Quarterly Discussion Group on Scientific Evidence of Design in the Universe

Organizing Committee

Granville Sewell



Prof. of mathematics, UTEP

>50 scientific publications
4 books

Regular contributor:
Science and Culture Today

Randall Schunk



Research Professor, UNM

Senior Scientist
Sandia National Labs.

>60 scientific publications

Advisor: Reasons to Believe

Michael Kent



Research scientist,
Sandia National Labs

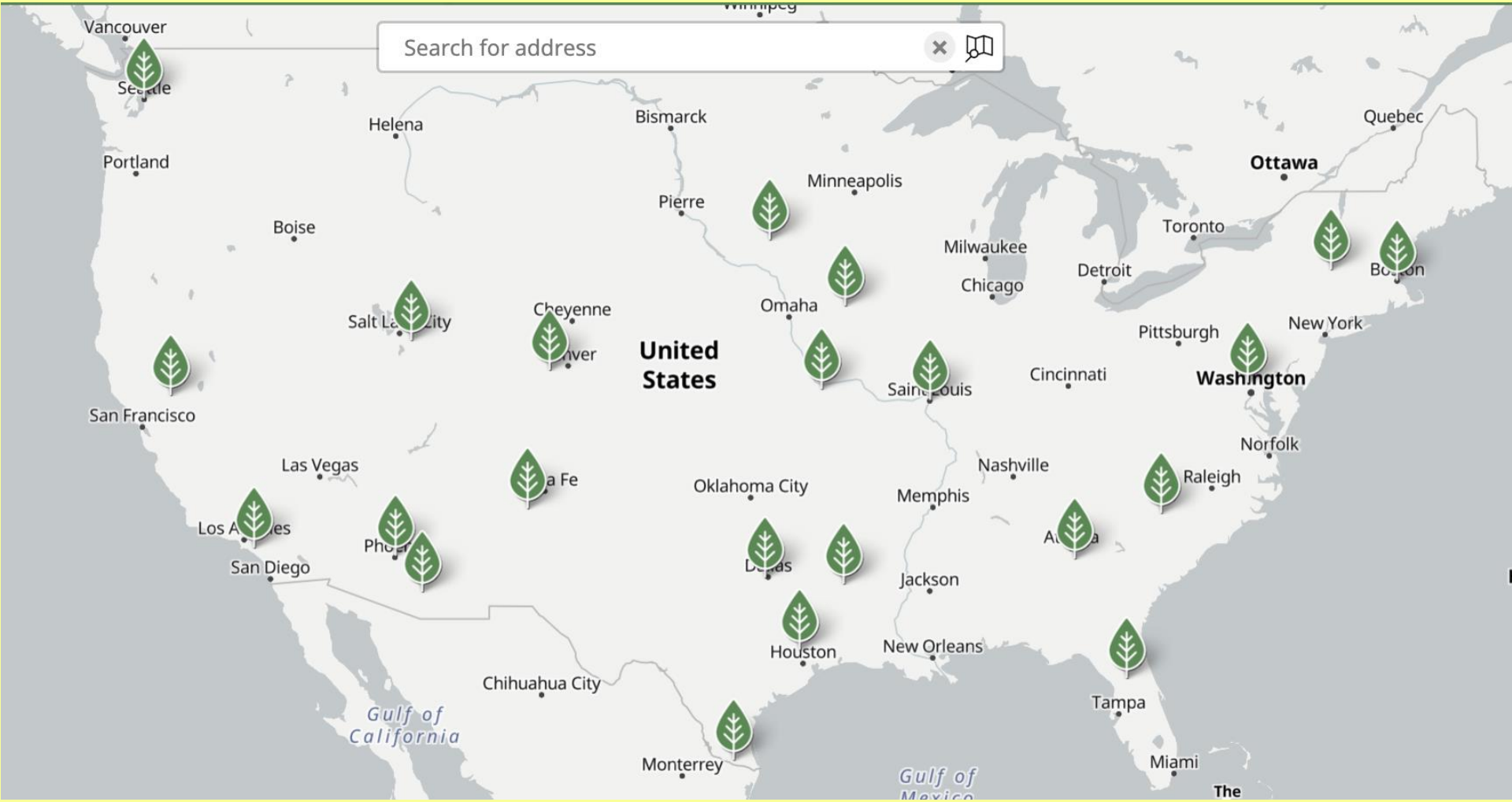
>90 publications

Fellow – Discovery Institute's
Center for Science and Culture

Update on ID movement around the US:

ID groups registered in the US with Discovery Institute

https://roots.discovery.org/network/



Our website: www.ABQ-ID.org

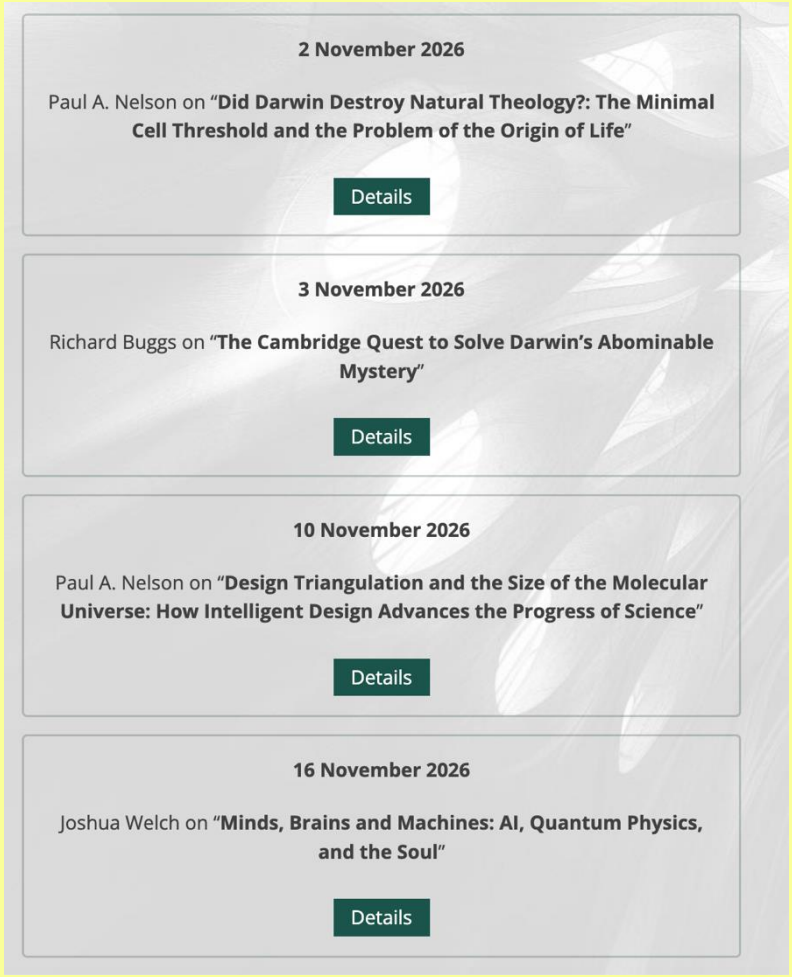
Update on ID movement around the world:

Discovery Institute Summer Seminars
(https://www.discovery.org/id/summer-seminars/)
Colorado
Application period: Jan – Apr
Event: June (6 days)



Update on ID movement around the world:

Whewell Institute, Cambridge England
(https://whewellcentre.uk/)

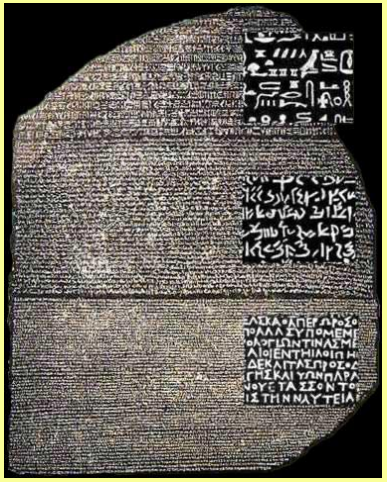


Update on ID movement around the world:

European Conference on Intelligent Design
(each year in October)

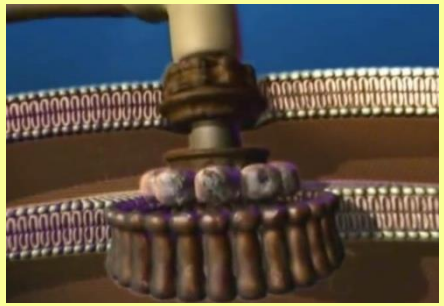


EN ARCHE wszechświat człowiek nauka
bioCosmos
DISCOVERY INSTITUTE
CID CENTRO ITALIANO INTELLIGENT DESIGN
WILLIAM WHEWELL CENTRE FOR SCIENCE & NATURAL THEOLOGY
ÉRTEM





Molecular machines and software of life

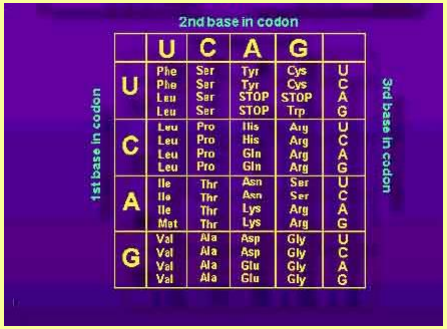


Intelligent Design:

Observations of information content beyond the reach of chance + natural law

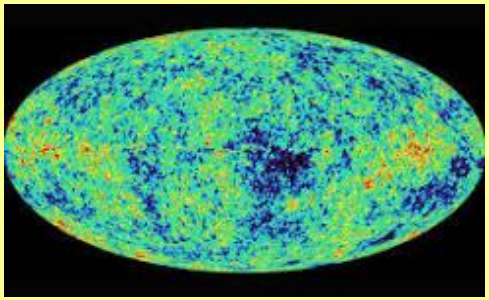
The natural world is incomplete, information input is required for a complete description

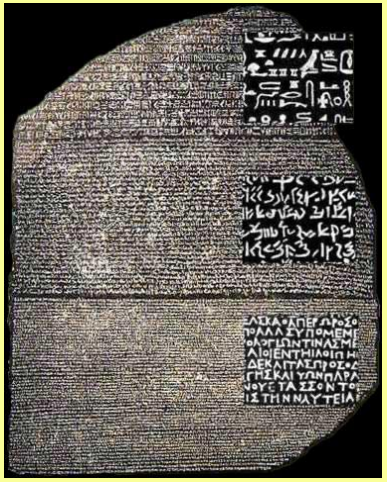
Genetic code





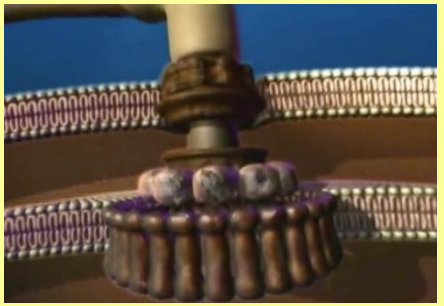
Origin and fine-tuning of the universe







Molecular machines and software of life



Intelligent Design:

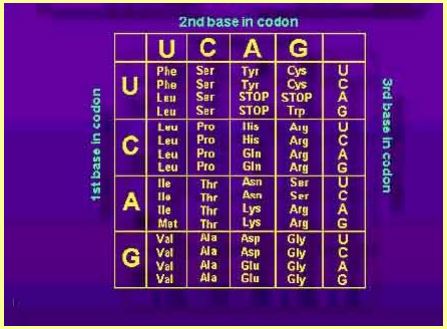
“creation of information is habitually associated with conscious activity.”

Henry Quastler

Pioneering Information Theorist

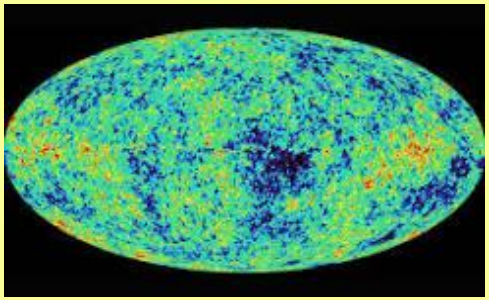
The Emergence of Biological Organization, p 16

Genetic code





Origin and fine-tuning of the universe



Today's Discussion Topics

1. **Quantum Physics – Evidence of ID?**

2. **Evidence of Design in the Simplest Forms of Life from both Top-Down and Bottom-Up Approaches**

QUANTUM PHYSICS/THEORY/MECHANICS

– EVIDENCE OF ID IN THE UNIVERSE?
THE FOUNDATION OF CONSCIOUSNESS?

Randy Schunk
Retired, Sandia National Laboratories
Research Professor, Chemical and Biological Engineering, UNM

The answers I seek:

Quantum theory and Quantum Mechanics: What are they?

What does quantum physics/mechanics/theory tell us about ID in the universe?

Are quantum phenomena supernatural? i.e., are there any physical laws that apply?

Quantum Entanglement: The foundation of an immaterial "force" that enables spiritual soul?

Do quantum phenomena explain human consciousness?

Numerous books, articles, and loads of internet content on these subjects and questions. I recommend: 1) J. Polkinghorne, "Quantum Theory: A very short introduction", 2002; 2) A. Eddington, "The Nature of the Physical World", 1948. other…

Discussion Outline

What are quantum theory and quantum mechanics?

The “weird” two-slit experiments

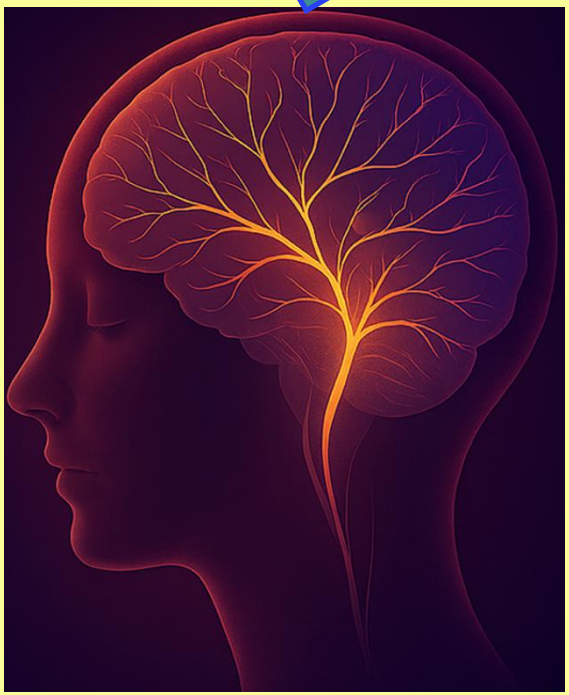
What are the societal implications of quantum
- Computing
- Light management
- medical

Connections to mind/brain/consciousness
- QZE, Stapp assertions.
- Gordon’s philosophical argument

Relevance to ID

Conclusions: Proof of the supernatural?

