

Programming of Life and its Prerequisites

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Topics for This Presentation

Review cell's computers & computer programs

Computer, coding systems, & algorithmic requirements

Undirected naturalism's answered information questions

Required properties of nature's constants & natural laws

Life's required component's properties probabilities

Naturalistic problems with the observed fine-tuning

What is A Computer?

Necessary and sufficient requirements for a functional computer (mechanical, electronic, or biological) are:

- Input (or embedded data)
- Memory and internal data transfer
- An instantiated algorithm (program)
- Processing capability
- Capability to produce meaningful output

The Atanasoff-Berry (first electronic) Computer Couldn't be reprogrammed and had no branching instructions

Electronic and biological computers have multiple components

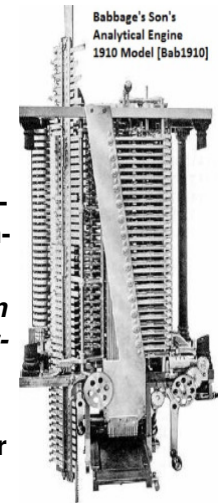
- DNA/RNA can store program instructions to be executed
- Proteins can be processing and communication components
- Proteins and cellular controls are examples of output

Life as Computer System? Mechanical computer designed 1837

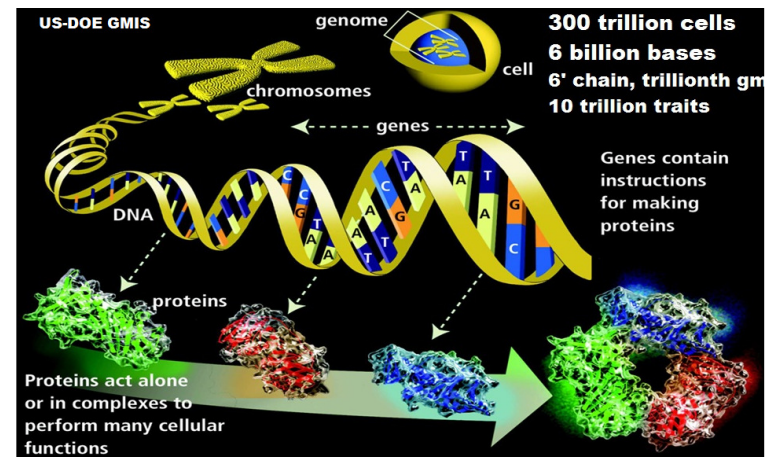
"The machine code of the genes is uncannily computer-like. Apart from differences in jargon, the pages of a molecular biology journal might be interchanged with those of a computer engineering journal." Dawkins River Out of Eden, p17

"Human DNA is like a computer program but far, far more advanced than any software we've ever created." Bill Gates, The Road Ahead, p.228.

"Life is basically the result of an information process, a software process. Our genetic code is our software." Craig Venter, 2010 Guardian interview.



Simplified Genetic Code for Protein Construction



Simplified View of Life's Incredible Complexity

25,000 genes (many overlapping to produce >100,000 proteins)

“A single gene can potentially code for tens of thousands of different proteins... It's the way in which genes are switched on and off, though, that has turned out to be really mind-boggling, with layer after layer of complexity emerging” Le Page, "Genome at 10," New Scientist, 6/16/10.

Genome: Digital (base 4) self-correcting encoded information

Group of 3 1-of-4 bases (ACGT) : 4^3 (= 64) possible codons

20 amino acids for proteins redundantly codon-specified

Information in 1 teaspoon of DNA: all people + all books

Information density is 1.88×10^{21} bits/cm³

Even "simplest" organism's DNA has >150,000 nucleotides

DNA, proteins, etc. must be fully-formed/functional

>2000 enzyme proteins enable reactions

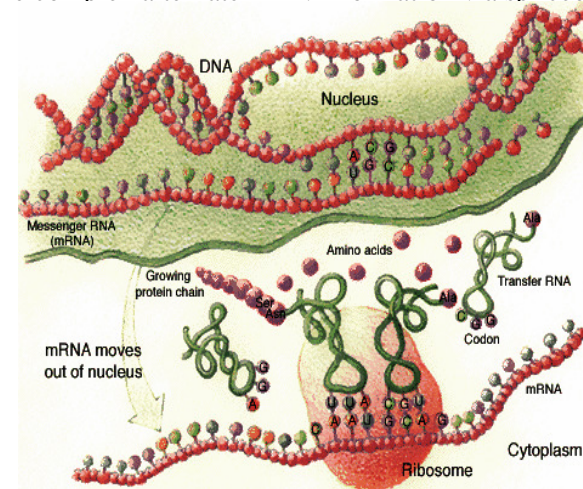
Slowest non-enzymatic reaction would take a trillion yrs

