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Original Research Article

**A CHANCE DISCOVERY SUGGESTS IMPROVEMENTS FOR PUBLIC HEALTH,
COMPUTERARCHITECTURE AND ENERGY GENERATION**

Michael T. Deans

*Flat 4, Cavendish House, Cavendish Road, Chiswick, London W4 3TD

Abstract: When a silica helium thermometer immersed in liquid nitrogen gave surprising readings, I proposed ice crystallizing on it had changed shape to accommodate water molecules' irregular shape. Now known as 'ice XIc', it formed on primordial Earth's poles, releasing latent energy as $\lambda \sim 4\mu$ infrared laser light. Polarized by multiple reflection, it photo-phosphorylated deoxynucleotides on tropical water surfaces, creating chiral DNA. 'Transport DNAs' created H-bond-lined pores through proto-cell membranes. Ice-light drove a ratchet mechanism feeding them with substrates. Life originated when tDNAs replicated, their descendants govern metabolism, proteins and enzyme catalysis evolved later, ~2,000/cell now complement barrels of α -helices. Deficiencies of the trace-elements they deploy as carriers explain common disorders. Hairpin proteins bind DNA, forming 'minions', they pack chromosomes, enable error-free replication and maintain sequence integrity. Their proton-ordered H-bond arrays oscillate constituting biological clocks, default settings store intellectual data. Replacing carbon chemistry with energetic simplifies science. Artificial intelligence modeled on minions would help diplomats forge agreements, scientist collaborate and select marriage partners. Organelles commensurate with λ mediate biological energy coupling, accounting for muscle contraction and photosynthesis. Minion tunnels accelerate protons, fusing with nuclei obstructing them and emitting γ -rays; using these to supply power might resolve climate change.

Keywords: Proton-ordered-H-bonds, Transport-DNAs, minions, resonance.

Introduction: New ideas arouse scepticism, they may be misunderstood and exploited for

For Correspondence:

michaeltddeans@gmail.com.

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nefarious purposes. Their implications should be explained to the public. My account of life's origins may reconcile religions, focus attention on social mores and peaceful coexistence. Advances in engineering, science and medicine have improved welfare, health and longevity but over-exploited resources, changed people's opportunities and polluted the environment.

My research offers simple ways to solve outstanding problems, public understanding need precede their implementation. Governments could encourage their adoption, possibly redirect defense expenditure to resolve climate change and humanitarian projects. Hopefully, scientists will understand, test and support my proposals. I acknowledge the contributions of predecessors from whose shoulders I have seen further. Nobody should be excluded from the benefits they promise.

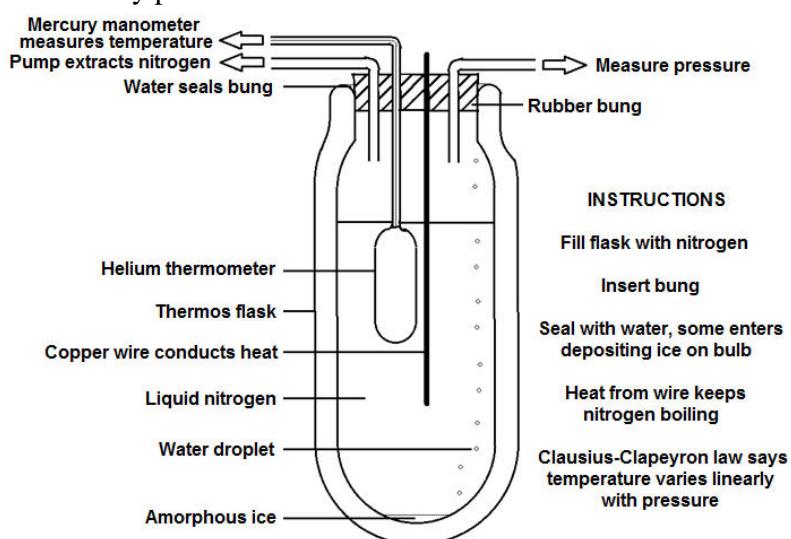


Figure 1. Basis for original proposal

Origin of life: During a primordial ice age, ice XIC crystallized in pools of liquid nitrogen on Earth's poles^{1,2,3}. Linus Pauling showed ice Ih retains entropy at 0 K⁴ but ice forms sixteen crystal types, that one is highly ordered is unsurprising. Temperature fluctuations drove its ferroelectric phase transition at 72 K releasing latent energy as ~4μinfrared laser light, ‘ice-light’, Figure 2. The transition accommodates the irregular tetrahedral shape of water molecules. Reflection by ice in clouds and on Earth’s surface like Marconi’s trans-Atlantic radio signals shone polarized laser light on Darwin’s warm tropical waters now known to have contained deoxyribonucleic acids⁵. Their phosphodiester bonds absorbed the radiation, polymerizing to form a *noodle soup* of DNA. The order of ice XIC, transmitted as laser light selected the molecules on which life depends.

Repeating my original observation: Records of the observations underlying my research were lost or destroyed, this diagram includes sufficient information replicate it. Pursuing laboratory records, supervisors, student witness or any other party 50 years later could cause offence. It’s based on falsifiable memory, ice XIC is reputed to crystallize extremely slowly, Figure 1.

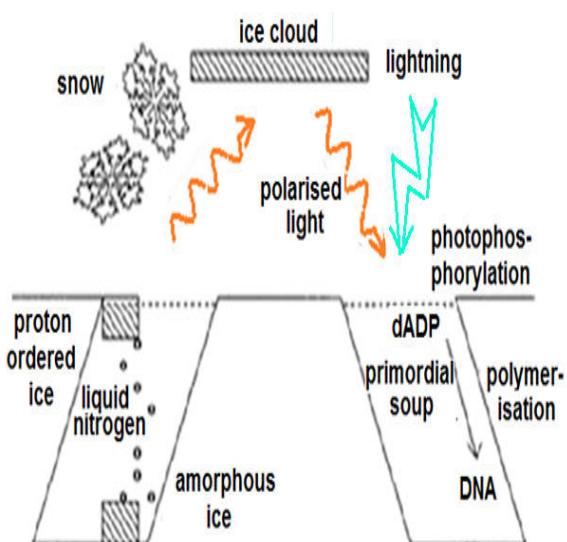


Figure 2. Origin of DNA

Transport DNA: The first bioactive molecules were ‘transport DNA’s, analogues of the transfer

RNAs involved in protein synthesis. They lined 'holes' through the membranes of the *coacervate* proto-cells Oparin proposed⁶ with orderly hydrogen bonds. Lightning charged the

coacervates, polarizing these H-bonds. Absorbed ice-light depolarized them, leaving a nett electric field which propelled carrier-substrate complexes through, Fig 3.