Mind/Soul: No particular reason why, if the universe originated uncaused, psycho-physical laws would bring about aesthetic sensibilities in humans (Richard Swinburne)



What are quantum theory and quantum mechanics?

Quantum mechanics is the branch of physics that studies how the smallest building blocks of the universe—like atoms and subatomic particles—behave. At this microscopic scale, the normal rules of everyday physics stop working, and nature acts in strange, unpredictable ways. Five characteristics of quantum theory:

Things can be in two places at once (superposition)
Nature relies on probabilities, not certainty (probabilistic waves/particle duality)
Energy comes in packets
Non-local interactions(quantum entanglement)
The underpinning mathematics (Schrodinger's equation and Born condition..) is precise!

"Quantum theory, as described by physicist and theologian John Polkinghorne in his book *Quantum Theory: A Very Short Introduction*, is the most revolutionary and counterintuitive physical framework of the subatomic world, replacing the predictable, clockwork universe of classical Newtonian physics with a cloudy, probabilistic reality."

RTB content Dr. Erica Carlson, Ph.D. physicist and Dr. Ken Samples, Ph.D. philosopher):
Watch https://www.youtube.com/watch?v=j_LXwXugEHU from RTB.

0 – 5 min -- we see all the evidence that the probabilistic evolution of the wave function gives the outcomes that we expect (predictive) but scientists are divided whether the wave function are real physics or just something that models well the inputs and outputs of quantum.

History and other facts of quantum

- In 1900 scientists sought to explain the “photoelectric effect”, viz. light hitting matter and knocking off electrons. They discovered that the frequency (color) of light mattered in the interaction.
- Einstein explained this with Planck’s equation and light energy packets called ”quanta” (different for different wave lengths). Planck’s equation shows that light acts as a wave but also as a packet of particles called photons.
- This is the birth of the ‘quantum world’ as classical physics couldn’t explain electro-light effects. Then came Schrodinger’s wave equation to explain how quantum state evolves over time.
- An electron can exist in multiple states and is only in a specific state when it is “measured” to be there. Each possible state is a possible “reality.
- The Measurement Problem (only 2 of these three assertions can be true)
  - Physical systems do—or at least *should*—always obey the same fundamental laws of nature, regardless of whether they are being measured. (After all, measurement itself is a physical process, so it would be strange indeed if measurements violated the laws of physics!)
  - The Schrödinger equation is a fundamental law of nature.
  - Measurements have determinate outcomes.
- Various interpretations – these are to try to make sense of quantum mechanics in the physical world. e.g. Copenhagen interpretation
- Controlling decoherence (dissipative processes/entropy that washes out effects) is the foundational barrier to realizing macroscopic benefits of quantum

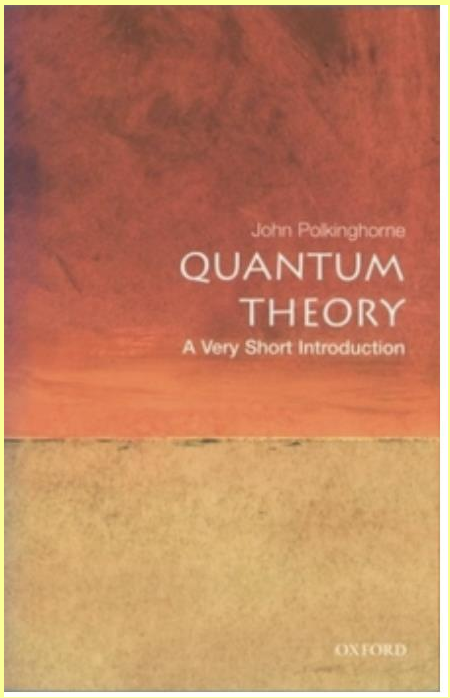
John Polkinghorne: Quantum Theory

Key Physics Concepts Explored by Polkinghorne

Breakdown of Determinism: Quantum mechanics shattered the clockwork, predictable universe of classical Newtonian physics, revealing an inherently probabilistic and subtle subatomic world. [1, 2]

Wave-Particle Duality & Superposition: Entities like electrons and photons exhibit both wave-like and particle-like characteristics, existing in overlapping "superposition" states (such as being both "here and there") until measured. [1, 2]

Uncertainty and Measurement: Core ideas like Heisenberg's uncertainty principle, wave function collapse, and decoherence highlight that the act of observation and the limits of knowledge are fundamental to quantum systems. [1, 2]



Two-Slit Experiments

- One of the classical experiments in all of physics. Can be performed with water waves, light, and even particles.

- With waves delivered from a point source, a classical interference pattern is noticed at a far measurement point.

- But light isn't just a wave – it's also a a particle called a photon. So what happens if you shoot a single photon at the double slits?

- Oddities/weirdness starts here:
  -A single photon still forms an interference pattern, as if the photon travels through both slits simultaneously.
  -However, it gets weirder! If a detector is set up to see which slit the photon goes through, the interference pattern fails to show up!

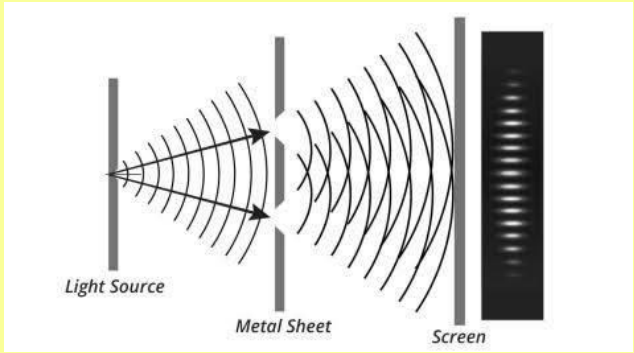
It's as if a photon/electron must explore ALL possible paths to the detector as if it were a field of probabilities…. Which is currently the best/only explanation for these results.

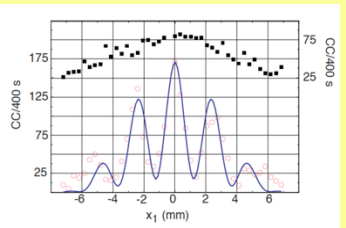
Science > Pop Mech Pro

The Logic-Defying Double Slit Experiment Is Even Weirder Than You Thought

By simply observing the process of the experiment, everything changes.

BY AVERY THOMPSON, JESSICA COULON UPDATED: APR 05, 2023 1:45 PM EDT





What do we learn from the Two-Slit Experiments with individual particles (photons, electrons, etc.)?

The Single-Particle Double-Slit Experiment (Wave-Particle Duality)
The Result: Even though they are fired individually, a detector screen records them as single dots that build up into an alternating wave interference pattern.
Significance: It proves that a single particle effectively passes through *both* slits simultaneously as a "wave of probabilities.

The "Which-Way" Detector Experiment (The Observer Effect)
The Result: The moment the detectors are turn on the wavelike interference pattern vanishes and two neat strips of particles appear behind the slits.
Significance: It highlights the **measurement problem** in quantum mechanics. The act of observing or measuring a quantum system forces its wave function to collapse from a cloud of probabilities into a single, definite reality.

Wheeler's Delayed-Choice Experiment – Delay particle detection until after it has passed through --- this still destroys the interference pattern.
Significance: It proves that a quantum particle does not "choose" whether to act as a wave or a particle until the exact moment of measurement. It challenges our conventional understanding of linear time and causality in quantum systems. [1, 2]

What do we learn from the Two-Slit Experiments with individual particles (photons, electrons, etc.)?

Quantum Eraser Experiment – A “which-way” detector is placed at the slits, collapsing the wave function and erasing the interference pattern. Then, a second device (the “eraser”) is used to scramble the “which-way” information, making it impossible to know which slit the particle wen through.
Result: The interference pattern magically returns.
Significance: It demonstrates that it is not the *physical presence* of a detector that destroys quantum wave behavior, but rather the *availability of information* about the particle's path in the universe.

Matter-Wave (Large Molecule) Experiments
The Setup: Instead of light (photons) or subatomic particles (electrons), scientists fire larger, complex structures—such as atoms, neutrons, and large molecules like **Buckyballs** (bacteriorhodopsin or \(C_{60}\)).
The Result: Even these massive, multi-atom structures still produce a quantum interference pattern.
Significance: It proves that wave-particle duality is not exclusive to light or tiny sub

Does quantum theory/physics raise more questions than answers?

Another deep mystery associated with microphysical systems is a phenomenon called *quantum entanglement (two particles interacting instantaneously through the same wave function).* Einstein, Podolsky, and Rosen pointed out that if this aspect of the theory is correct, then quantum entanglement violates the *principle of locality*, which says that no causal influence can travel faster than light. This problem—the fact that quantum entanglement violates the principle of locality—is known as the *EPR paradox*. (EPR stands for Einstein, Podolsky, and Rosen.)

J. Hershey, Faithful Science, 2015.

We may never know whether quantum mechanisms, in a strange matter of speaking, is simply a way we can do the sums and not truly what subatomic nature is like"

John Polkinghorn, "Quantum Theory" , 2002

"Quantum mechanics leaves us with no clear distinction between the natural and supernatural"
"Meanwhile we may note that science thereby withdraws its moral opposition to freewill."

A.S. Eddington "The Nature of the Physical World", Cambridge at the University Press, 1948

Physical Evidence of ID in the Universe?

Fine-tuning (teleological argument)

-**The ID Interpretation:** Thinkers like Stephen C. Meyer from the Discovery Institute emphasize that if the fundamental constants governing quantum interactions (such as the strong nuclear force or electromagnetism) were altered by even a fraction, atoms, stars, and DNA could not form. They conclude this precision implies an intentional, purposeful setup.

Max Planck, widely thought as the father of quantum mechanics: "All matter originates and exists only by virtue of a force which brings the particles of an atom to vibration and holds this most minute solar system of the atom together. We must assume behind this force the existence of a conscious and intelligent Mind. This mind is the matrix of all matter." *Max Planck (1950), A Scientific Autobiography and Other Papers, trans. Frank Gaynor (London: Williams and Norgate), p. 167.*

*"Quantum mechanics itself reveals a profound order and design at the subatomic level, hinting at something deeper within creation. Some have suggested that quantum physics exposes a connection between consciousness and the very fabric of reality."

*J. Moore and B. May, "Quantum Mechanics: Unveiling the Creator's Design in the Fabric of Reality", Apologetics Press

Conclusions and takeaways

- **Classical physics and mechanics cannot fully explain why/how the universe works and its origins.**
- **The "why quantum theory/mechanics is so precise?" is a question unanswered! Calls into question the whole idea of naturalism.**
- **The physical basis of the "immaterial mind" may never be explained, just like quantum physics, particularly the "measurement problem" and "quantum entanglement". The purpose of both argue for supernatural intelligent design.**

Design in the simplest forms of life revealed by both bottom-up and top-down approaches

Michael S. Kent
Research scientist, Sandia National Labs. (retired)
90 publications on chemistry, biophysics, and materials science
Discovery Institute Fellow
www.abq-id.org

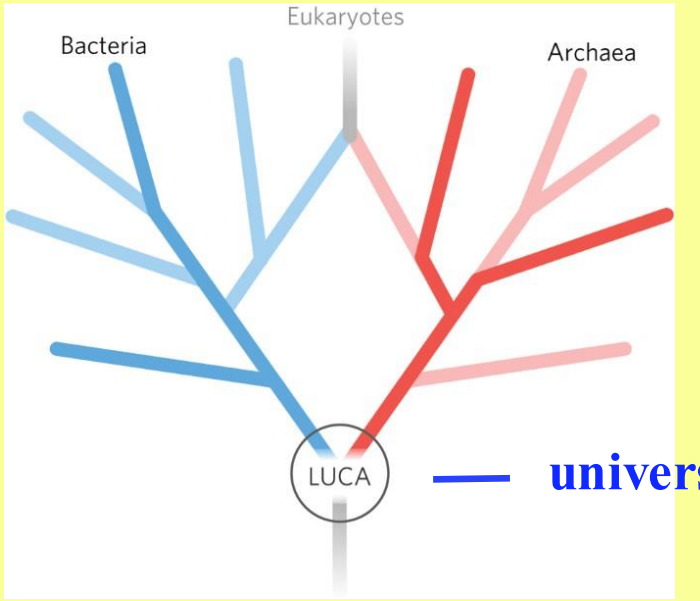
I. Introduction

II. Six recent (noncontroversial) discoveries in biology regarding the simplest forms of life that reveal design

II. New hypotheses to explain life

III. Summary

Hypothesis since 1871



universal genetic core

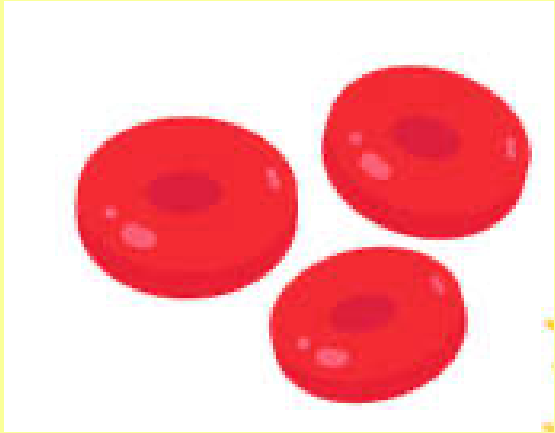
Simple to complex

First Life

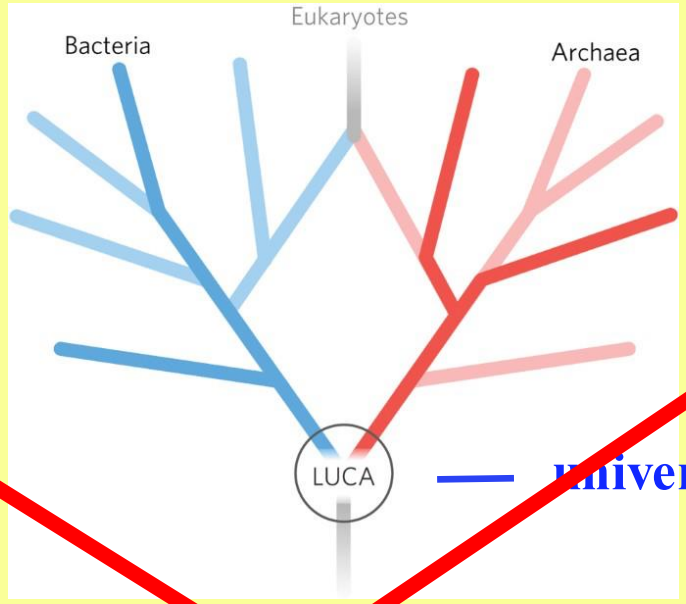
chemistry



simple protocell



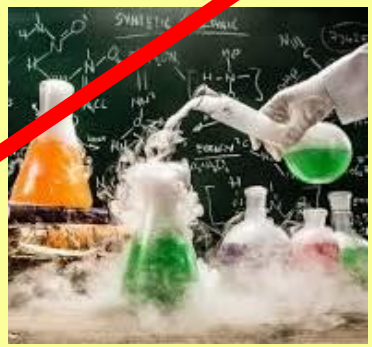
Hypothesis since 1871



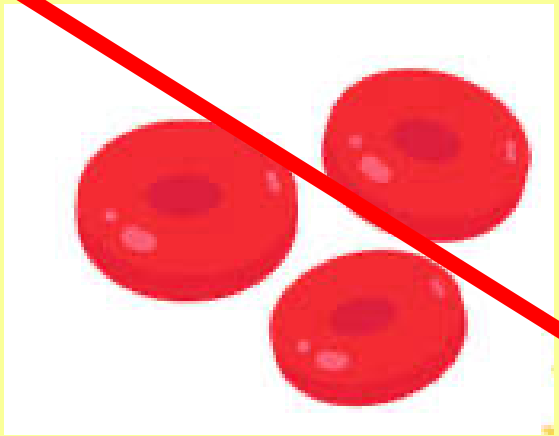
Simple to complex

First Life

chemistry



simple protocell



the data do not support this!