Information Systems in Life

- Genetic system is a preexisting operating system
- Specific genetic program set (genome) is application
- Native language has codon-based encryption system
- Enzyme-based computers (with own OS) read codes
- Enzyme's output is to another OS in a ribosome
- Codes are decrypted and output to tRNA computers
- Codon-specified amino acid is transported to protein construction site
- In each cell, there are multiple OSs, multiple programming languages, encoding/decoding hardware and software, specialized communications systems, error detection/correction mechanisms, specialized input/output channels for cell component control and feedback, and variety of specialized “devices” to accomplish the tasks of life.

Simplified DNA Transcription/Translation Process

(more complex alternate mRNA formation via spliceosomes)



Algorithmic Prescriptive Information (PI) in Life

DNA gene sequences are real computer programs

Chance & law can't explain decision nodes (choice)

PI is intrinsically formal, but implemented physically

Abel, "The Biosemiosis of Prescriptive Information," *Semiotica*:174-1, 2009, p1-19

A nucleotide can be in multiple prescriptions

“No rational scientific basis exists for blindly believing in a relentless uphill push by mere physicality toward formal algorithmic optimization”

Abel & Trevors, "Self-Organization vs Self-Ordering events in Life-Origin Models," *Physics of Life Rev*:3, 2006, p211-228.

“The Origin-of-Life Prize® ... will be awarded for proposing a highly plausible natural-process mechanism for the spontaneous rise of genetic instructions in nature sufficient to give rise to life.”

Problems not Usually Considered

Biosemiotics: Arbitrary cybernetic sign-system

Information transfer from protein to RNA is impossible
(20 to 64 symbols exceeds Shannon channel capacity)

Life's initial alphabet was at least that of codon alphabet

Harmful mutations limit life's existence

current 60 per newborn human -- extinction in <10ky

Fitness declines by 1-2% per generation (1995 J. Theo.

Biol. Paper title: "Why have we not died 100 times over?")

>300 generations would cause certain extinction!

Each mutation causes a guaranteed net information loss
in the genome (DNA), changing the prescriptive program

Information Increase Moving up Tree

- The simplest life has only 267,000 information bits
- Human DNA has over 6 billion information bits
- Based on functional information, simplest life is $10^{300,000,000}$ more probable than man
- No mechanism to produce ANY net info increase
New functionality offset by functionality loss, e.g.--
Single mutation causes sickle cell anemia
Nylon-eating bacteria: frame-shift/plasmid transpose
- "We must concede there are presently no detailed Darwinian accounts of the evolution of any biochemical or cellular system, only a variety of wishful speculations" Harold, *The Way of the Cell*, 2001, p205.

Neo-Darwinian Biology: Random mutation/Selection

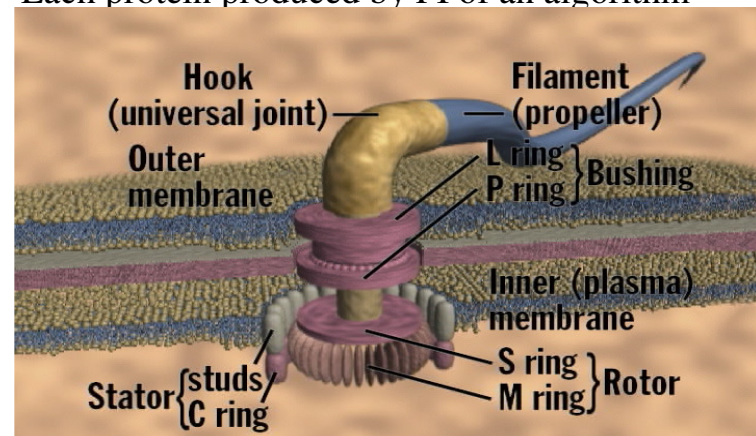
Richard Dawkins: "Each nucleus ... contains a digitally coded database larger, in information content, than all thirty volumes of the Encyclopedia Britannica." "Each successive change in the gradual evolutionary process was simple enough, relative to its predecessor, to have arisen by chance... Even if the evidence did not favour it [evolution by natural selection], it would still be the best theory available!" "Mutation is not an increase in true information content, rather the reverse." *Climbing Mount Improbable, Blind Watchmaker, Information Challenge*