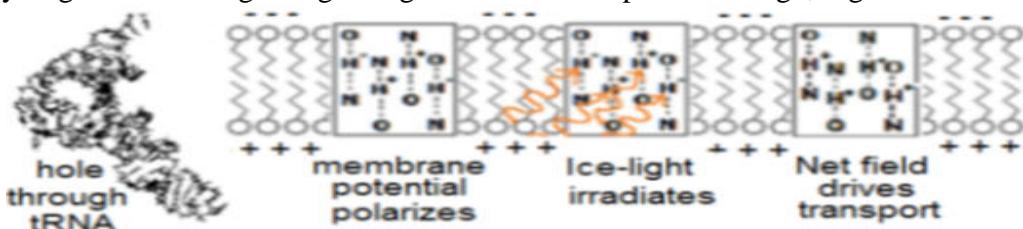


Figure 3. X-ray diffraction image of tRNA showing ‘hole’⁷ and ratchet pump mechanism

tDNAs and dDNAs effectively control metabolism, they evolved long before the synthesis of protein enzymes, establishing life's atomic alphabet, molecular vocabulary and metabolic grammar. They depend on carriers

incorporating trace elements often deficient in modern diets. Supplementing them prevents or treats most common mental and physical disorders. Table 1 shows those essential, toxic and not involved in life:

Table 1. Periodic table showing essential, toxic & unused elements

Concentrating life's molecular ingredients promoted chemical reactions. Most accounts of early life overlook the extreme dilution of chemicals in the *primordial soup*. Although evaporation forms pools of concentrated chemicals and the environment around sea-floor vents is rich in metabolites, their isolation and temporary existence make evolution there improbable. Polar ice Xlc could have radiated steadily for millions of years and DNA accumulated⁸ (it's stable in the prevailing aseptic conditions) until tDNAs emerged.

In modern life, ‘differentiation DNAs’ select tDNAs, analogous to messenger RNAs selecting transfer RNAs for protein synthesis. They control cell diet, complementing the much-studied ‘barrels of α -helices’. Adenylcyclase releases phosphodiester bond energy from ATP replacing ice-light. Alternate single/double bonds [$\text{---C}=\text{ C---C}=\text{ }]$ _ninvitamins A and E, retinal and α -tocopherol transfer energy for carrier synthesis as solitons⁹, Fig. 4:

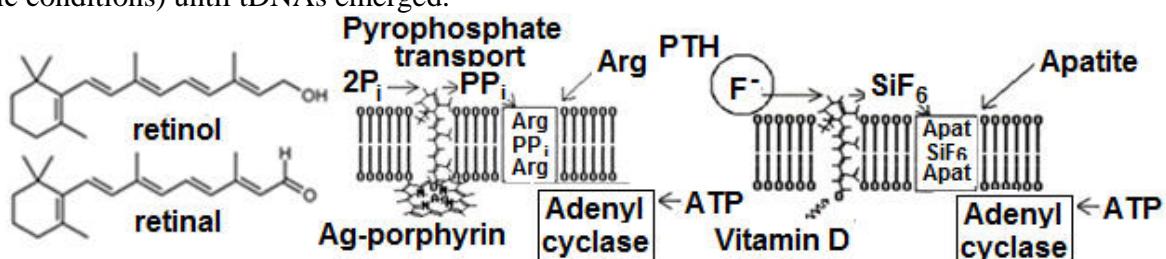


Figure 4 Retinal conducts solutions, transferring energy from silver porphyrin for pyrophosphate, PPi synthesis and from vitamin D to synthesize silicon hexafluoride.

Minions: Before ribosomes synthesized enzymes, proteins formed anti-parallel β -pleated sheet hairpins with alternate neutral/basic [A, L,

I | V / K | R] residues, P forming an asymmetric U-bend. They bound to uncoiled DNA retaining B-helical spacing and overlap, Fig 5:

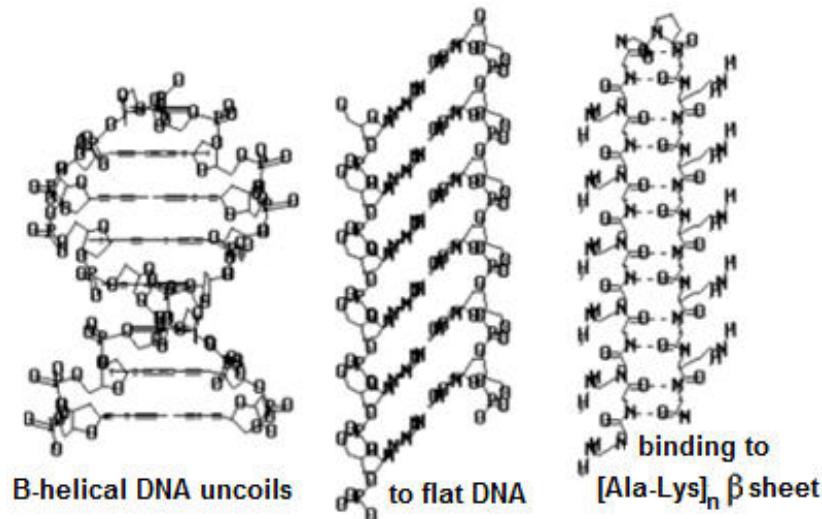


Figure 5. Uncoiled DNA binds to flat protein hairpins

Twenty-one units with nine base-pairs form a coil and nine coils complete a *minion*. Minions replicate 1,701 base pairs with minimal

uncoiling and recoiling, they pack DNA on chromosomes better than *nucleosome core particles*, Fig 6.