MY VIEW - The data support intelligent design!

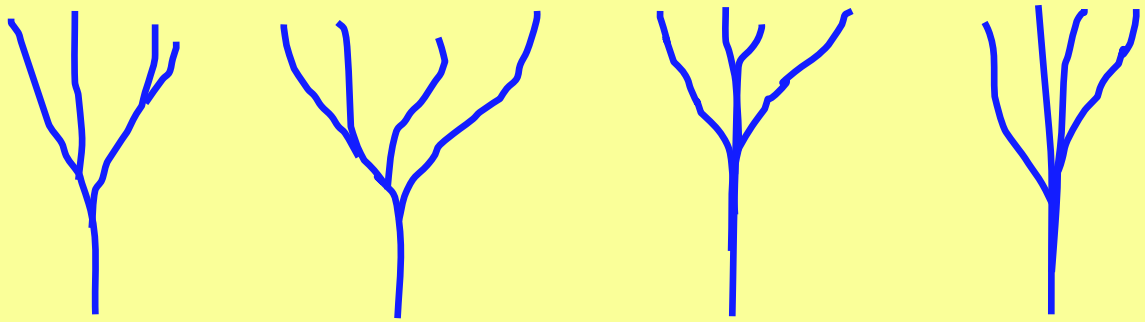
top down

~~"tree of life"~~

~~LUCA~~

First Life

genomic data supports independent designs



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bottom up

chemistry to life

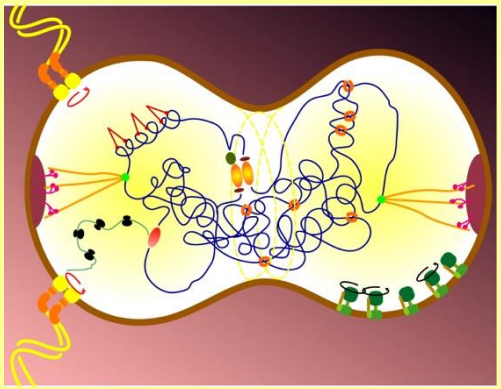
impossible!

chemistry



simplest cell

very high information density



~ 473 genes

That is not the view of most scientists in the western world!

I will give some alternative views

Example of philosophical commitment to materialism

"Some future day may yet arrive when all reasonable chemical experiments run to discover a probable origin of life have failed unequivocally. Further, new geological evidence may yet indicate a sudden appearance of life on earth. Finally, we may have explored the universe and found no trace of life, or processes leading to life, elsewhere. **Some scientists might choose to turn to *religion* for an answer. Others, myself included, would attempt to sort out the surviving less probable *scientific* explanations in the hope of selecting one that was still more likely than the remainder**."

R. Shapiro, "Origins: A Skeptics Guide to the Creation of Life in the Universe, 1986, 1988. pp 130.

My goal (my wish):

People should be knowledgeable about this subject and the philosophical decisions should be in their own hands.

II. Six recent discoveries in biology regarding the simplest forms of life

(not controversial)

1. **The number of genes in the simplest free-living organism is about 450.**

2. **An incredibly small fraction of random sequences make functional enzymes (~ 1 in 10^{77} for 150 aa)**

3. **All life is based on a digital information processing system.**

4. **Molecular machines and sophisticated software algorithms are essential to all life-forms.**

5. **The chemical linkages of proteins, polynucleotides, and polysaccharides in living systems are highly specific and selective (non-random)**

Top-Down:

6. **The sets of essential genes for different species of archaea and bacteria differ greatly, indicating there is no universal genetic core of life.**

1. The number of genes in the simplest free-living organism is about 450.

RESEARCH ARTICLE

SYNTHETIC BIOLOGY

Design and synthesis of a minimal bacterial genome

Clyde A. Hutchison III,[1*†] Ray-Yuan Chuang,[1†‡] Vladimir N. Noskov,[1] Nacyra Assad-Garcia,[1] Thomas J. Deerinck,[2] Mark H. Ellisman,[2] John Gill,[3] Krishna Kannan,[3] Bogumil J. Karas,[1] Li Ma,[1] James F. Pelletier,[4§] Zhi-Qing Qi,[3] R. Alexander Richter,[1] Elizabeth A. Strychalski,[4] Lijie Sun,[1||] Yo Suzuki,[1] Billyana Tsvetanova,[3] Kim S. Wise,[1] Hamilton O. Smith,[1,3] John I. Glass,[1] Chuck Merryman,[1] Daniel G. Gibson,[1,3] J. Craig Venter[1,3*]

Science 351, aad6253 (2016)

Original *Mycoplasma mycoides* genome has **901** genes

M. capricolum with synthesized minimal genome from *M. mycoides* can survive with **473** genes

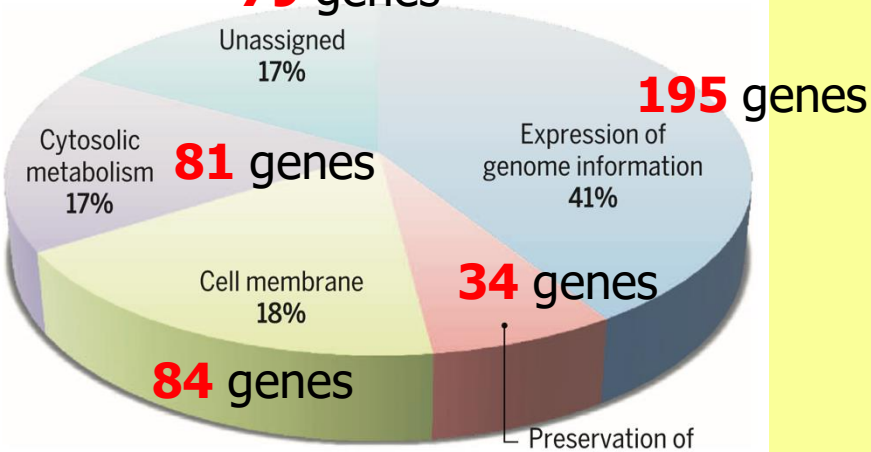


Fig. 6. Partition of genes into four major functional groups. Syn3.0 has 473 genes. Of these, 79 have no assigned functional category (Table 1). The remainder can be assigned to four major functional groups: (i) expression of genome information (195 genes); (ii) preservation of genome information (34 genes); (iii) cell membrane structure and function (84 genes); and (iv) cytosolic metabolism (81 genes). The percentage of genes in each group is indicated.

438 protein-coding
35 RNA genes

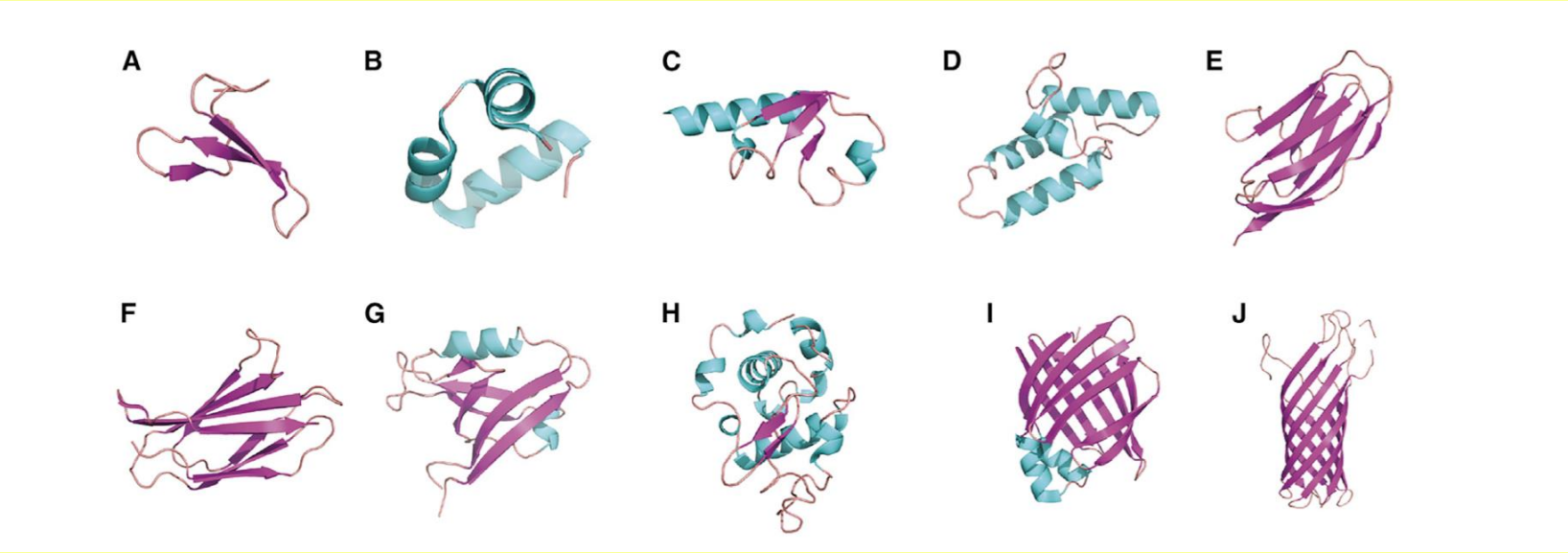
Smaller genome than any autonomously reproducing natural organism

Growth in rich medium

2. An incredibly small fraction of random sequences make functional enzymes (~ 1 in 10^{77} for 150 aa)

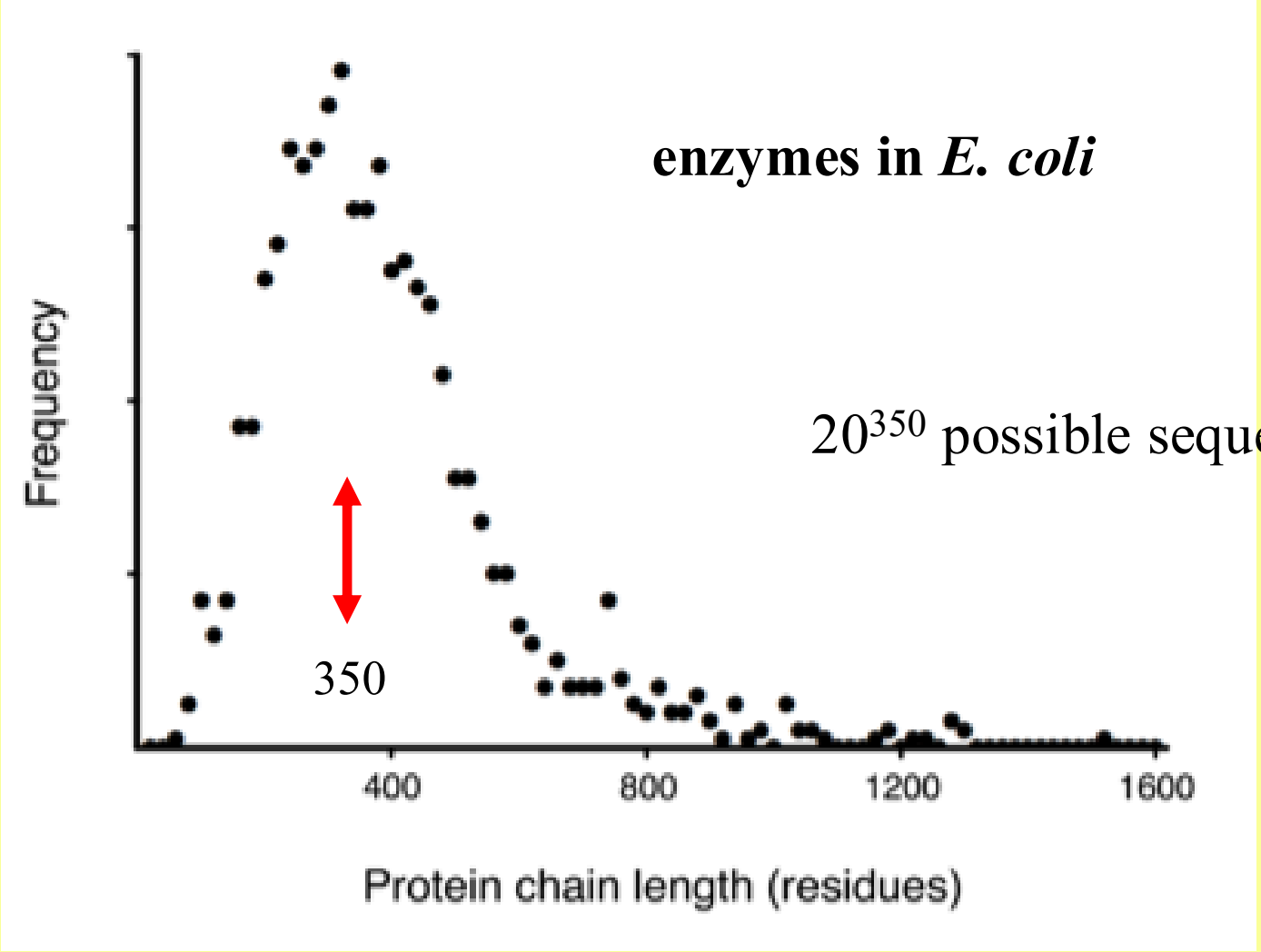
bioinformatics method:

Protein folds they studied



Biophysical Journal, **2017**, 113, 1719

What fractions of random sequences will fold?