"The failure to observe even one mutation that adds information is more than just a failure to support the theory. It is evidence against the ... neo-Darwinian theory." *Spector, Not By Chance, p160*

Bacterial Flagellum: Irreducibly Complex

48+ proteins (>30 unique): <1 in $10^{5,250}$ probability

Each protein produced by PI of an algorithm



Darwinism Doubted by Thousands of Scientists

“The complexity of biology has seemed to grow by orders of magnitude... Biology’s new glimpse at a universe of non-coding DNA — what used to be called ‘junk’ DNA — has been fascinating and befuddling... the signaling information in cells is organized through networks of information... It’s infinitely more complex.” Erika Hayden, “Life is Complicated,” *Nature*, 4/10, p664-667

“Natural selection is not a mechanism, it's the process by which the results of evolution are sorted.” Bruce Runnegar, p188 of *The Altenberg 16: An Exposé of the Evolution Industry*, 2010 (Mazur)

“Stunningly, information has been shown not to increase in the coding regions of DNA with evolution. Mutations do not produce increased information... the amount of coding in DNA actually decreases with evolution” [Abel, “The GS (genetic selection) Principle,” *Frontiers in Bioscience* . 1/1/09, p2959-2969]

Science Needs to Provide Plausible Mechanisms to Explain **How did nature:**
write the prescriptive programs needed to organize life’s metabolism?
formally solve life’s other complex problems and write the programs?
develop the operating systems and programming languages?
develop the arbitrary protocols for communication and coordination among the thousands (or millions) of computers in each cell?
develop alternative generation of prescriptive messages using techniques such as overlapping genes, messages within messages, multi-level encryption, and consolidation of dispersed messages?
defy computer science principles by avoiding software engineering’s top-down approach required for complex programming systems?
produce complex functional programs without planning by randomly modifying existing algorithms?
simultaneously modify multiple such programs to result in the production of irreducibly complex structures?
(from “Programming of Life” -- www.djpol.info)

Evolution via Natural Genetic Engineering

“Molecular cell biology has revealed a dense structure of information-processing networks ...The natural genetic engineering functions that mediate genome restructuring are activated by multiple stimuli...One of the traditional objections to Darwinian gradualism has been that it is too slow and indeterminate a process to account for natural adaptations, even allowing for long periods of random mutation and selection ... natural genetic engineering ... employs a **combinatorial search process** based upon DNA modules that already possess functionality ... Such a **cognitive component** is absent from conventional evolutionary theory because 19th and 20th century evolutionists were not sufficiently knowledgeable about cellular response and **control networks.**” James Shapiro, “Mobile DNA and evolution in the 21st century,” *Mobile DNA* 1/25/10 (Book: *Evolution: A View from the 21st Century*)

Defeating Creationism in the Courtroom, But Not in the Classroom Berkman & Plutzer, 1/28/11 *Science*. P404-405

Only “28% of all biology teachers consistently implement the major recommendations and conclusions of the National Research Council”
Recommended fix is for those “who cannot accept evolution as a matter of faith to pursue other careers.”
Their plan “would reduce the supply of teachers who are especially attractive to the most conservative school districts.”
Such statements destroy the credibility of science.
Science evaluates evidence (not dogmatic doctrine)

