

Prerequisites for Life on Earth (8/23/15)



Interesting Observations

- “Each nucleus ... contains a digitally coded database larger, in information content, than all thirty volumes of the Encyclopedia Britannica” *Dawkins, Climbing Mt Improbable*
- “Biology is the study of complicated things that give the appearance of having been designed for a purpose.”, *Dawkins, The Blind Watchmaker*, p. 1
- “Although they claimed to be wise, they became fools and exchanged the glory of the immortal God for images made to look like man and birds and animals and reptiles.” (Rom 1:22)

(expand non-physical code, meaning, action, & purpose of information)

Prerequisites for Life on Earth

Don Johnson

Ph.D. Chemistry: Michigan State Univ.

Ph.D. Computer & Information Sciences: U of Minn

“Love the Lord your God with all your heart and with all your soul and with all your mind.” Mt. 22:37

Topics for This Presentation

Overview of cell's computers & computer programs

Computer, coding systems, & algorithmic requirements

Required properties of nature for information storage

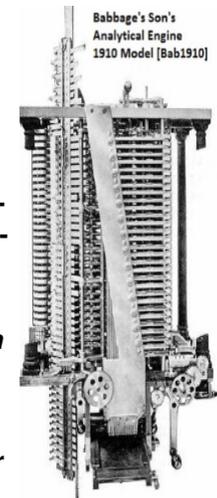
Life as Computer System?

•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.*



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

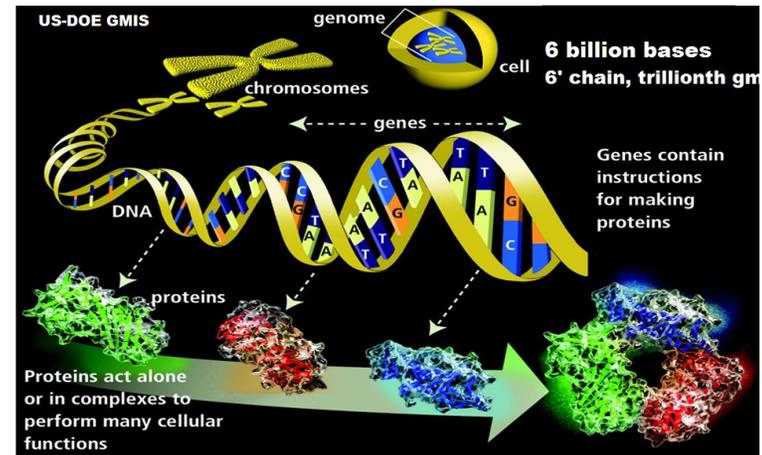
- Electronic and biological computers have multiple components
DNA/RNA can store program instructions to be executed
Proteins can be processing and communication components
Proteins and cellular controls are examples of output
- **Biology is an information science** since it's determined by the flow of information that controls the chemistry and physics involved (it's not complex organic chemistry)

Simplified View of Life's Incredible Complexity

Life is "fearfully and wonderfully made" Ps 139:14

- 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

Simplified Genetic Code for Protein Construction



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."**

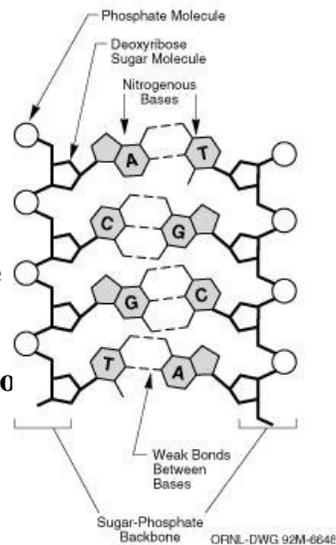
Prerequisite Fine-Tuned Nature of the Universe

(Mass/Energy Origin Is Unknown to Science)

- 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

Amazing Chemicals of Life

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



Universe is “fine-tuned” to allow for life

- **“An accuracy of one part in $10^{10^{123}}$...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]
- **“He who fashioned and made the earth, He founded it; He did not create it to be empty, but formed it to be inhabited.”** (Is. 45:18)

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.