Method 3: bioinformatics

SC – sequence capacity
SC*– fraction of total

TABLE 1 Estimates of SC

Protein	L	Fold	SC	SC*	M
WW	35	all-β	9.9×10^{21}	2.9×10^{-24}	5800
Villin	35	all-α	1.6×10^{13}	4.7×10^{-33}	759
NTL9	56	α/β	3.2×10^{19}	4.4×10^{-54}	4828
IM7	87	all-α	1.6×10^{27}	1.1×10^{-86}	536
Titin I27	89	all-β	2.0×10^{78}	3.2×10^{-38}	55,422
TNfn3	90	all-β	8.5×10^{78}	6.9×10^{-39}	66,289
PDZ	94	α/β	1.2×10^{73}	5.8×10^{-50}	30,176
α-LA	123	α/β	1.1×10^{39}	1.0×10^{-121}	934
IFABP	131	α/β	3.0×10^{59}	1.1×10^{-111}	1691
OmpA	171	all-β	7.9×10^{96}	2.6×10^{-126}	31,397

L refers to the protein length, SC* is the absolute SC normalized by the total number of possible sequences (20^L), and M is the number of sequences in the MSA for each protein family.

Biophysical Journal, **2017**, 113, 1719

Typical enzymes and folded proteins are almost infinitesimally rare in sequence space!

3. All life is based on a digital information processing system

20 amino acids

20 of these special enzymes!

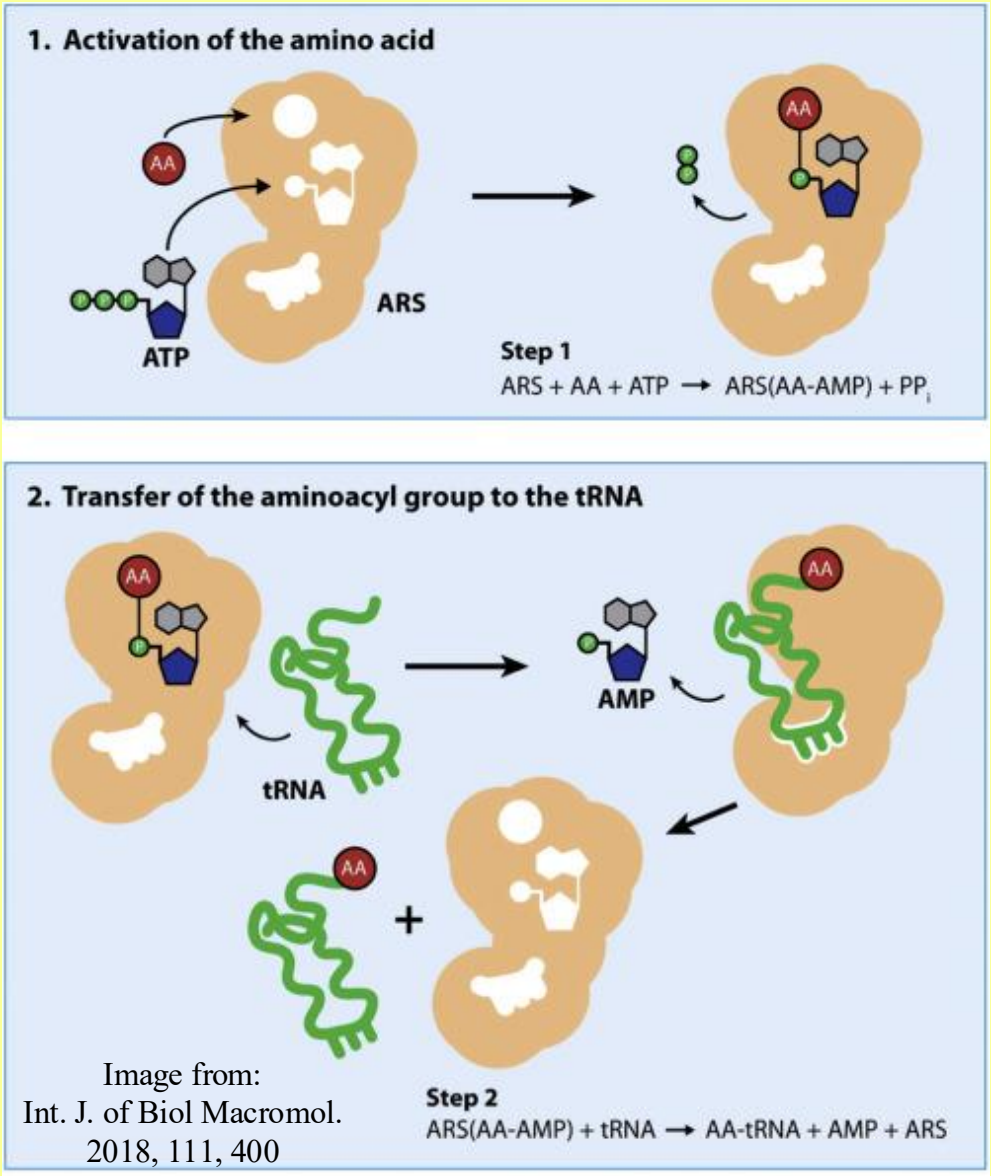
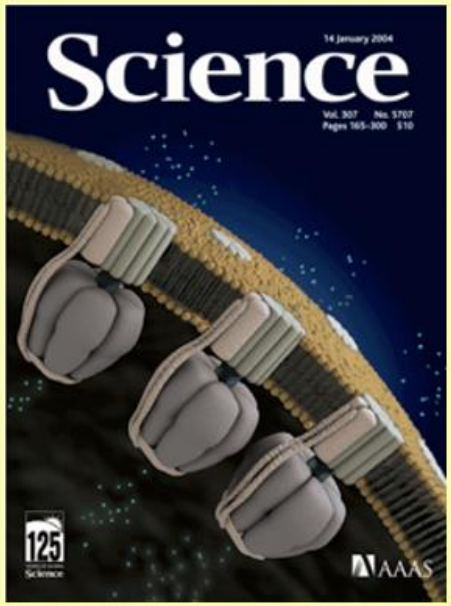


Image from:
Int. J. of Biol Macromol.
2018, 111, 400

Enzymes called **tRNA synthetases**

The genetic code is contained within these enzymes!

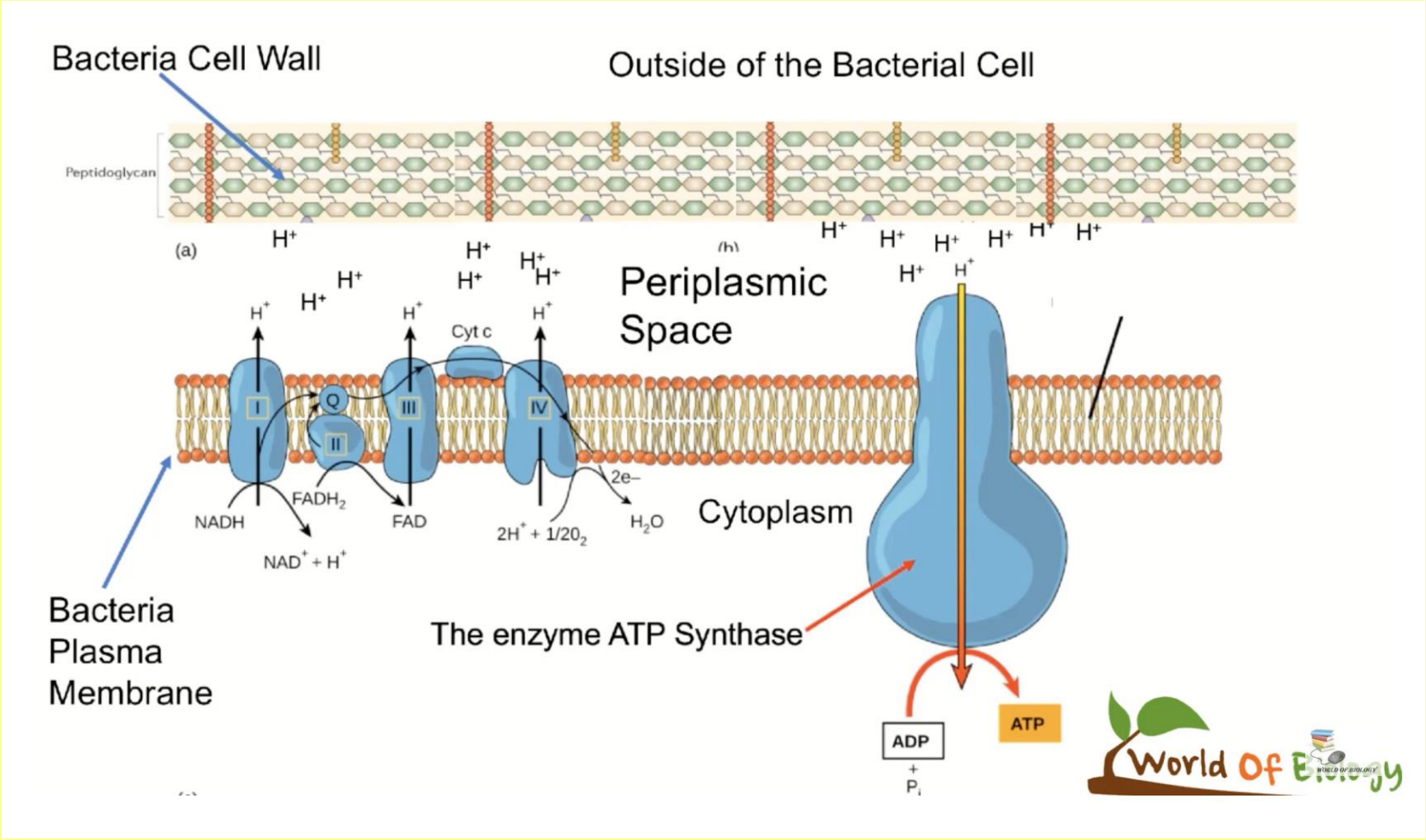
4. Molecular machines and sophisticated software algorithms are essential to all life-forms.





ATP synthase is a irreducibly complex machine that converts a proton gradient to mechanical energy which is converted to chemical energy

Bacteria

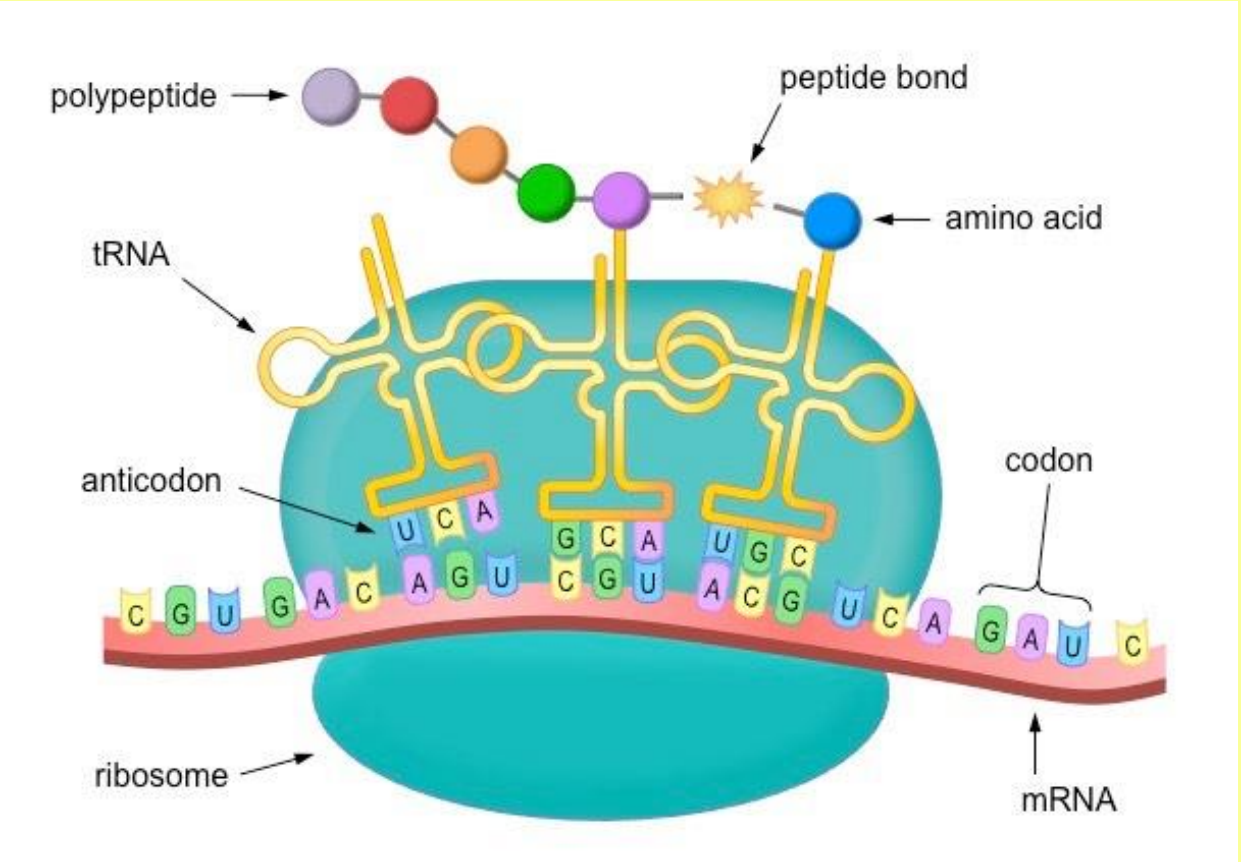


ATP synthases must fit into a larger system

The entire system must be **coherent**

ribosome

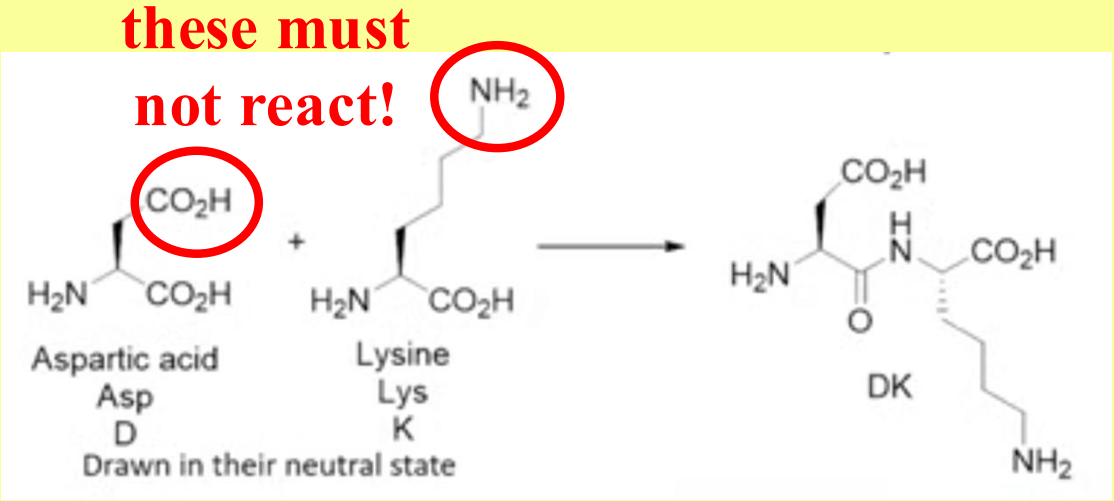
ribosomes are made of both RNAs and proteins!