Evolution and Religion

- Evolution is “a full-fledged alternative to Christianity... Evolution is a religion. This was true of evolution in the beginning, and it is true of evolution still today.” Michael Ruse, “Saving Darwinism from the Darwinians,” National Post, 5/13/00
- Supreme Court (1961) held “Among religions in this country which do not teach what would generally be considered a belief in the existence of God are ... Secular Humanism.”
- “Atheism is religion, and the group... was religious in nature even though it expressly rejects a belief in a supreme being.” (2005 Appellate decision)

Fine-Tuned Nature of the Universe

- Physical constants for weak and strong nuclear forces, electromagnetic and gravitational forces, ratios of forces and electron/proton masses, and properties of neutrons are all critical, as are the expansion rate, mass, and density of the universe
- Earth’s orbit, tilt, rotation, magnetic field, atmosphere, and composition are life-critical
- Concerning the constants of physics: “The remarkable fact is that the values of these numbers seem to have been very finely adjusted to make possible the development of life.” Stephen Hawking, *A Brief History of Time*, 1988

Mass/Energy Origin Is Unknown to Science

Oscillating Universe violates: 2nd law & expansion

Quantum fluctuation of undetectable vacuum energy

>10⁵⁰⁰ Colliding unseeable “Universes” with 10+ dimensioned “Strings” collapse to our 3 space + time

“Infinite” energy being(s) convert energy to mass or otherwise supernaturally create universe’s 3 X 10⁵⁵ g or 3 X 10⁶⁸ joules of mass/ energy

ALL 4 have unprovable/unverifiable/unfalsifiable assumptions not bound by known science

All are philosophical or theological beliefs

It is no more scientific to believe a natural scenario than to believe a supernatural one since known science cannot account for the origin.

Most violate conservation of mass/energy and/or increasing entropy

Universe is “fine-tuned” to allow for life

- “An accuracy of one part in 10^{123} ...the precision needed to set the universe on its course.” Penrose in *The Emperor’s New Mind*, p.344
- “There is for me powerful evidence that there is something going on behind it all.... It seems as though somebody has fine-tuned nature’s numbers to make the Universe.... The impression of design is overwhelming.” Paul Davies, *The Cosmic Blueprint: New Discoveries in Nature’s Creative Ability To Order the Universe*, 1988, p203
- “A common sense interpretation of the facts suggests that a superintellect has monkeyed with the physics”
[F. Hoyle, “The Universe: Past and Present Reflections,” *Engineering and Science*, 11/81U, p8-12]

More Fine-Tuning Quotes

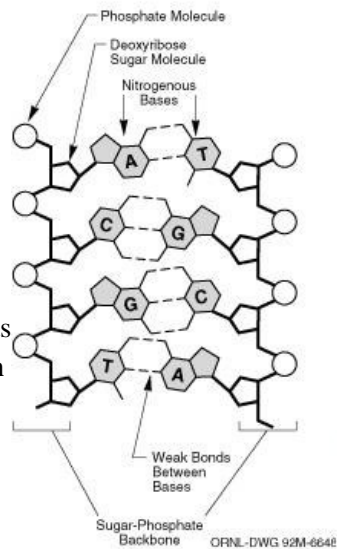
- “If we nudge one of these constants just a few percent in one direction, stars burn out within a million years of their formation, and there is no time for evolution. If we nudge it a few percent in the other direction, then no elements heavier than helium form. No carbon, no life. Not even any chemistry. No complexity at all.” David Deutsch, Interviewed on The Science Show: The Anthropic Universe, 2/18/06.
- “The really amazing thing is not that life on Earth is balanced on a knife-edge, but that the entire universe is balanced on a knife-edge, and would be total chaos if any of the natural ‘constants’ were off even slightly... even if you dismiss man as a chance happening, the fact remains that the universe seems unreasonably suited to the existence of life -- almost contrived -- you might say a ‘put-up job.’” Paul Davies, Wiki-Quote, <http://en.wikiquote.org/wiki/Darwinism>

Amazing Chemicals of Life

DNA backbone encodes the genetic prescriptive instructions used in the development and functioning of all known living organisms

Life’s main elements: Hydrogen (H, 59%), Oxygen (O, 24%), Carbon (C, 11%), and Nitrogen (N, 4%), with 2% other elements

Carbon’s bonds are stable enough to withstand harmful chemical and physical assaults, yet not so strong so as to prevent many different kinds of reactions.