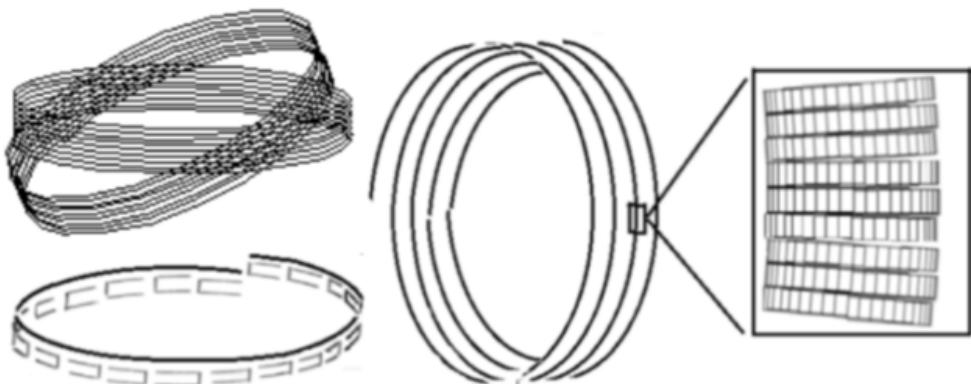


Fig 6. Minion replicates, 21-units form a coil, minions stack to form chromosome

The neutral [A, L, I and V] residues fit neatly against DNA bases C, G, A and T, mnemonic: A LIVe CiGAreTte, Figure 7:

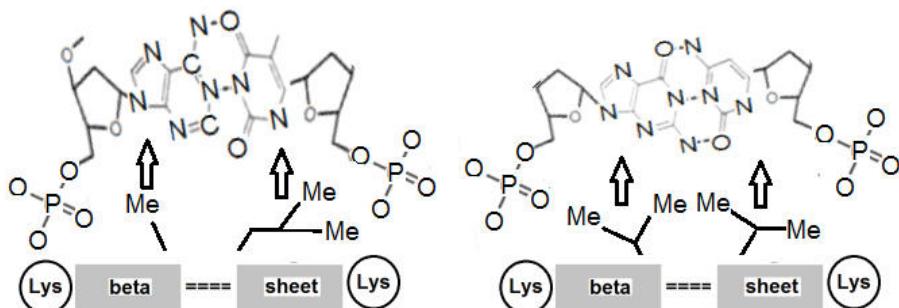


Fig. 7. Specific histone amino acids conserve key base sequences

18 x 189 arrays of proton ordered H-bonds connect the ω-amines of K or R residues with DNA phosphates, P_i flanking minions, Figure 8:

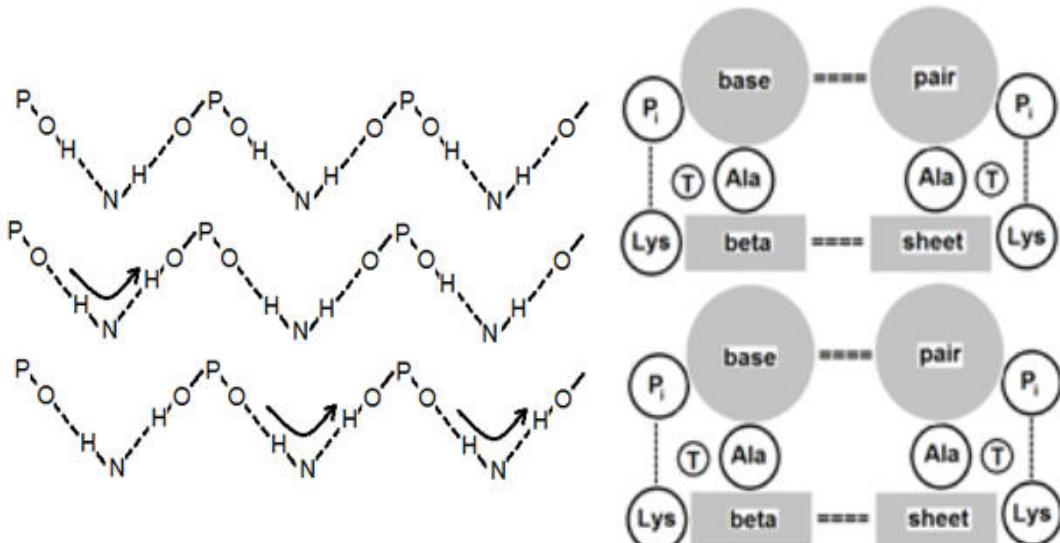


Fig.8. H-bond chains oscillate, end view of minion shows adjacent tunnels, T

Their oscillations constitute the hands of biological clocks. The time light takes to pass thrice around a coil determines their time unit: $\tau = 3 \times 189 \times 7.37 \times 10^{-10} / 3 \times 10^8 \approx 1.39$ fem to seconds [Equation 1]

where the 3 reflects Dekatron™ logic¹⁰, there are 189 base pairs per coil, 7.37 Å is β-sheet spacing, 3×10^8 the velocity of light and a fem to second = 10^{-15} sec.

Minions are coiled abacuses; they introduce wrap-around counting errors α and β, 1 in 63^{18} and 1 in 63^9 respectively. Used as ‘chip in the brain’, this creates relativity between perception and conception, accounting for the new physics stemming from Michelson and Morley’s measurement of the speed of light. The

compensating Tyger equation, named after Blake’s *what immortal hand or eye dare frame thy fearful symmetry?*¹¹ describes the boomerang-like trajectory light appears to follow, Figure 9:

$$\left. \begin{aligned} \frac{d^2\Theta}{dt^2} &= \frac{\pi\beta^2}{2\sqrt{e([1+\beta]^{t/\tau}+[1+\beta]^{-t/\tau})}} \\ \frac{d^2\Phi}{dt^2} &= \frac{\pi\beta^2}{2\sqrt{e([1+\beta]^{t/\tau}-[1+\beta]^{-t/\tau})}} \end{aligned} \right\}$$

Fig 9. Tyger equation uses polar coordinates Θ and Φ, $\beta = 63^9$ and e is the base of natural logarithms

Minions render plane surfaces spherical, nested shells of planes predict the periodicity of Mendeleev's table¹² better than s, p / π electron orbitals and —, =, ≡ / ⋯ chemical bonds. The carbon-nitrogen cycle converts carbon to nitrogen and helium. Protons accelerated along the tunnels, T have energy:

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

where proton mass, $p_m = 1.67 * 10^{-27} \text{ kg}$, sufficient to fuse with nuclei obstructing them. $^{12}\text{CO}_2$, $^{13}\text{CO}_2$, $^{14}\text{NO}_2$, $^{15}\text{NO}_2$, $^{12}\text{CH}_4$, $^{13}\text{CH}_4$, $^{14}\text{NH}_4$ and $^{15}\text{NH}_4$ recoil along the tunnels emitting γ-rays. Diffracted at source by DNA, they follow a boomerang-like trajectory, returning as from pulsars¹³ which have matching ½-lives and energies. Proton tunnels between H_2O and Pd crystals explain the cold fusion Fleischmann and Pons observed¹⁴, Figure 10:

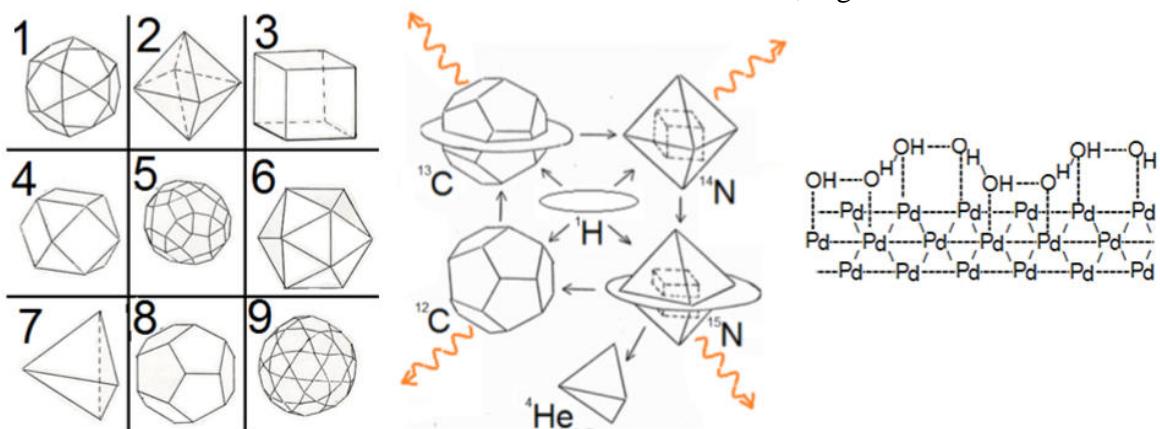


Fig 10. Nine plane combinations predict elements' nuclear structure and chemical properties.
Carbon-nitrogen cycle and cold fusion on palladium

Molecular scale nuclear fusion by tanks of bacteria would generate power cleanly if the γ-rays released could be trapped, resolving global warming.

Calculations: The coordinates of H_2O in ices Ic and XIc are:

$$\Delta x = \Delta y (b + h) \sin(\theta_a/2) = 2.26 \text{ Å}$$

and $b \sin(\theta_b/2) + h \sin(\theta_c/2) = 2.32 \text{ Å}$

$$\Delta z = (b + h) \cos(\theta_a/2) = 1.6 \text{ Å}$$

and $b \cos(\theta_b/2) + h \cos(\theta_c/2) = 1.5 \text{ Å}$

Energy released by ferroelectric transition:

$$E = \frac{\mu^2}{4\pi\epsilon_0 r^3} = \frac{(1)}{4\pi * 3.1}$$

$\Sigma E \approx 22.3 \text{ kJ/Mol}$, ~ ATP's $P_i \sim P_i$ energy, wavelength $\lambda = h * c * N / \Sigma E$:

$$\lambda = 6.63 * 10^{-34} * 3 * 10^8 * 6.02 * 10^{23} / 2.1$$

The discrepancy between this and the 4μ which makes many satisfactory correlations needs review¹⁵.

H-bond length	$h = 1.75 \text{ Å}$
OH-bond length	$b = 1.01 \text{ Å}$
Tetrahedral angle	$\theta_a = 104.5^\circ$
H-O-H bond angle	$\theta_b = 109.5^\circ$
Charge cloud	$\theta_c = 120^\circ$
Dipole moment	$\mu = 1.27 * 10^{-29} \text{ coulomb-m}$
Dielectric constant	$\epsilon = 3.1$
Space dielectric	$\epsilon_0 = 8.85 * 10^{-12}$
Planck's constant	$h = 6.63 * 10^{-34}$
Avogadro number	$N = 6.02 * 10^{23}$
Velocity of light	$c = 3 * 10^8 \text{ m/sec}$

Parameters

Minions as *chips in the brain*: Minions serve as *chips in the brain*, the default settings of the above-mentioned H-bond arrays on each minion coil stores one letter of an 18-character word, Table 2 lists their associated qualities. Their 64-character alphabet embraces our 26-character alphabet, the 10 arithmetic digits and 64 components of the I Ching¹⁶. The 1.8 million in any human cell nucleus could remember the Bible, Koran and Shakespeare's works. Minions

span 103 octaves, those in sense organs classify all inputs to 18 categories, their storage capacity exceeds that of *neural networks*. Memory recall involves resonance between minions within the same nucleus or connected with others by nerve fibers. Nerve fibers serve as optic cables, equivalent to optic cables. Synapses filter information, the brain regions underpinning the *neural network model* use different neurotransmitters.

Table 2. Qualities associated with minion coils

#	QUALITY	PERIOD	COLOUR	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 x base pairs	chemistry
-6	progress	22 n sec	violet	8.3 n gram	computer processing
-5	love	1.4 μ sec	bronze	0.033 p gram	biochemistry
-4	peace	87 μ sec	yellow	130 p gram	genetics
-3	beauty	5.5 m sec	pied	0.51 μ gram	biology
-2	truth	350 m sec	gold	2 m gram	engineering
-1	goodness	22 sacs	green	8.1 gram	psychology
+1	goodness	23 mins	green	32 k gram	psychiatry
+2	truth	1 day*	gold	130 ton	head hunting
+3	beauty	9 weeks	pied	0.5 M ton	sociology
+4	peace	11 y*	yellow	2000 M ton	politics
+5	love	685 y	bronze	8 G ton	history
+6	progress	43 k y	violet	31 P ton	archaeology
+7	stability	2.7 M y	blue	1.8 Moons	palaeontology
+8	justice	170 M y	silver	84 Earths	astronomy
+9	unity	11 B y ^{17*}	red	Sun	cosmology

each track represents a different quality, ± correspond to introvert and extravert personalities,
 $\text{periods} = 63^N \tau$,

those marked *are approximate. Colours feature in metaphors, masses are in ratio
 63^2 , m_e & m_p = *electron* & *proton* masses.
 Replacing M with $\mu = \sqrt{M}$ renders $E = Mc^2$ symmetric:

$E = \mu^2 c^2$, f, p, n, μ , m, k, M, G & P represent
 $10^{-15}, 10^{-12}, 10^{-9}, 10^{-6}, 10^{-3}, 10^3, 10^6, 10^9$ & 10^{15} .