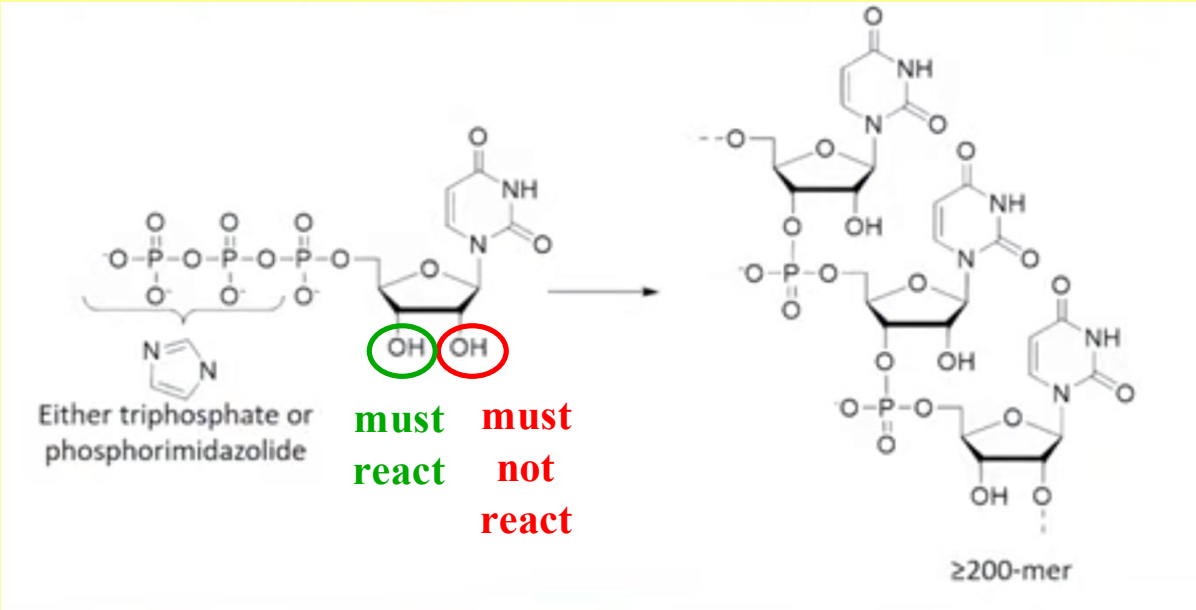
https://www.youtube.com/watch?v=TfYf_rPWUdY

5. The chemical linkages of polysaccharides, proteins, and polynucleicacids in living systems are non random (highly specific)

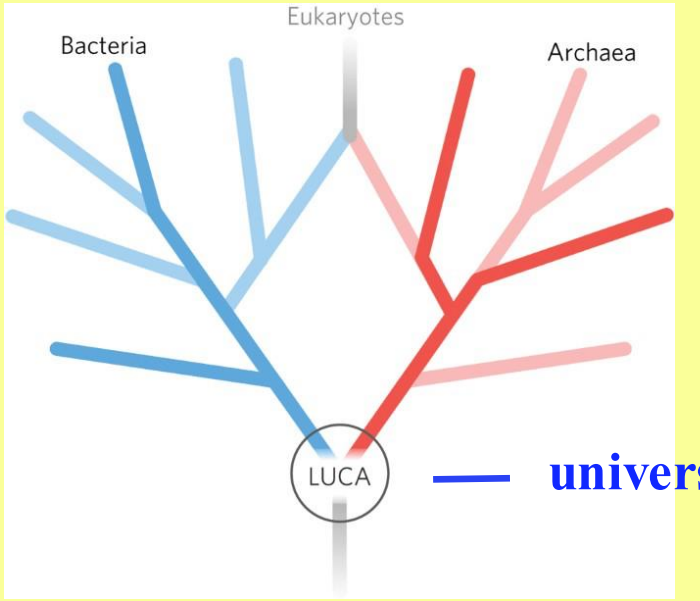
Peptides with correct linkages



RNAs with correct linkages



Hypothesis since 1871

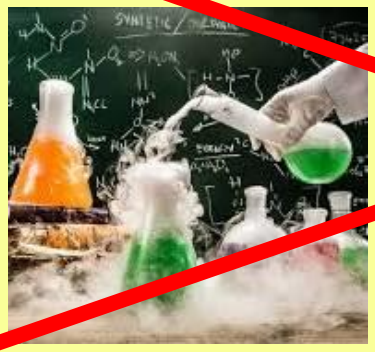


universal genetic core

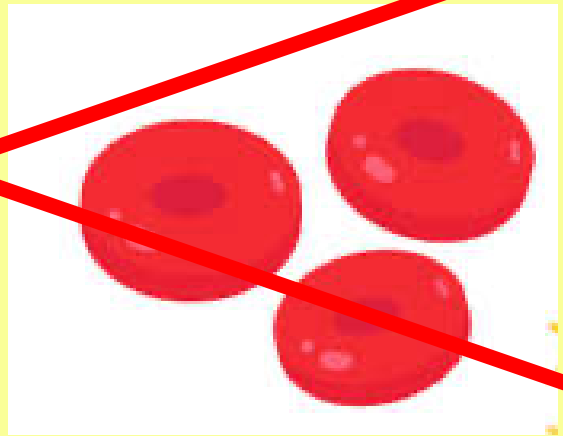
Simple to complex

First Life

chemistry



simple cell

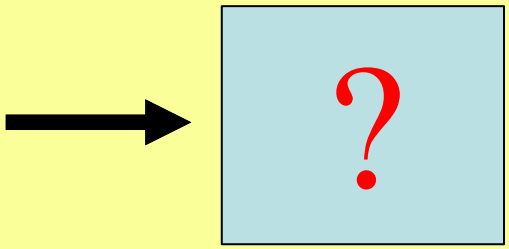


Current status – bottom up

chemistry



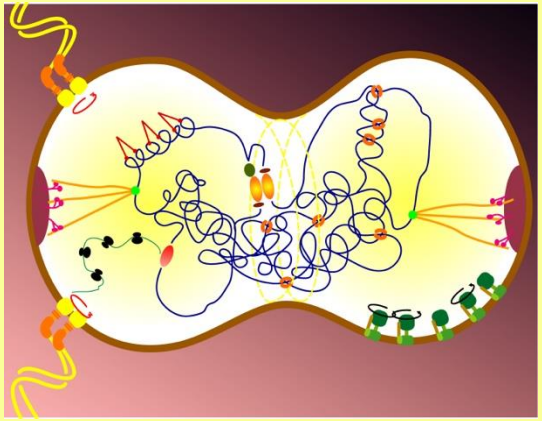
researchers try to do this



chemical system that can replicate

and believe that natural selection will do this

simplest cell



473 genes

-RNA world

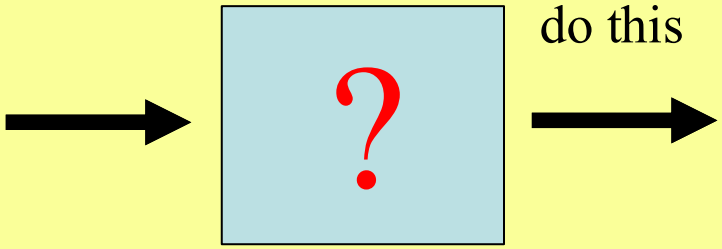
-Metabolism (proteins) first

Current status – bottom up

chemistry



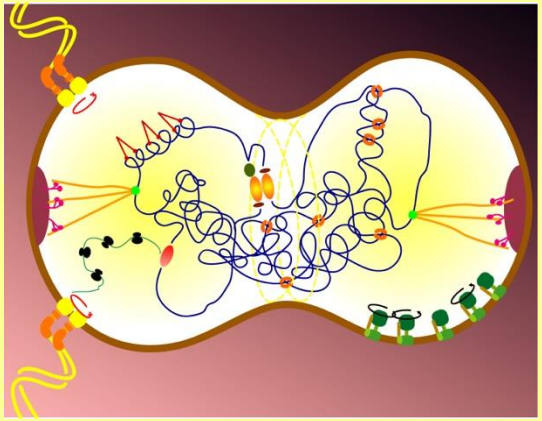
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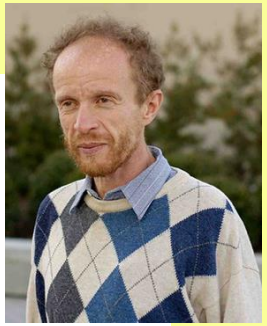


473 genes

-RNA world
-Metabolism (proteins) first

This has not gone well!

Current status



IUBMB *Life*, 61(2): 99–111, February 2009

Critical Review

Origin and Evolution of the Genetic Code: The Universal Enigma

Eugene V. Koonin and Artem S. Novozhilov
National Center for Biotechnology Information, National Library of Medicine, National Institutes of Health, Bethesda, MD, USA

translation system that embodies it. At the heart of this problem, is a dreary vicious circle: what would be the selective force behind the evolution of the extremely complex translation system before there were functional proteins? And, of course, there could be no proteins without a sufficiently effective translation system. A variety of hypotheses have been proposed in attempts to break the circle (see (*133–136*) and references therein) but so far none of these seems to be sufficiently coherent or enjoys sufficient support to claim the status of a real theory.

Disconfirming evidence

+

Commitment to methodological naturalism

lead to

Hypotheses that are even more improbable!

(far-fetched)

(bizarre)

Infinite Universes?

Biology Direct

BioMed Central

Hypothesis

Open Access

The cosmological model of eternal inflation and the transition from chance to biological evolution in the history of life

Eugene V Koonin*

Address: National Center for Biotechnology Information, National Library of Medicine, National Institutes of Health, Bethesda, MD 20894, USA

Email: Eugene V Koonin* - koonin@ncbi.nlm.nih.gov

* Corresponding author

Published: 31 May 2007

Biology Direct 2007, 2:15 doi:10.1186/1745-6150-2-15

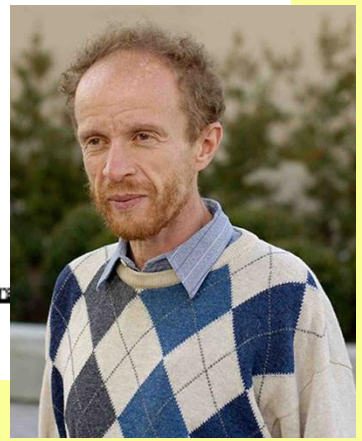
Received: 10 May 2007

Accepted: 31 May 2007

This article is available from: http://www.biology-direct.com/content/2/1/15

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Eugene Koonin
Senior Investigator
NIH

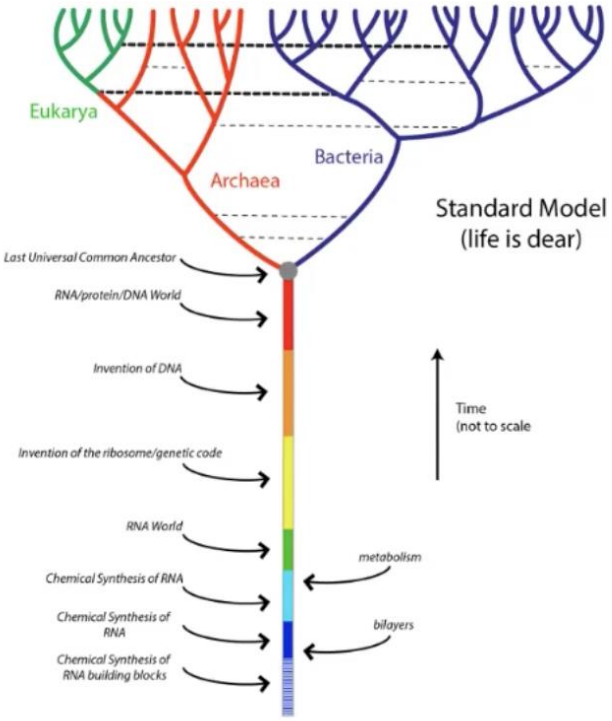
Infinite Universes:

Abstract

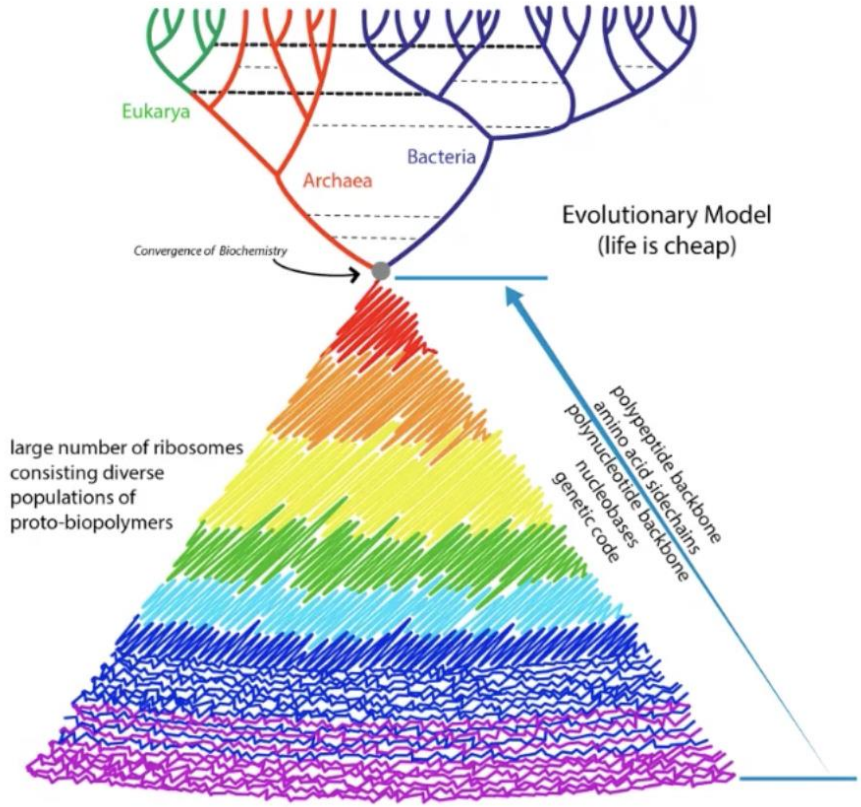
Background: Recent developments in cosmology radically change the conception of the universe as well as the very notions of "probable" and "possible". The model of eternal inflation implies that all macroscopic histories permitted by laws of physics are repeated an infinite number of times in the infinite multiverse. In contrast to the traditional cosmological models of a single, finite universe, this worldview provides for the origin of an infinite number of complex systems by chance, even as the probability of complexity emerging in any given region of the multiverse is extremely low. This change in perspective has profound implications for the history of any phenomenon, and life on earth cannot be an exception.