Origin of Life Observations Ps 139:14

- **Could a Protocell Live and Reproduce Without a “Genome”?**
Reliable, yet evolvable, replication is fundamental to life
Cybernetically-controlled chemical metabolic networks are needed to admit and process fuel to harness energy for growth, reproduction, manufacturing, etc.
(from Johnson, “What Might Be a Protocell’s Minimal Genome?” in *The First Gene*, 2012)
- **“The origin of life remains one of the humankind’s last great unanswered questions, as well as one of the most experimentally challenging research areas.”** Miller & Cleaves, “Prebiotic Chemistry on the Primitive Earth,” in *Systems Biology VI: Genomics*, 2007
- **“The origin of life remains one of the most vexing issues in chemistry, biology, and philosophy,”** *Bioinorganic Photochemistry*, 2009, p109
- **“The challenge for an undirected origin of such a cybernetic complex interacting computer system is the need to demonstrate that the rules, laws, and theories that govern electronic computing systems and information don’t apply to the even more complex digital information systems that are in living organisms.”** Johnson, *Probability’s Nature and Nature’s Probability*, 2009/2010, p48.

The Uniqueness of Earth

(See PoL2 21:44-25:24)

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)

Life: “fearfully and wonderfully made” (Ps 139:14)

- **“The complexity of biology has seemed to grow by orders of magnitude... Biology’s new glimpse at a universe of non-coding DNA has been fascinating and befuddling... the signaling information in cells is organized through networks of information rather than simple discrete pathways. It’s infinitely more complex.”** E. Hayden, “Life is Complicated,” *Nature*, 4/10, p664-7
- **<2% of the genome codes for protein, the rest was considered to be “Junk DNA”**
- **“Creationists might spend some earnest time speculating on why the Creator should bother to litter genomes with untranslated pseudogenes and junk tandem repeat DNA.”** Richard Dawkins, “The Information Challenge,” 2004
- **30 papers published In Fall of 2012 shows KNOWN function of >80% of DNA (it’s NOT junk!)**

Goals of This Presentation

Science supports the insights in the Bible

All life is filled with incredible functional complexity

Life has many “unnatural” prerequisites in nature

The Bible IS reliable and can be trusted – “All Scripture is God-breathed and is useful for teaching...” (2 Tim. 3:16)

“The God who made the world and everything in it is the Lord of heaven and earth.” Acts 17:24 (evangelism)

Christian faith is fact-based, not "blind" or “anti-logic” – “You will know the truth, and the truth will set you free.” (Jn. 8:32). Study & “Always be prepared to give an answer” 1 Pet 3:15

Our knowledge on any subject is limited – “Now we see but a poor reflection as in a mirror.” (1 Cor 13:12).

The world is blind to many truths (Rom. 1:18-32, 1 Cor. 1:18-2:16) – “They exchanged the truth of God for a lie.”

Science Needs to Provide Plausible Mechanisms to Explain **How did nature:**

- write 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.programmingoflife.info)

Useful ID References

Probability's Nature and Nature's Probability, Don Johnson (2 versions: 2009 Lite/2010 revised Scientists')

Programming of Life, Don Johnson, 10/10&5/15, Video 8/11&7/15

The Privileged Planet, Gonzalez & Richards, 2004

Darwin's Black Box, Michael Behe, 1996

Signature in the Cell, Stephen Meyer, 2009

Darwin's Doubt, Stephen Meyer, 2013

Uncommon Dissent, William Dembski, 2004

arn.org, intelligentdesign.org, uncommondescent.com, scienceintegrity.org (PDFs available at www.4iam.org)

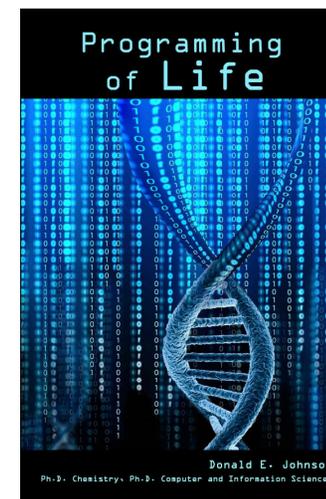
Creation/Biblically-based References

answersingenesis.org, creation.com, icr.org, reasons.org

The Case for A Creator, Lee Strobel, 2006

I Don't Have Enough Faith to Be an Atheist, Geisler, 2004

POL highlights the informational aspects of life that are usually overlooked or ignored in chemical and biological evolutionary. Each cell of an organism has thousands (or millions) of interacting computers reading and processing digital information using algorithmic digital programs and digital codes to communicate information. Most scientists have been attempting to use physical science to explain life's information domain, a practice which has no scientific justification. For more info see www.djpol.info and video at www.programmingoflife.com



Amazon Bestsellers Rank: #2,685 in Books (after 4 weeks)
#1 in Books > Science > Evolution > Molecular Biology
#14 in Books > Science > Biobal Sciences > Biology

•x

x