Spirogyra filaments
5	Tissues combine up to 5 hooks
6	Allow tumour and cancer growth

TABLE 3. Hooks control morphology.

Stem cells have all dDNAs and tDNAs, synthetic replacements could create monsters, A little knowledge is a dangerous thing. Cu IUDs inhibit sperm glucose uptake, preventing them reaching ova, Cu accumulation in the eye causes Wilson's disease. Cu supplements and bracelets may ameliorate arthritis. Amino acids from protein digestion pass to the liver for inter-conversion, ensuring the brain receives a balanced mixture.

11. Rigidity

Fluorspar, *blue John* is very stable, illustrating Ca's strong affinity for fluorine, FIG. 7, Silicon hexafluoride carries calcium phosphate, aka (fluor-)apatite. Both parathyroid and thyroid glands incorporate halides to hormones, they may have coevolved. Para-thyroid hormone is secreted continuously, preventing F⁻ accumulation. Vitamin D stores ~265 nm UV sunlight matching Si~F energy and retinal transfers it as solitons:



Failure of this pH-sensitive reaction arising from acidity in kidney failure or menopause causes osteoporosis. Replacing F⁻ with OH⁻ in apatite hardens tooth enamel and fluoridation of water supplies counters childhood tooth decay (mottled teeth result from excessive exposure). Tea drinking typically supplies adequate F⁻.

Acid air pollution (SO_x/NO_x) entering leaves via stomata prevents SiO₂ production, leading to leaf-fall [25]. Liming the soil proved ineffective, delaying diesel exhaust regulation. SO_x/NO_x also promotes inappropriate SiF₆²⁻ synthesis in the nasal fossa, it's passed along the olfactory nerves to the brain. There, breakdown releases F⁻ and deposits aluminosilicate plaques. F⁻ inhibits Krebs cycle, killing cells and disrupts protein folding as nascent proteins pass through tDNAs, creating β-amyloid and τ-protein tangles. Aluminium hexafluoride is excreted and F⁻ cleared from the brain four days after fluorinated anaesthetic administration. Alzheimer's Disease [26] symptoms are relieved until disintegrating nerve cells release more F⁻. Reducing acid air pollution or F⁻-containing pharmaceuticals might manage dementia.

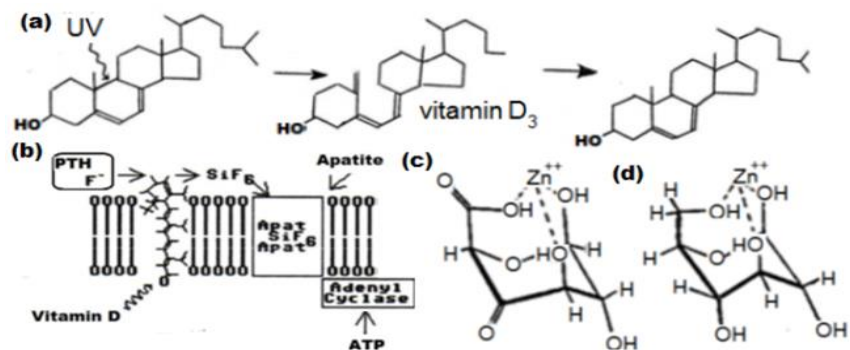


FIG. 7(a). Vitamin A stores UV light. (b) Retinal delivers energy for SiF_6^- synthesis. (c) Vitamin C derivative L-Gulonate binds Zn^{2+} . (d) βD -Glucose binds Zn^{2+} .

Similar tangles in Prion diseases [27], result from mutant tRNAs misinterpreting mRNA sequences and incorporating the wrong amino acids to proteins; embedded mutant tRNAs render them infectious. Genetically engineered tRNAs and tDNAs might prevent their inheritance.

12. Assimilation

Zinc binds to the triangle of sweetness [28] found in β , D-glucose, vitamin C derivative 2-keto-L-gulonate, barbiturates, insulin and glucagon. Glucose transport using Zn as carrier maintains animal blood and plant xylem/phloem sugar concentrations, controlling carbohydrate metabolism. Pavlov noted his dog lapping up diabetics' urine. Pancreatic β -cells incorporate Zn to insulin, anticipating, tasting or smelling food promotes its secretion; L-gulonate takes Zn where insulin can't reach. Pancreatic α -cells secrete glucagon, recycling Zn and disabling glucose transport. Banting, Best and Hodgkin won Nobel prizes for elucidating insulin's function and structure.

Vitamin C or Zn deficiency caused scurvy affecting sailors' skin, digits and gonads until limes high in vitamin C prevented it. Zn incorporates hydroxy-proline to connective tissue protein collagen. The zinc sulphide in Calamine™ lotion performs the same function. The vitamin C supplements Linus Pauling [29] advocated prevent importing rhinoviruses causing colds and flu, Zn blocks nasal tDNAs. Since Zn is cofactor for alcohol dehydrogenase, consuming alcohol and taking barbiturates divert it to the liver, the reduced glucose supply to the brain causes inebriety, attention to Zn might manage alcoholism. Cu coil contraceptives inhibiting sperm glucose uptake prevent them reaching their target.

When adult hemoglobin replaces fetal, Zn conjugates glucose to bilirubin for excretion causing neonatal jaundice, bilirubin reaching the brain can cause seizures. Zn in colostrum [30] affords natural protection, sucking a midwife's pewter spoon was traditionally effective, blue-blooded families' silver spoons were useless. The many types of diabetes arise from defects in this pathway, an implanted Zn monitor linked to an artificial pancreas might improve its management. Diabetics suffer from glaucoma when Zn accumulates in the vitreous humor of their eyes. Sugar excreted in urine causes kidney infections poor peripheral circulation loss of fingers and toes.