Hypothesis: Origin of life is a chicken and egg problem: for biological evolution that is governed, primarily, by natural selection, to take off, efficient systems for replication and translation are required, but even barebones cores of these systems appear to be products of extensive selection. The currently favored (partial) solution is an RNA world without proteins in which replication is catalyzed by ribozymes and which serves as the cradle for the translation system. However, the RNA world faces its own hard problems as ribozyme-catalyzed RNA replication remains a hypothesis and the selective pressures behind the origin of translation remain mysterious. Eternal inflation offers a viable alternative that is untenable in a finite universe, i.e., that a coupled system of translation and replication emerged by chance, and became the breakthrough stage from which biological evolution, centered around Darwinian selection, took off. A corollary of this hypothesis is that an RNA world, as a diverse population of replicating RNA molecules, might have never existed. In this model, the stage for Darwinian selection is set by anthropic selection of complex systems that rarely but inevitably emerge by chance in the infinite universe (multiverse).

New Hypothesis:
Chemical "evolution" or selection prior to life?

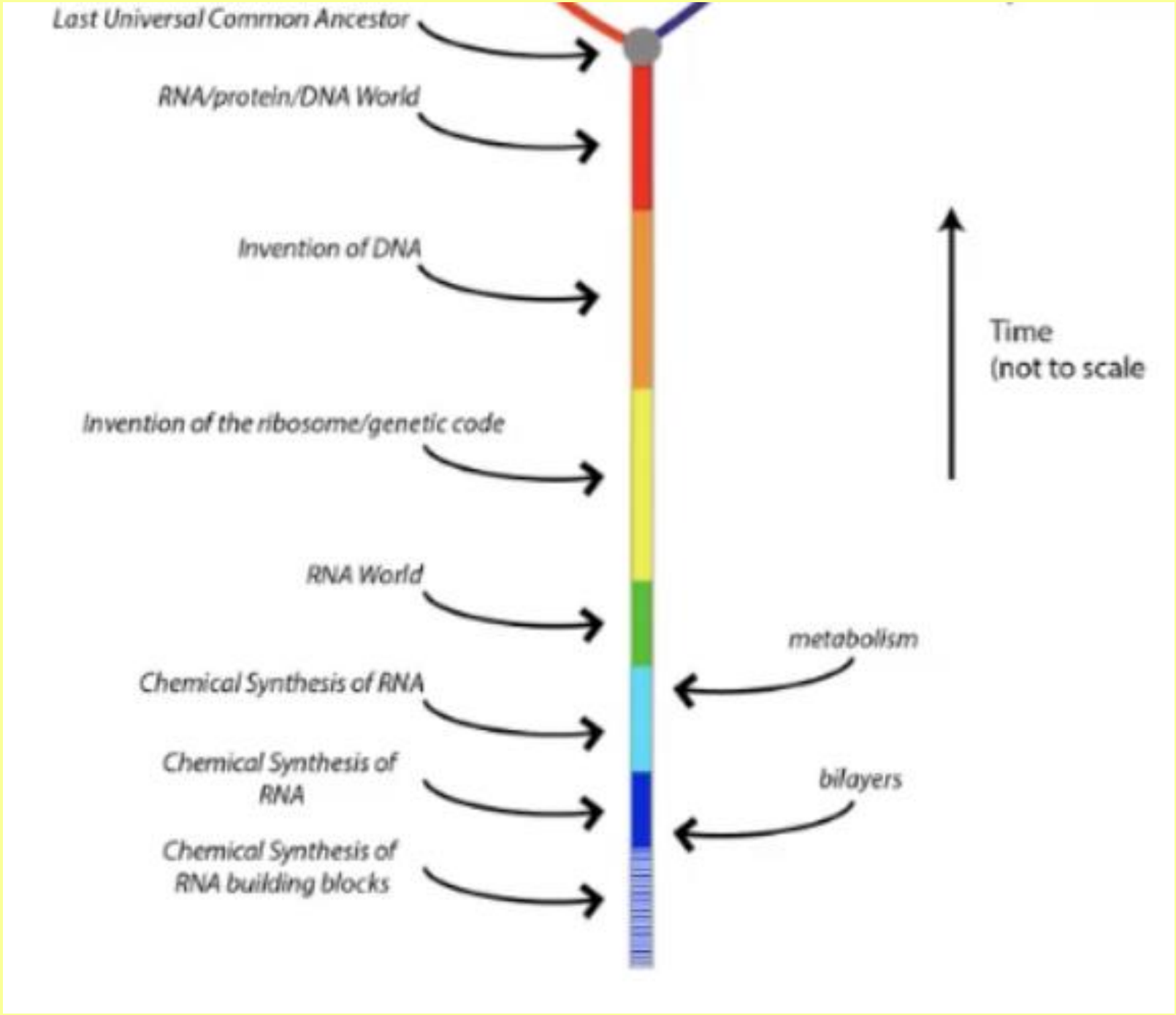


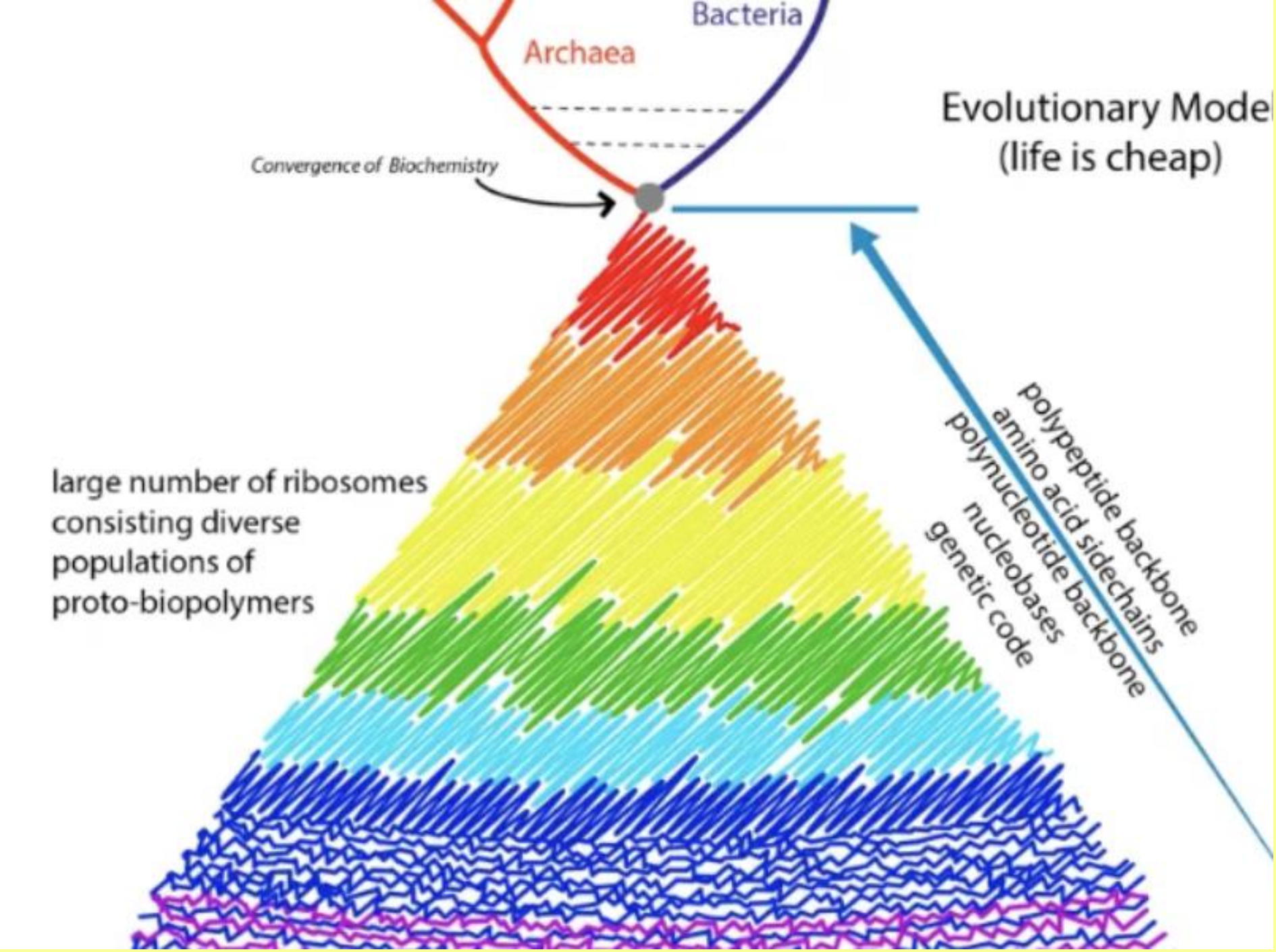
Chicken-Egg-Chicken-Egg...



Everything Everywhere All at Once

Loren Williams: https://www.youtube.com/watch?v=6lEhhIVhJ6M


Last Universal Common Ancestor
RNA/protein/DNA World
Invention of DNA
Invention of the ribosome/genetic code
RNA World
Chemical Synthesis of RNA
Chemical Synthesis of RNA
Chemical Synthesis of RNA building blocks
metabolism
bilayers
Time
(not to scale


Bacteria
Archaea
Evolutionary Model
(life is cheap)
Convergence of Biochemistry
large number of ribosomes
consisting diverse
populations of
proto-biopolymers
polypeptide backbone
amino acid sidechains
polynucleotide backbone
nucleobases
genetic code

Loren Williams' recipe for life:

Our recipe for life (there are probably other recipes).

- rocky planet (not tidally locked)
- both land and liquid water
- organic gunk
- stability (few big impacts, abrupt climate transitions, etc)

"Biology is irrepressible and cannot be stopped"

https://www.youtube.com/watch?v=6lEhhIVhJ6M

New Hypothesis:

Chemical “evolution” or selection prior to life?

Acc. Chem. Res. 2025, 58, 659−672

The biopolymers of life have special characteristics and could not have arisen by direct chemical synthesis but are products of extensive evolution / selection.

Evolutionary models of biopolymer origins are experimentally accessible, for example by wet-dry or freeze-thaw cycling.



Prof. Lee Cronin

@leecronin · **Follow**

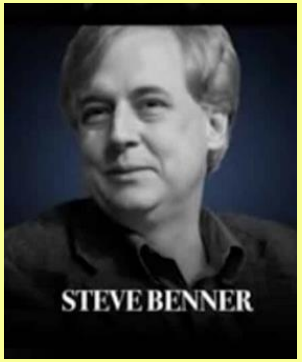
If the origin of life is the origin of evolution & nothing comes before life then we are indeed stuck. I don't think we need to be. Let's shed the dogma, ego, & closed minds & ask the question clearly. How do we detect the onset of evolution BEFORE biology?

3:15 PM · Oct 16, 2023

207 Reply Copy link

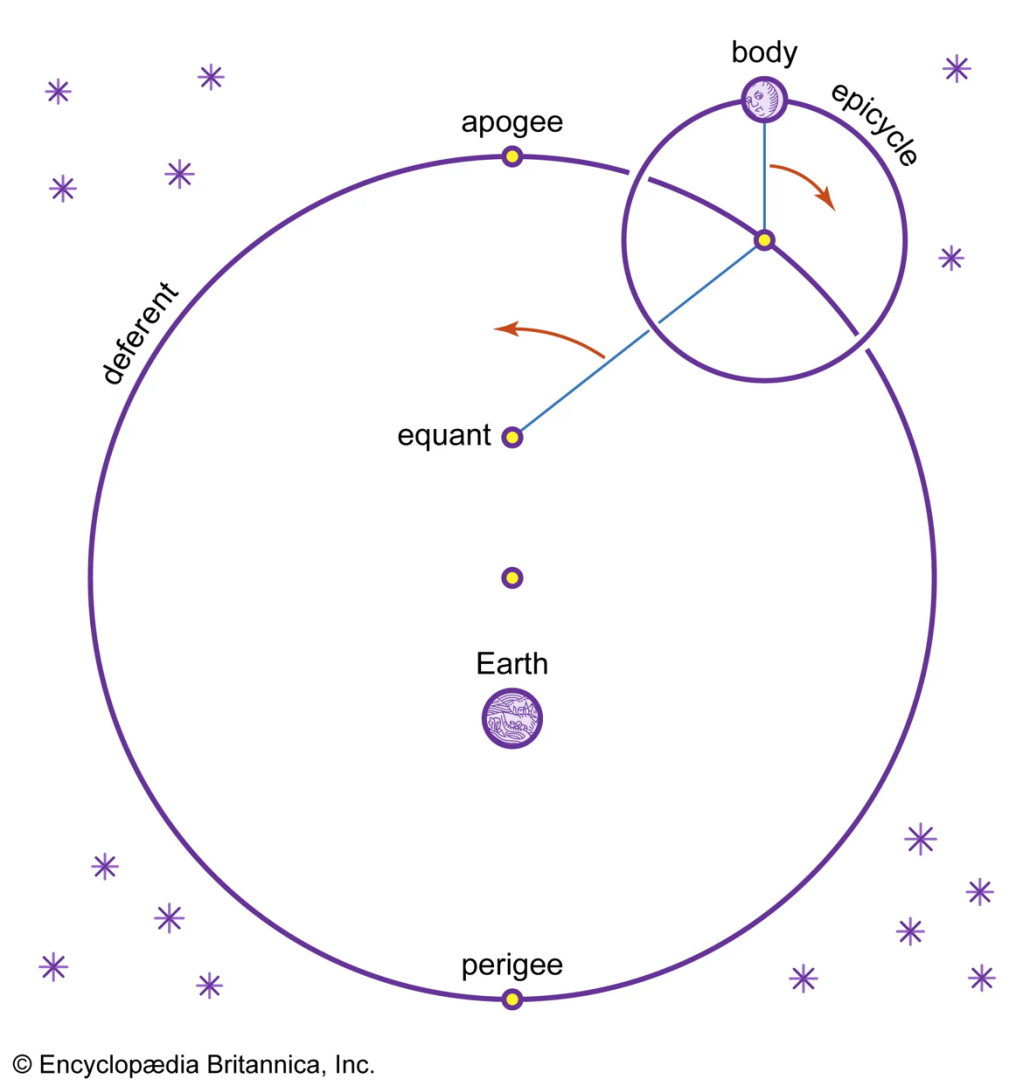
Read 50 replies

5 paradoxes in Ool: Benner *Orig Life Evol Biosph* 2014



1. The Asphalt Paradox: **an enormous amount of empirical data** have established, as a rule, that organic systems, given energy and left to themselves, devolve to give uselessly complex mixtures, "**asphalts**".
   …. it is impossible for any non-living chemical system to escape devolution to enter into the Darwinian world of the "living".
2. The Water Paradox: ...
3. The Information-Need Paradox: …
4. The Single Biopolymer Paradox: ...
5. The Probability Paradox: ...