Infinite Universes Problems: “The Grand Design”

Describes how miraculous it is that the laws of physics allow for a Universe that is hospitable for life, in which the Universe has an excess of matter over antimatter and galaxies with stars (& planets) that last billions of years, “explained using “M-theory”

“Besides the absence of any compelling experimental evidence for M-theory, there is another difficulty — its predictions are far from unique. There are 10^{500} different ways to curl up the extra seven dimensions and hide them, and how they curl up determines the fundamental constants and what we four dimensional creatures see as the laws of physics.” [M. Turner, “Hawking’s: No miracle in the multiverse,” Nature, 10/7/10, p657-658]

Hydrogen and Oxygen

Hydrogen is wouldn’t exist if the strong nuclear force constant were larger, and if that constant were smaller, hydrogen would be the only element in the Universe.

“Water’s life-giving properties exist on a knife-edge. It turns out that life as we know it relies on a fortuitous, but incredibly delicate, balance of quantum forces.

Water is one of the planet’s weirdest liquids, and many of its most bizarre features make it life-giving” [Grossman, “Water’s Quantum Weirdness Makes Life Possible,” New Scientist, 10/25/11]

Ice is less dense than liquid water

Water’s heat of vaporization regulates temperatures

Water’s high surface tension permits capillary action to plant tops

Water also plays important roles in geological structures formation

Predict H₂O “should” boil at -100° C, not the observed +100°

Element Formation by nuclear fusion

Two helium-4 nuclei can form a beryllium-8 nucleus

A ${}^4\text{He}$ and ${}^8\text{Be}$ can form ${}^{12}\text{C}$

A ${}^{12}\text{C}$ and a ${}^4\text{He}$ can form a ${}^{16}\text{O}$

The half-life of ${}^8\text{Be}$ 10^{-15} seconds, making ${}^{12}\text{C}$ formation “almost” a three-body collision. If ${}^8\text{Be}$ were less stable, nothing higher (e.g. ${}^{12}\text{C}$) would form, and if it were more stable, production of higher chemicals would proceed so rapidly that no life-required chemicals would remain.

If nuclear energy ratio of ${}^{12}\text{C}$ to ${}^{16}\text{O}$ were larger, there would be insufficient oxygen, and if smaller, insufficient carbon.

The Uniqueness of Earth

A list of probabilities that any planet within the Universe will possess the specific features within the appropriate range to support bacterial life for 90 days or less is based on a study of >650 astronomical/astrophysical research papers. The probability for occurrence of all 501 parameters occurring on one planet is 10^{-311} . Long-term simple life and intelligent life have much lower probabilities. [H. Ross, “RTB Design Compendium (2009),” Part 3 [http://www.reasons.org/files/compendium/compendium_Part3_ver2 .pdf](http://www.reasons.org/files/compendium/compendium_Part3_ver2.pdf)]

Natural Science Probabilities of Life

Law of Probability allows a maximum probability of forming-

- a typical functional protein^a: 1 part in 10^{175}
- the required enzymes for life^b: 1 part in $10^{40,000}$
- a living, self-replicating cell^c: 1 in $10^{340,000,000}$

^aThaxton, Bradley, & Olsen, *The Mystery of Life's Origin*, 1992

^bFred Hoyle, *The Intelligent Universe* pp. 16-17, 1983

^cHarold Morowitz, *Energy Flow in Biology*, p. 99

Equivalent to winning each (once is 1 in 41,416,353) CA Superlotto for: ^a23 times, ^b50 years, ^c125 million years

Life is unfathomably complex: “Functionally effective proteins have a vanishingly small chance of arising spontaneously in a prebiotic environment.” Jimenez-Montano, “Applications of Hyper Genetic Code to Bioinformatics”, *J. Biol. Sys.* (12) pp5-20, 2004

Summary

Life has the necessary & sufficient computer requirements
Life is incredibly complex & information rich (codes & PI)
Scenarios proposed inadequately address information

- Assertions for origins of life & species need verification
- Other avenues may provide more fruitful paths

Nature’s constants and chemicals are fine-tuned for life
The Earth is extremely unique in the Universe

(PDF of presentation available through link at www.djpol.info)