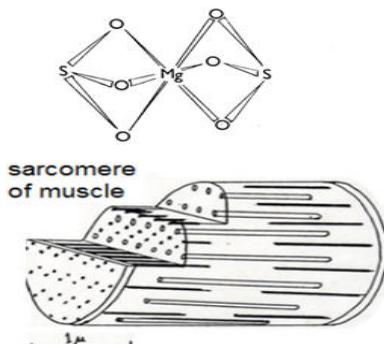
The minion's time, τ , Equation 1 determines the limits of perception, justifying Einstein's suspicion of quantum mechanics. New axioms explain gravitation and reinterpret cosmology, they render Einstein's relativity¹⁸. Heisenberg's uncertainty and Lemaître's big-bang cosmology¹⁹ obsolete. Modelling computers and data-bases on minions promises human-friendly AI satisfying Turing's criteria²⁰, such machines might enable diplomats to forge peace treaties, matchmakers to find better partners and scientists to resolve mysteries. The notion that

an infants' first breath burns a reference datum on its minions and determines their personality justifies astrology. Using particle accelerators, telescopes and rockets to find more fundamental particles and seek life elsewhere is costly. Substituting τ for Planck's constant²¹ resolves these dilemmas.

Table 3. Nine independent biological pathways

#	SYSTEM	TISSUE	CARRIER	SUBSTRATE	PATHOLOGY
1	motility	muscle	Ca ⁺⁺ Mg ⁺⁺	SO ₃ ⁼	spasticity
2	sensitivity	nerve	Na ⁺ K ⁺	catecholamines	depression
3	excretion	kidney	Mn ⁺⁺	salt	kidney failure
4	respiration	lung	I ⁻	O ₂ .H ₂ O	bipolar
5	metabolism	liver	Cu ⁺⁺	amino-acids	growth defects
6	rigidity	bone	SiF ₆ ⁼ AlF ₆ ⁼	apatite	Alzheimer's
7	assimilation	gut	Zn ⁺⁺	β -D-glucose	diabetes
8	reproduction	gonads	Ag ⁺ & arginine	pyrophosphate	cancer
9	water-pumping	heart	Mn ⁺⁺ & SeO ₃ ⁼	water	heart disease

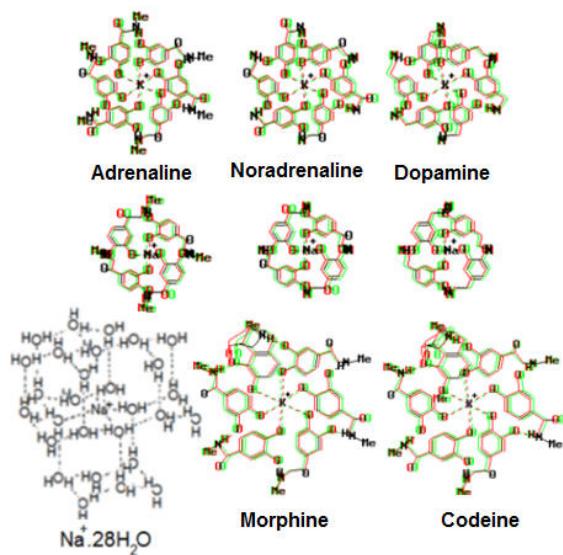
Motility: Retinal conducts energy as solutions, converting sulphur to sulphite, replacing Ca⁺⁺ with Mg⁺⁺, cofactor for kinase enzymes. Sarcomeres of muscle contract to form $\sim\frac{1}{2}\lambda$ resonant cavities for the $\lambda \sim 4\mu$ infrared released, efficiently converting chemical to mechanical energy, Figure 11. Huxley's model²² depends on cross-bridges making and breaking at random, sharing the inefficiency inherent in thermodynamic engines. Exchanging creatine for P-creatine replenishes ATP for sustained contraction.



Sensitivity: Catecholamines [nor]-adrenaline and dopamine form four- and six-member rings around Na⁺ and K⁺ ions; they exchange three Na⁺ for two K⁺ ions at synapses mediating pain transmission. Figure 12. The increase in cell sap

Trace element metabolism: The minion's nine-fold symmetry governs nine mutually independent biochemical pathways. Each involves a transport DNA, endocrine gland, carrier and substrate. Correct dietary trace elements can prevent the associated pathologies in Table 3:

viscosity when Na⁺ ions, having the same shape and size as H₂O, form hydrates slows metabolism. Since K⁺ ions bind less water, the exchange reduces viscosity and speeds reactions, the 'fight or flight' response. Substituting morphine creates larger rings which block tDNAs and prevent pain transmission. When more pumps are enrolled to compensate, pain sensitivity increases, explaining drug addiction.

**Fig 12. Catecholamines and morphinans form 4-/6-member rings around sodium/potassium ions and sodium hydrate**

Excretion: Manganese chlorides: $MnCl_3^-$, $MnCl_4^{2-}$ and $MnCl_6^{4-}$ complex with common salt. Hormones: aldosterone, angiotensin and rennin and pharmaceuticals: histamine and aspirin control its transport through renal membranes. Carbonic anhydrase catalyses the *chloride shift*, exchanging bicarbonate for chloride, CO_2 excretion controls pH:



Breathing exchanges CO_2 for O_2 which erythrocytes distribute bound to haemoglobin.