This hypothesis, that goes against "an enormous amount of empirical data", seems to me to be reminiscent of the extraordinary steps taken to try to save the geocentric model of the solar system



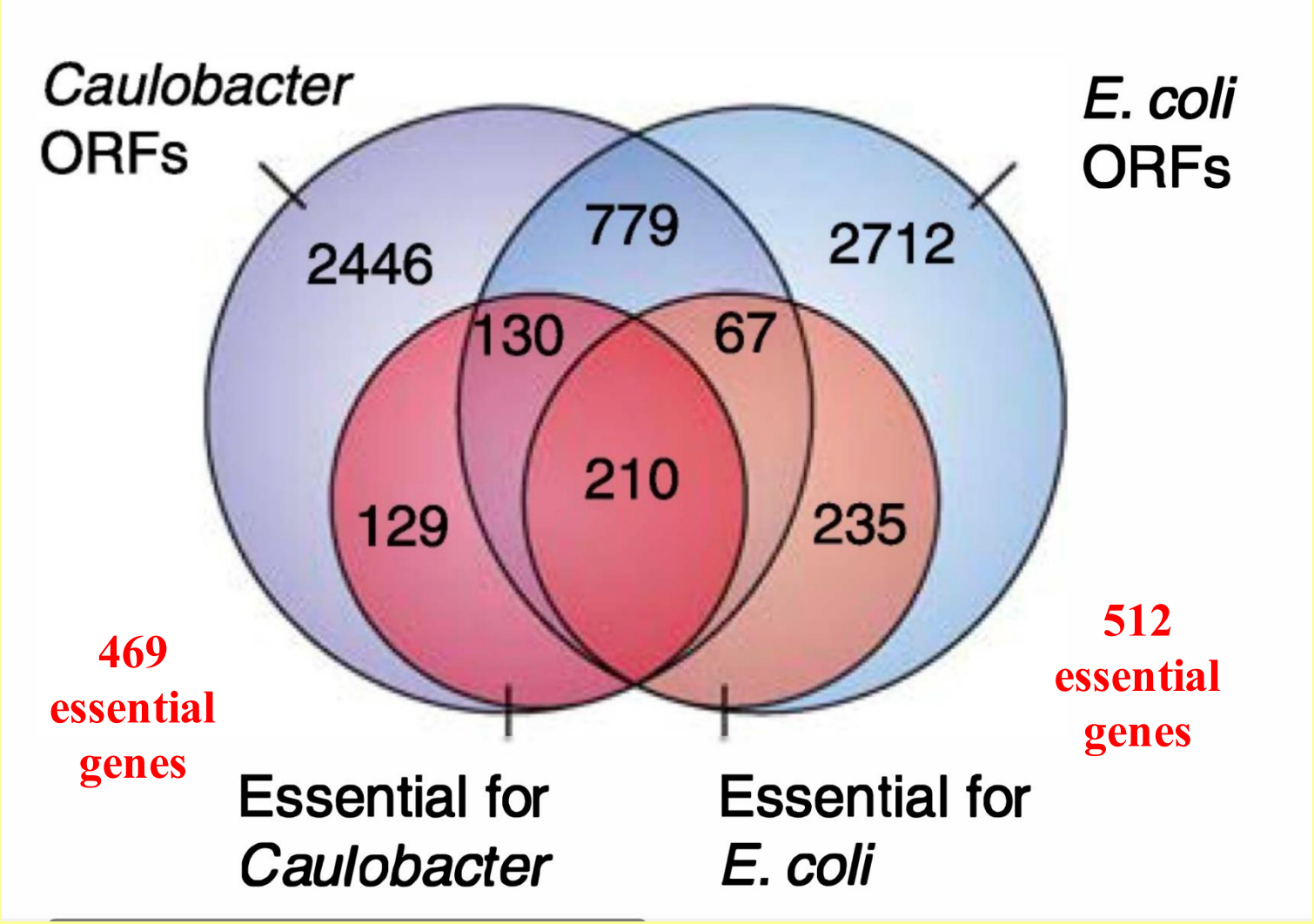
6. Sets of essential genes for different species of archaea and bacteria differ substantially. There is no universal genetic core of life.

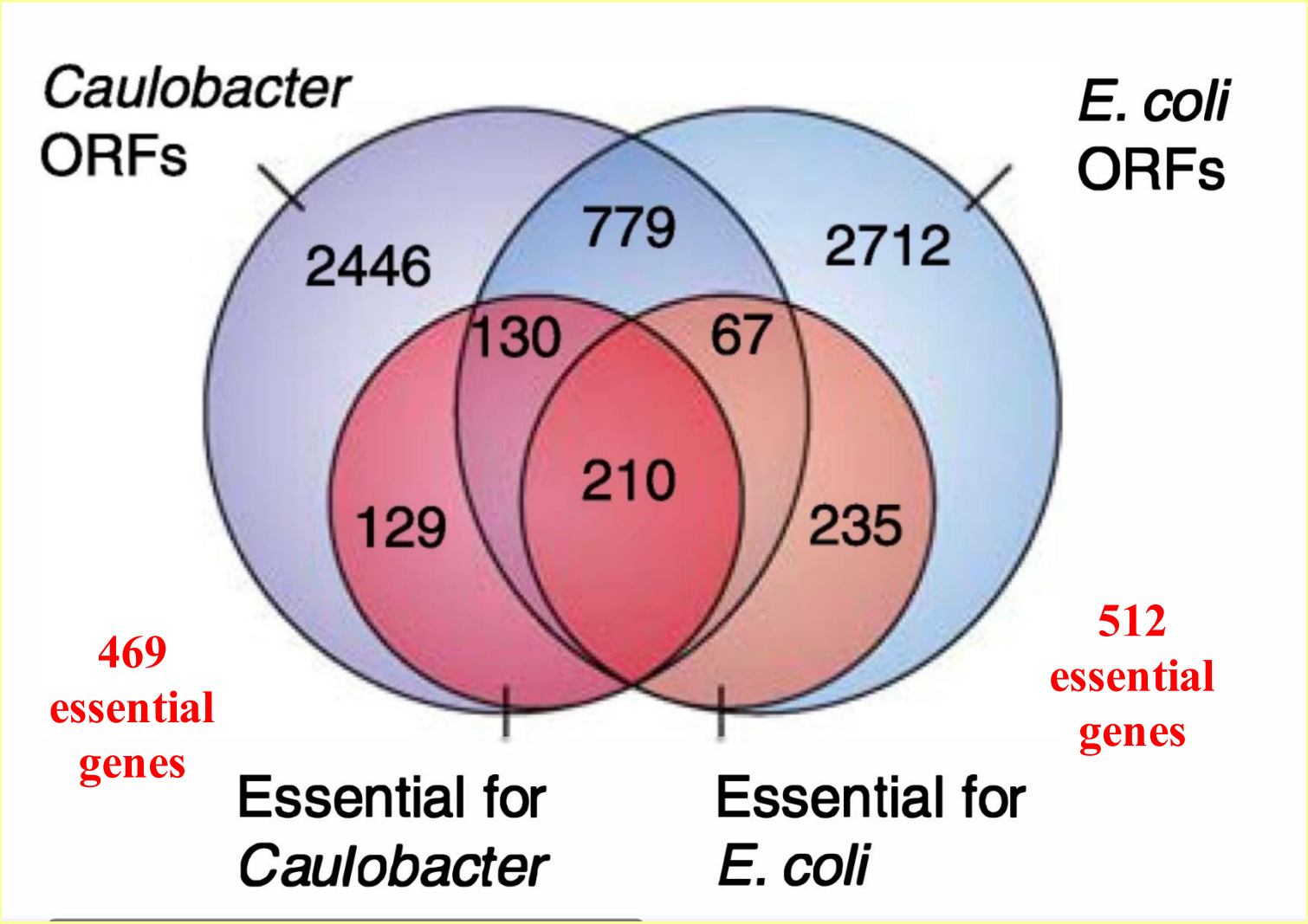
(Top-Down)

Molecular Systems Biology 7; Article number 528; doi:10.1038/msb.2011.58
Citation: *Molecular Systems Biology* 7:528
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www.molecularsystemsbiology.com

molecular systems biology

The essential genome of a bacterium





A large fraction of essential genes are not shared among these organisms!

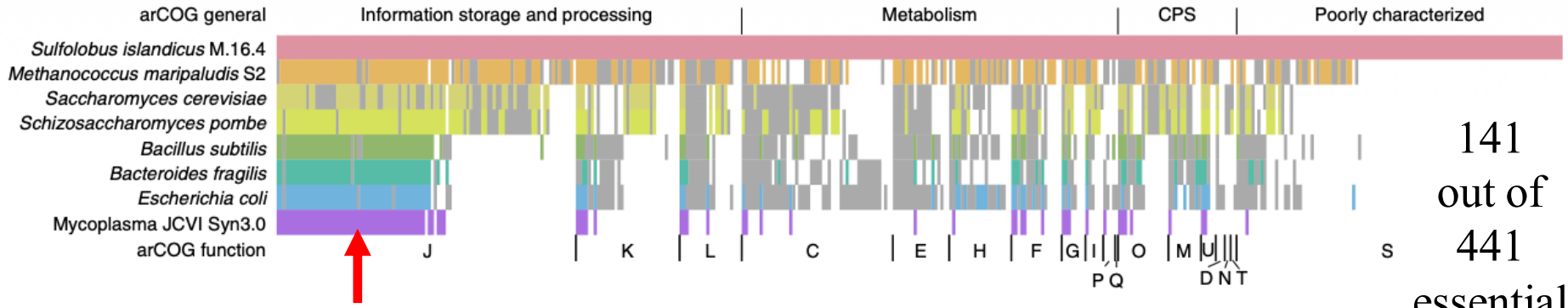
ARTICLE

DOI: 10.1038/s41467-018-07379-4 OPEN

The essential genome of the crenarchaeal model *Sulfolobus islandicus*

Changyi Zhang[1,2], Alex P.R. Phillips[1,2], Rebecca L. Wipfler[1], Gary J. Olsen[1,2] & Rachel J. Whitaker[1,2]

Nature Communications 2018



ribosome

Fig. 5 Shared essential genes across the three domains of life.

141 out of 441 essential in all

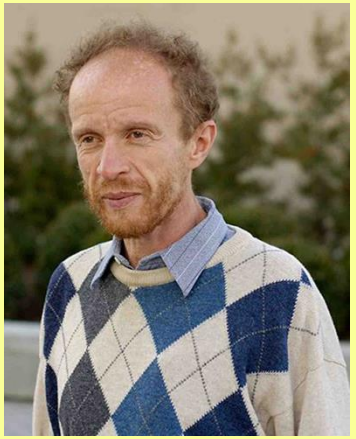
199 are uniquely essential to S islandicus

The majority of essential genes are not shared across the three domains of life!

Functional categories in the Clusters of Orthologous Groups (COGs) database

A	RNA processing and modification
B	Chromatin structure and dynamics
C	Energy production and conversion
D	Cell cycle control and mitosis
E	Amino acid metabolism & transport
F	Nucleotide metabolism & transport
G	Carbohydrate metabolism & transport
H	Coenzyme metabolism
I	Lipid metabolism
J	Translation
K	Transcription
L	Replication and repair
M	Cell wall / membrane biogenesis
N	Cell motility
O	Post-translational modification
P	Inorganic ion metabolism & transport
Q	Secondary structure
T	Signal transduction
U	Intracellular trafficking & secretion
Y	Nuclear structure
Z	Cytoskeleton
R	General functional prediction only
S	Unknown function

Evolution of the Genomic Universe, 2016



Eugene Koonin
Senior Investigator
NIH

As the genome database grows, it is becoming clear that **NOGD reaches across most of the functional systems and pathways** such that there are very few function that are truly "monomorphic, i.e. represented by genes from the same orthologous lineage in all organisms that are endowed with these functions.

Accordingly, the universal core of life has shrunk almost to the point of vanishing. All that remains ubiquitous are some 30 genes for proteins involved in translation and 3 large RNA polymerase subunits, along with an approximately equal number of structural RNA genes (rRNAs and tRNAs). … **Thus with the notable exception of a miniscule core of genes involved in the key steps of information transmission, there is no universal genetic core of life**, …

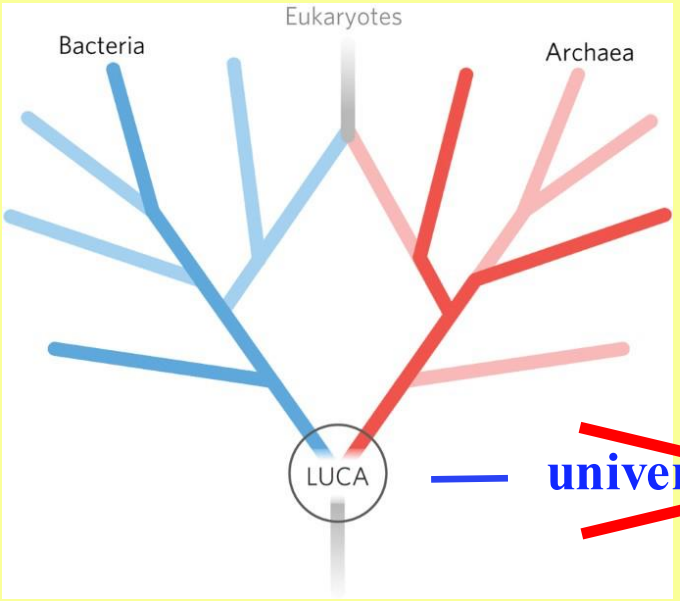
V.L. Korogodina et al. (eds.), *Genetics, Evolution and Radiation*,
DOI 10.1007/978-3-319-48838-7_35

Hypothesis since 1871

top down

"tree of life"