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13. Reproduction

The pineal gland distributes silver in 6-member serotonin and melatonin rings like those catecholamines form around potassium. Porphyrins, FIG. 8, supply nature’s colors:

- Magnesium porphyrin the green of chlorophyll
- Iron porphyrin the red of hemoglobin in erythrocytes
- Silver porphyrin the pink of leaf buds

they inter-convert light and chemical energy. Vitamin D absorbs UV light, energizing silver porphyrin [31], retinal transfers it as solitons by retinal, converting phosphate to pyrophosphate. PP_i is less polarized than P_i , it’s transported bound to arginine as PP_i . Arg. This complex provides the atomic ingredients (24H, 12C, 11O, 8N and 2P) to replicate DNA at cell division.

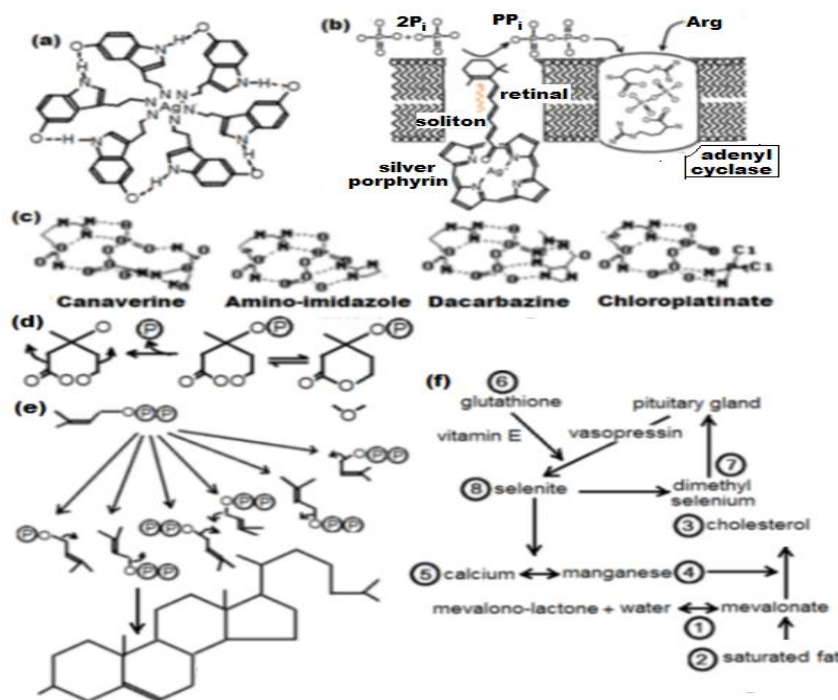


FIG. 8(a). Serotonin carries Ag^+ . (b) PP_i synthesis and PP_i -arginine transport. (c) Anti-cancer drugs mimic PP_i -arginine. (d) Mevalonate and its lactone transport water. (e) Surplus converted to cholesterol. (f) Blood-pressure controls.

Anti-cancer drugs mimic PP_i . Arg, before the advent of antibiotics, Ag was widely used in medicine, it might control resistant pathogens. In animal trials, Ag colloid was effective against cancers; they can develop when its deficient. Ag repairs tissues and sister hormone melatonin regulates sleep. Phosphate has independent roles in energetics, DNA synthesis and skeletal maintenance are independent.

14. Water Pumping

Peter Mitchell's chemiosmosis [32] presumes water diffuses freely through unit membranes, regards them as semi-permeable and proposes they equilibrate differences in osmotic pressure. Exchanging three sodium for two potassium ions maintains membrane potential. The active transport of water is essential. Mevalonate, residue of saturated fat breakdown, is named after the herb Valerian, it was formerly known as all heal. Water is transported by a tDNA exchanging mevalonate-5-phosphate for mevalono-lactone-5-phosphate.

The posterior pituitary gland packs hormones oxytocin and vasopressin with selenium. Vitamin E, α -tocopherol conveys energy as solitons, it oxidizes Se to SeO_3^- , carrier exchanging Ca^{++} for Mn^{++} . Mn is cofactor for enzymes converting mevalonate to cholesterol, essentially a byproduct of this process, it's feedstock for steroid hormone synthesis. Factors controlling blood pressure, FIG.8.

1. Inherited tDNA mutants
2. Saturated fat consumption
3. HLA and LPA cholesterol transporters
4. Manganese nutrition
5. Exercise affecting calcium levels
6. Sulphur competes with Se
7. Methyl mercury competes with dimethyl Se [33]
8. Se deficiency.

Sedimentary rocks incorporate Se from fossilized early life. Plate tectonic subduction introduced them to igneous deposits. Breast cancer distribution correlates with surface geology [34,35]. Drinking hard water from limestone and water percolating through volcanic rocks provides most Se. Sea floor manganese nodules may date from primordial life. Animal husbandry [36] evidences Se dependency; Se supplements prevent cattle getting hypertension in pregnancy, protect sheep grazing pasture treated with super-phosphate against white muscle disease and pigs en route to market succumbing to heart failure. European royal families' Se-rich diets may explain their longevity.

Pandemic Se deficiency explains deaths from heart attacks, strokes, cancers of tissues specializing in water pumping: breast, bowel, cervix and prostate and pre-eclampsia. Its causes include:

- Precipitation during water purification [37]
- Agriculture using Se-deficient soils
- High temperature food preparation and preservation [38]
- Insufficient dietary Se
- Foods rich in Se are expensive

precedents for intervention include: limes for scurvy, iodine for goiter, cod liver oil for rickets and fluoridation for dental caries. Supplementing Se promises to prevent the above-mentioned conditions.

15. Acknowledgements

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