Respiration: Iodine incorporated to thyroxine in the thyroid glands is released at target tissues as iodonium, I^+ , carrier for $O_2 \cdot H_2O$. This process

serves to protect littoral seaweeds from tidal O_2 fluctuations; their purple and yellow colours reflect those of I^- and I^+ . The tDNA environment connects N_2 , O_2 and NO to nicotinamide and protons, fixing nitrogen, oxygenating the atmosphere²³ and controlling vasodilatation. The Haber process²⁴ is less efficient than bacterial N_2 fixation. HCN and CO are toxic, they block this tDNA. Mutant tDNAs account for bipolar disorder by disrupting nerve cell oxygenation; excess and deficient O_2 cause mania and depression respectively. Li^+ is diagonally related to I^+ in the periodic table, its substitution regulates O_2 supply, Figure 13.

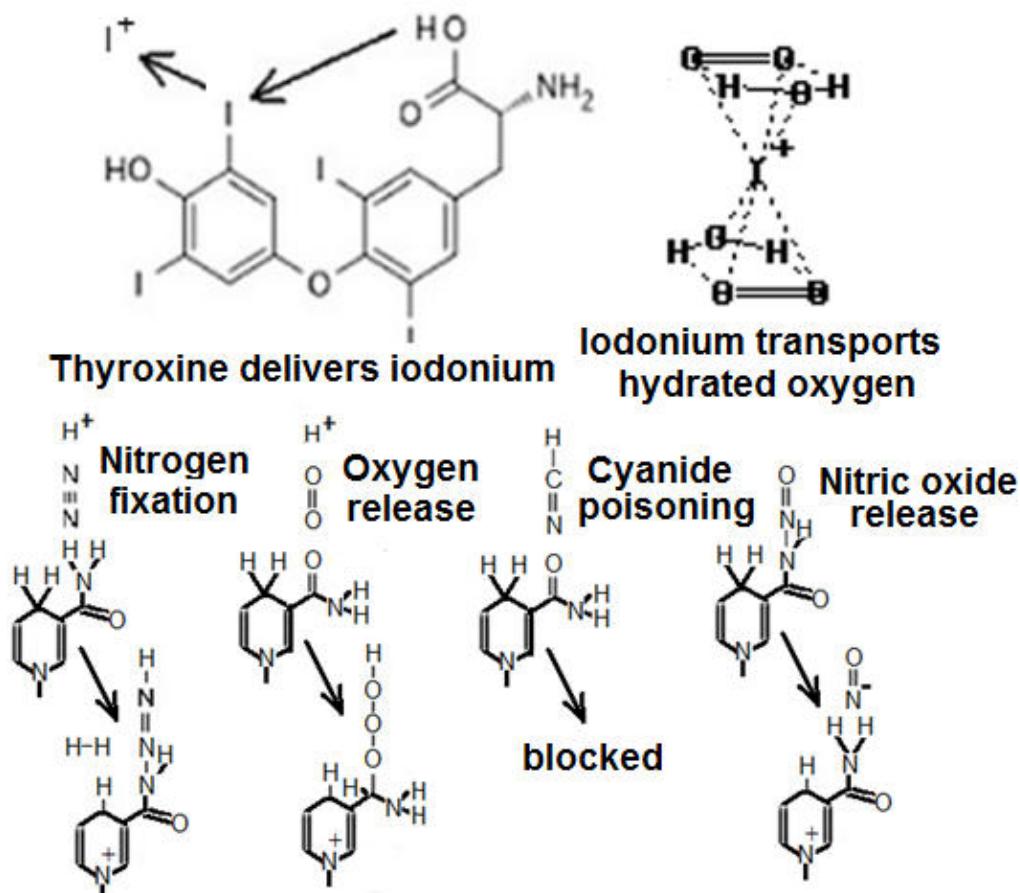


Fig 13. Thyroxine, O_2 transport, N_2 fixation, O_2 release, HCN poisoning & NO release

Metabolism: Cu⁺⁺ has a high affinity for peptide bonds, *c.f.* the Biuret test. tRNAs transfer amino acid-Cu⁺⁺ complexes through the endoplasmic reticulum membrane for protein synthesis just as tDNAs transport substrates through cell membranes. A hormone cascade controls it: hypothalamic hormones stimulate anterior pituitary growth hormone release, they distribute Cu which stimulates endocrine glands and endocrine hormones promote protein synthesis. Gigantism, dwarfism and acromegaly signify its failure. ‘Differentiation DNAs’ control the intra-cellular substrates available for metabolism by coordinating tDNAs, analogous to mRNAs selecting tRNAs for protein synthesis. At cell division, tDNAs feeding from gastrula and blastula are nutrient-starved and overheat. Guanyl- replaces adenyl-cyclase and synthesizes ‘hook proteins’; they pair, binding daughter cells together, explaining tissue morphology. 1-hook leucocytes neutralize any 6-hook cells preventing tumour and cancer growth, Figure 14. Cu-coil contraceptives inhibit sperm glucose uptake, preventing them reaching ova.

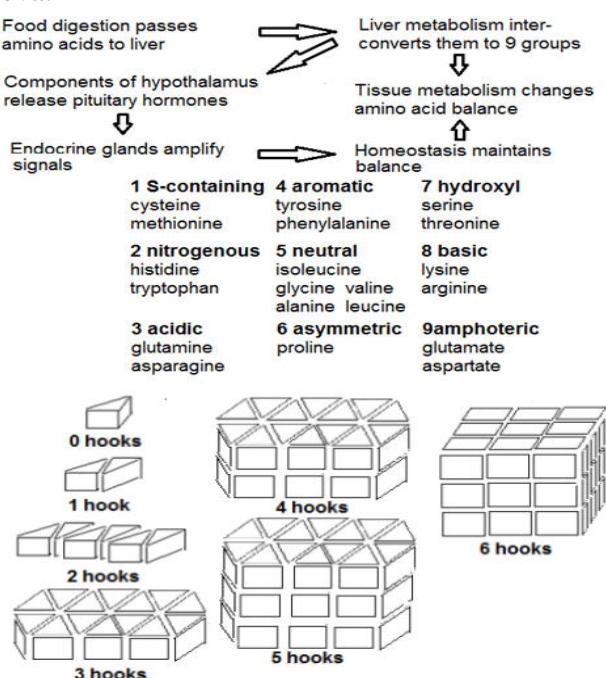


Fig 14. Liver equilibrates amino acids, they form nine groups and hook proteins

Rigidity: Parathyroid hormone is continuously released, preventing toxic F⁻ accumulation. Sunbathing stores ~265 nm UV matching Si ~ F bond energy in vitamin D, Figure 4:

$\text{SiO}_2 + 6 \text{F}^- + 4 \text{H}^+ + \text{UV-light} \rightarrow \text{SiF}_6^- + 2 \text{H}_2\text{O}$, a pH-sensitive reaction. SiF₆⁻ carries Ca₁₀(PO₄)₆(OH/F)₂ maintaining bones and teeth. Acidity due to kidney failure or menopause cause osteoporosis. A parallel process forms plants’ SiO₂ skeletons; acid air pollution causes leaf-fall. Liming soils proved ineffective, discouraging diesel regulation. SO_x/NO_x pollution²⁵ allows SiF₆⁻ synthesis in the nasal fossa; olfactory nerves take it to the brain. Its breakdown yields: alumino-silicate plaques, F⁻ inhibits Krebs cycle causing cell death and disrupts protein folding creating β-amyloid and τ-protein tangles; explaining Alzheimer’s Disease²⁶. Mutant tRNAs substitute amino acids creating similar tangles in Prion diseases²⁷; embedded tRNAs render them infectious. Fluorinated anaesthetics promote renal AlF₆⁻ excretion, simultaneous clearance of F⁻ from the brain temporarily relieves dementia symptoms. Controlling acid air pollution or a pharmaceutical delivering F⁻ to the brain might manage dementia.

Assimilation: Zn⁺⁺ binds to the triangle of sweetness²⁸, Figure 15, anticipating, tasting or smelling food promotes pancreatic β-cell insulin secretion, distributing Zn⁺⁺, carrier for β-D glucose. Biological fluid sugar concentrations

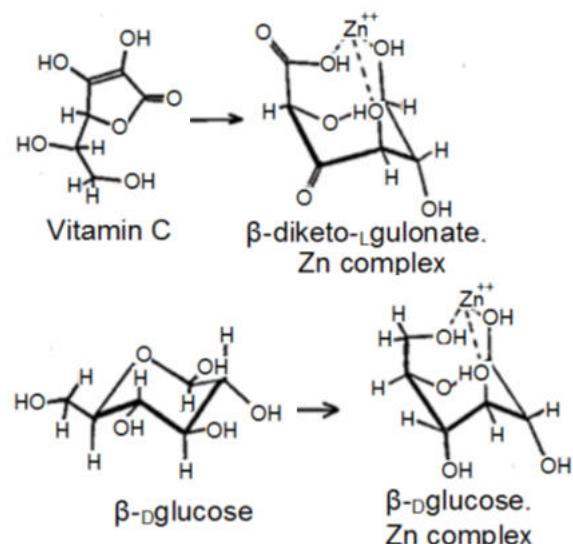


Fig 15. Zinc binds vitamin C metabolite gulonate and glucose

are maintained. Pancreatic α -cells distributing glucagon disables glucose transport and recycles Zn. Vitamin C derivative L-gulonate takes Zn where insulin can't reach²⁹. Zn incorporates OH-P to collagen, vitamin C deficiency, causing scurvy; the ZnS in Calamine™ lotion performs the same function. Glucose transport defects cause diabetes; Zn accumulation in diabetics' eyes causes blindness; they often suffer kidney and foot problems. An implanted Zn monitor linked to an artificial pancreas might manage diabetes.

Appetizers and aphrodisiacs deliver Zn; anorexia and bulimia respond to Zn supplements. When adult haemoglobin replaces foetal, Zn conjugates glucose to bilirubin for excretion, preventing the seizures bilirubin causes if it reaches the brain. Zn in colostrum³⁰ or sucking a midwife's pewter spoon were effective remedies before irradiation with blue light was introduced. The vitamin C supplements Pauling advocated ensure Zn

blocks nasal tDNAs, preventing rhinovirus import. Zn is cofactor for alcohol dehydrogenase, alcohol consumption diverts it to the liver and reduced Zn supply to the brain causes inebriety; alcoholism could be better managed. Glucose is stored in the liver as glycogen, in leaves as starch and its conversion to fat can cause obesity; Zn may be key to countering food addiction.

Reproduction

The pineal gland distributes Ag in 6-member rings, Figure 15, *c.f.* Figure 12. Retinal transfers solitons from pink silver porphyrin³¹, converting P_i to PP_i , Figure 4. The PP_i .Arg complex, mimicked by anti-cancer drugs, provides the atomic ingredients for DNA replication at cell division. Ag repairs tissues and regulates sleep; deficiency allows cancers to develop. Ag colloids were widely used in medicine before antibiotics were introduced. Phosphate's roles in energetics, DNA synthesis and skeletal maintenance are independent.

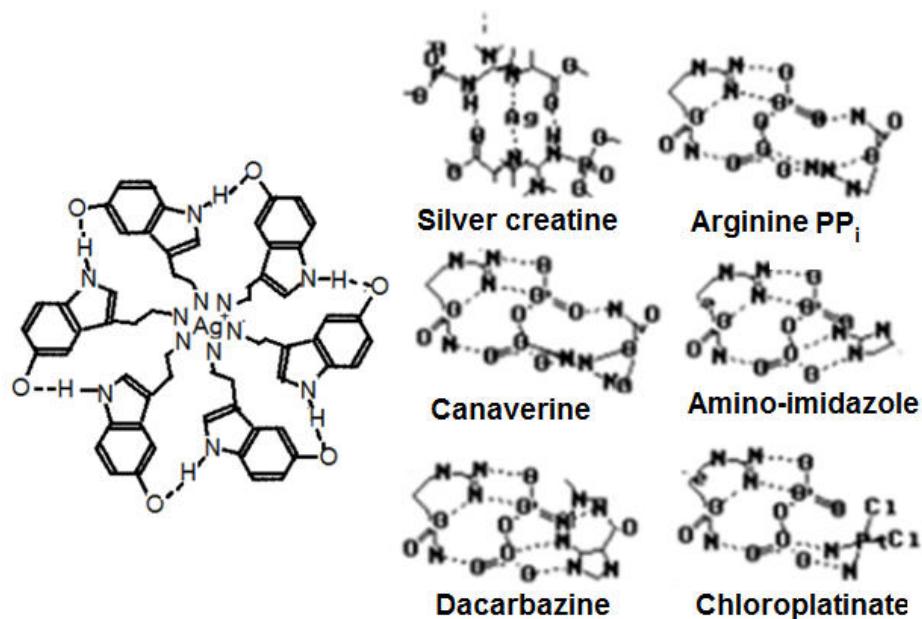


Fig 15. Serotonin carries silver and anti-cancer drugs

Water-pumping: Mitchell's chemiosmotic theory³² suggested membrane potential prevents water diffusing through unit membranes. Saturated fat breakdown yields mevalonate;

exchanging P-mevalonate for P-mevalonolactone transports water, Figure 16. Posterior pituitary hormones oxytocin and vasopressin distribute Se. Vitamin E, α -

tocopherol transfers solitons, oxidizing Se to SeO_3^{2-} which exchanges Ca^{++} for Mn^{++} , cofactor for converting mevalonate to cholesterol. Se deficiency causes most Western morbidity: water purification removes trace elements³³, S in superphosphate fertilizers competes with Se, low-Se soils yield Se-deficient foods, using high temperatures for food preparation and preservation³⁴ releases H_2Se , and Se-rich foods are expensive.

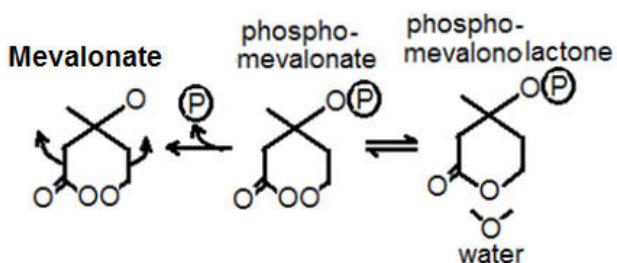


Fig.16. Phospo-mevalonate transports

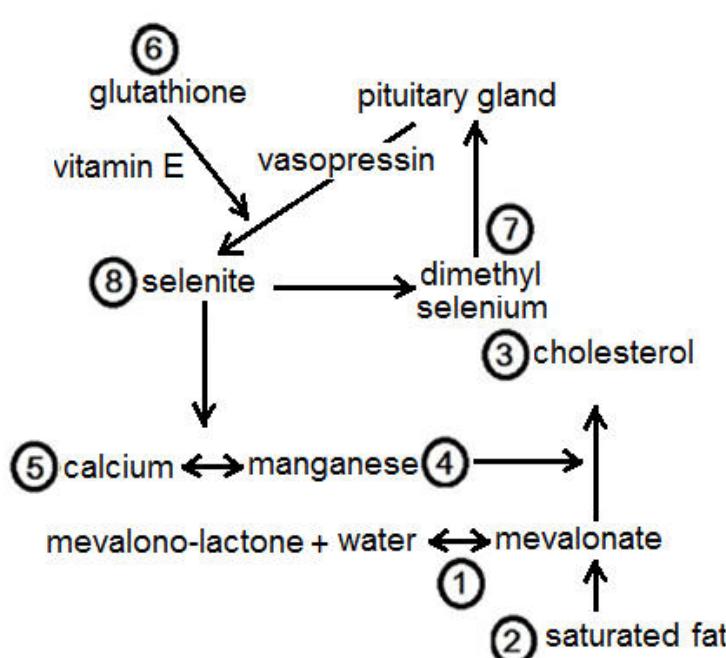


Fig 17. Controls on blood pressure

Blood pressure controls include:

1. tDNA genetics
2. Saturated fat consumption
3. Lipids transporting cholesterol
4. Mn nutrition
5. Exercise and Ca levels
6. S metabolism
7. HgMe^+ competing with SeMe_2^{+35}
8. Se and vitamin E nutrition.

Early Se-dependent life left sea-floor deposits, e.g. Mn-nodules, limestone contains their fossilized remains, plate tectonic subduction introduced Se to volcanic magma.

'Hard' water supplies from sedimentary or igneous rocks contain more Se than 'soft' water. Surface geology correlates with breast cancer

incidence. Se supplements in animal husbandry³⁶ prevent hypertension in pregnant cattle, protect sheep grazing super-phosphate treated pasture against swayback and pigs suffering heart failure. Royal families' Se-rich diets explain their longevity. Se deficiency explains deaths from pre-eclampsia, heart attacks, strokes and cancers of tissues specializing in water pumping: breast, bowel, cervix and prostate^{37,38}. Selenium supplements could prolong life, precedents include: limes for scurvy, I for goitre, cod liver oil for rickets and fluoridation for tooth decay.

Discussion

The Delphic injunction *Know thyself* has profound significance. The *minion* model of

brain function makes it easier to do that. Self-knowledge facilitates career choice, understanding others and knowing how best to help them. Vitamin C supplements prevented scurvy, fluorinated water supplies have reduced children's dental caries. Adequate selenium would prevent heart attacks, strokes and cancers of breast, colon, prostate and cervix. Reducing acid air pollution (SO_x/NO_x) could tackle Alzheimer's dementia. Attention to the zinc controlling carbohydrate metabolism promises to address diabetes, eating disorders, obesity and alcoholism. Less polluting energy generation could resolve climate change. The ideas arising from my observation as a 19-year-old student at Churchill College Cambridge in 1967 have relevance today. They're explained in my book SCIENCE UNCOILED, Melrose Press, available in English and Chinese translation with a list of difficult words you can check in Wikipedia and on my website: www.scienceuncoiled.co.uk, where you'll also find my 1988 PhD thesis *Some biochemical consequences of a consistent framework for the origin of life*. If there's anything you can't understand, ask someone you know to try to help before emailing me: michaeldeans@gmail.com. I'll reply as soon as possible or refer you to a set of answers to frequently asked questions. I wish all my readers a long, peaceful, happy life.

Acknowledgements: This is all my own work but during the fifty years it's taken to put it together, I've read many books and learned articles. People I've consulted have sometimes pointed out inconsistencies and suggested things I haven't included. As Isaac Newton is supposed to have said, *I have stood on the shoulders of giants* and seen further. Only the X-ray-diffraction image of tRNA needs copyright permission – it could be excluded if that's a problem. There are lots of famous scientists I haven't cited. My heroes were Charles Darwin, Michael Faraday and Linus Pauling. My parents, schoolteachers, tutors and friends have helped. I

intend producing new editions and writing another book, PEACE BUILDING.

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