LUCA



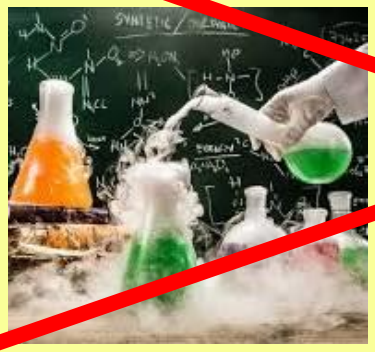
universal genetic core

First Life

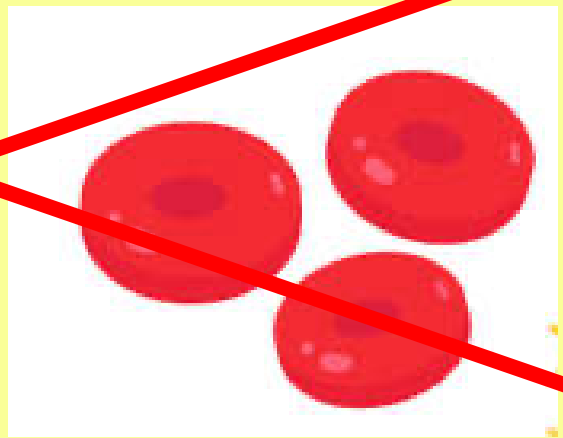
bottom up

chemistry to life

chemistry



simple cell



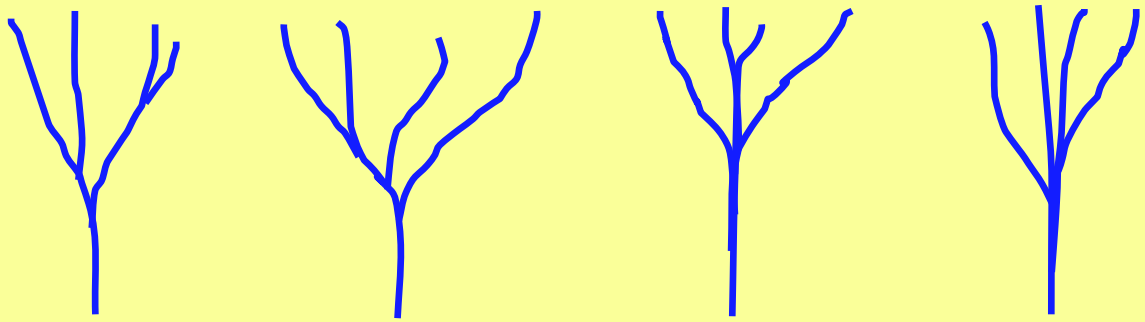
top down

"tree of life"

LUCA

First Life

genomic data supports independent designs



bottom up

chemistry to life

seems impossible!

MY VIEW: the data supports intelligent design

Disconfirming evidence

+

Commitment to methodological naturalism

lead to

Hypotheses that are even more improbable!

(far-fetched)

(bizarre)

New Hypothesis:

Non-orthologous gene displacement (NOGD)

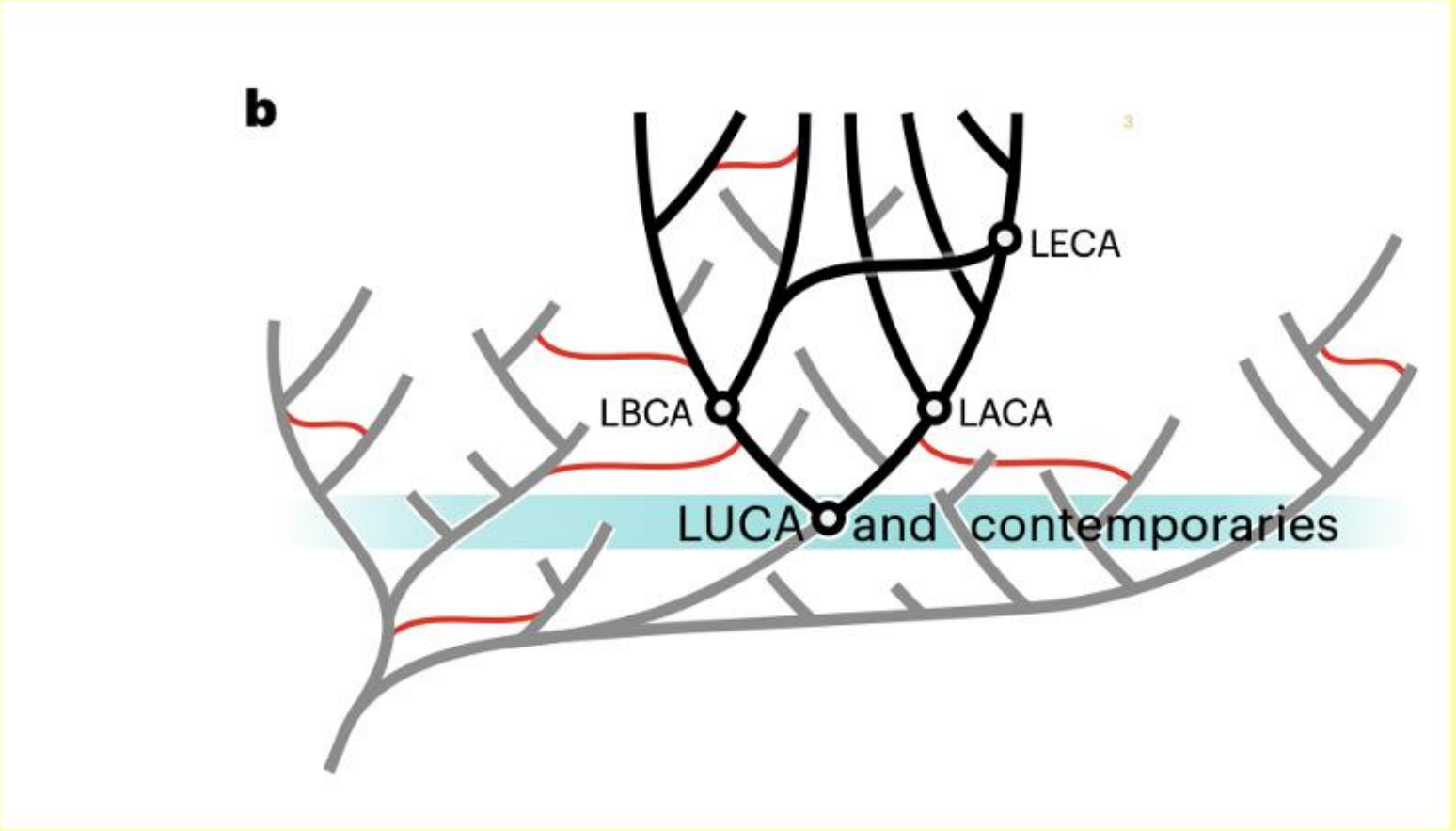
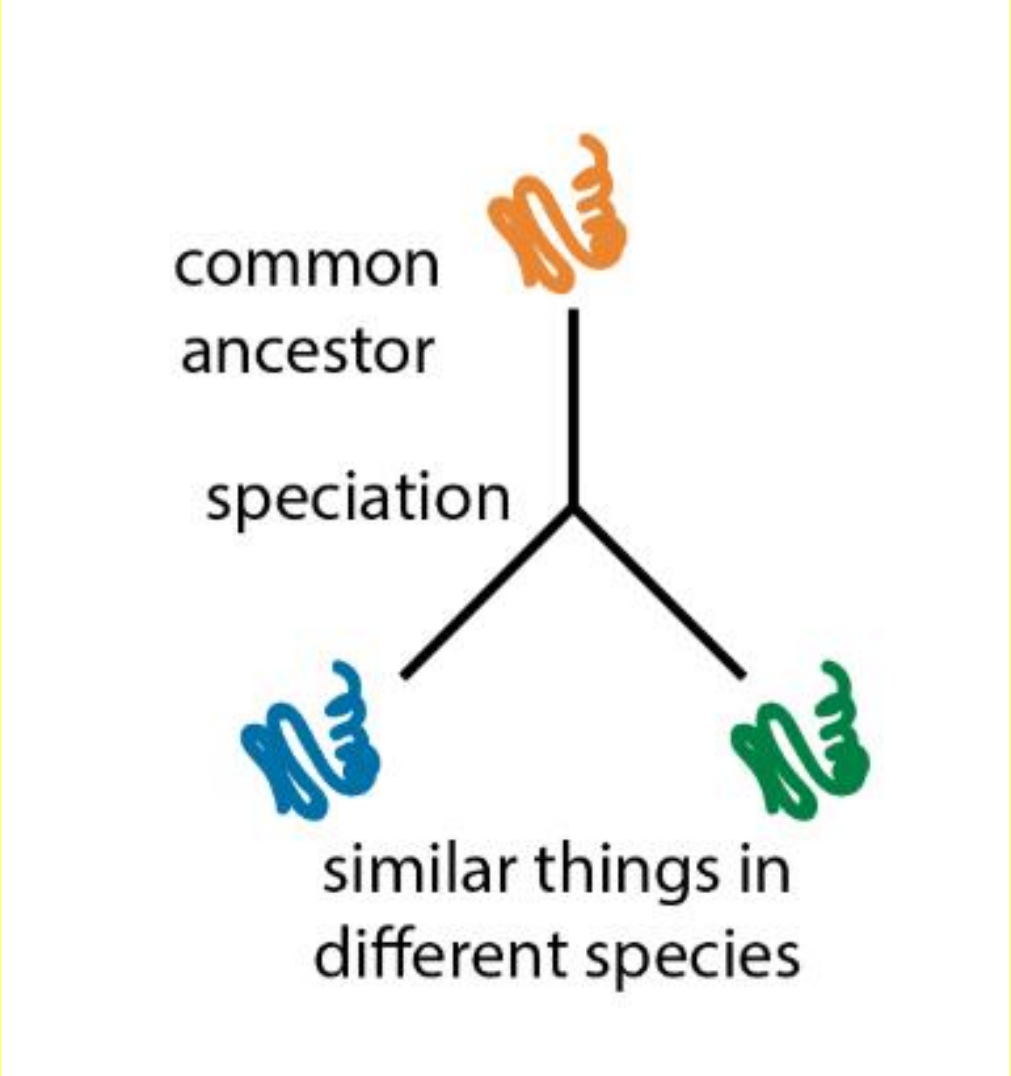


Fig 3b in Nature Ecology and Evolution, 2024, 8, 1654

Orthologous genes

Based on:

-sequence identity
-genomic context
-domain structure
etc



Non-orthologous gene displacement

Perhaps, the most consequential outcome of the minimal gene set exercise was the finding that several essential functions were missing from the list of readily detectable orthologs. This observation was dramatically reinforced by the comparison of the bacterial genomes with the first archaeal genome (*Methanocaldococcus jannaschii*) which revealed a number of additional glaring gaps in the set of conserved essential functions (Bult et al. 1996; Koonin et al. 1997). These findings have been conceptualized in the notion of non-orthologous gene displacement (NOGD), an evolutionary scenario under which unrelated or distantly related genes (not orthologs) become responsible for the same essential function in different organisms (Koonin 2003). The actual evolutionary scenario for NOGD is easy to imagine: an evolving lineage acquires an alternative, functionally redundant gene for a particular essential role and so goes through an intermediate state in which both implementations of the function in question are present (such redundancy is often observed in organisms with more complex genomes), followed by the loss of the original version (Koonin and Mushegian 1996). With the growth

"Evolution of the Genomic Universe", by E. V. Koonin in Genetics, Evolution, and Radiation 2016.

New Hypothesis:

Non-orthologous gene displacement (NOGD)

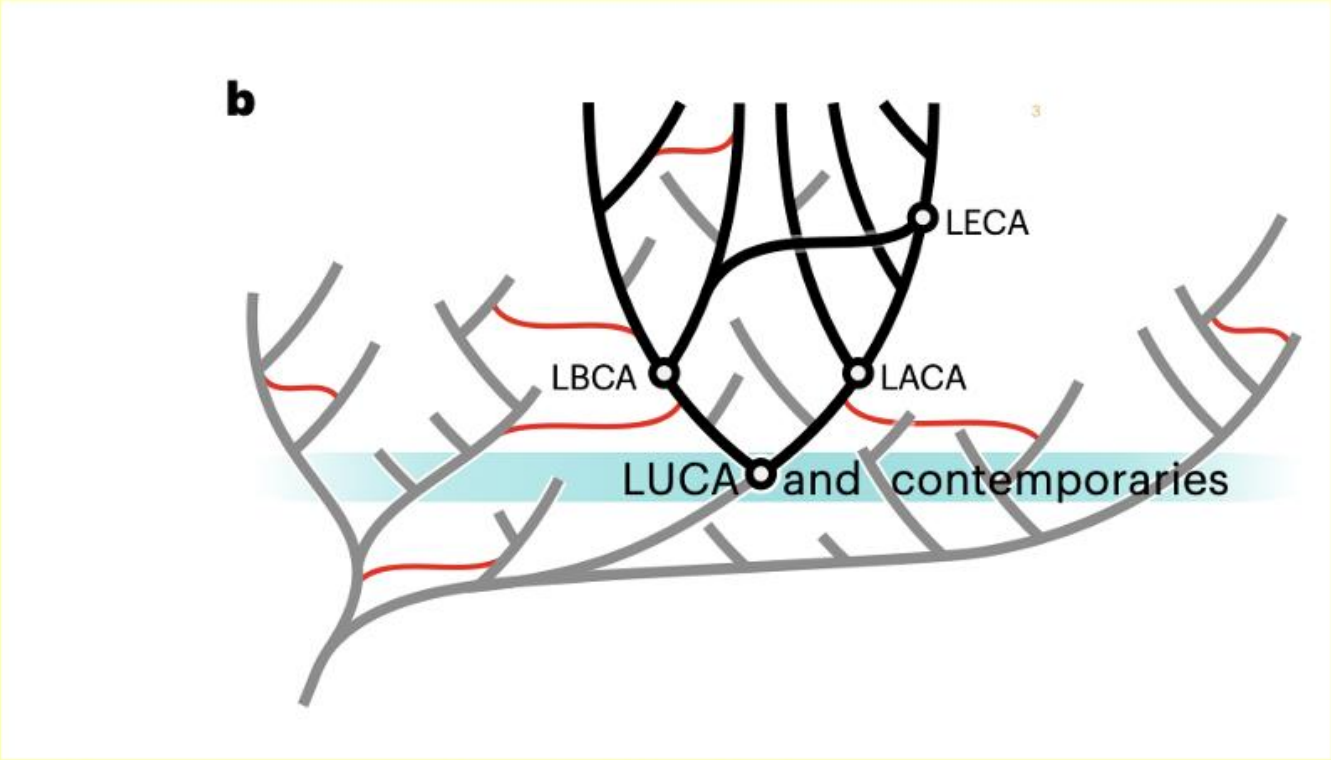


Fig 3b in Nature Ecology and Evolution, 2024, 8, 1654

-also new gene inventions
-massive gene losses

New Hypothesis:

Non-orthologous gene displacement (NOGD)

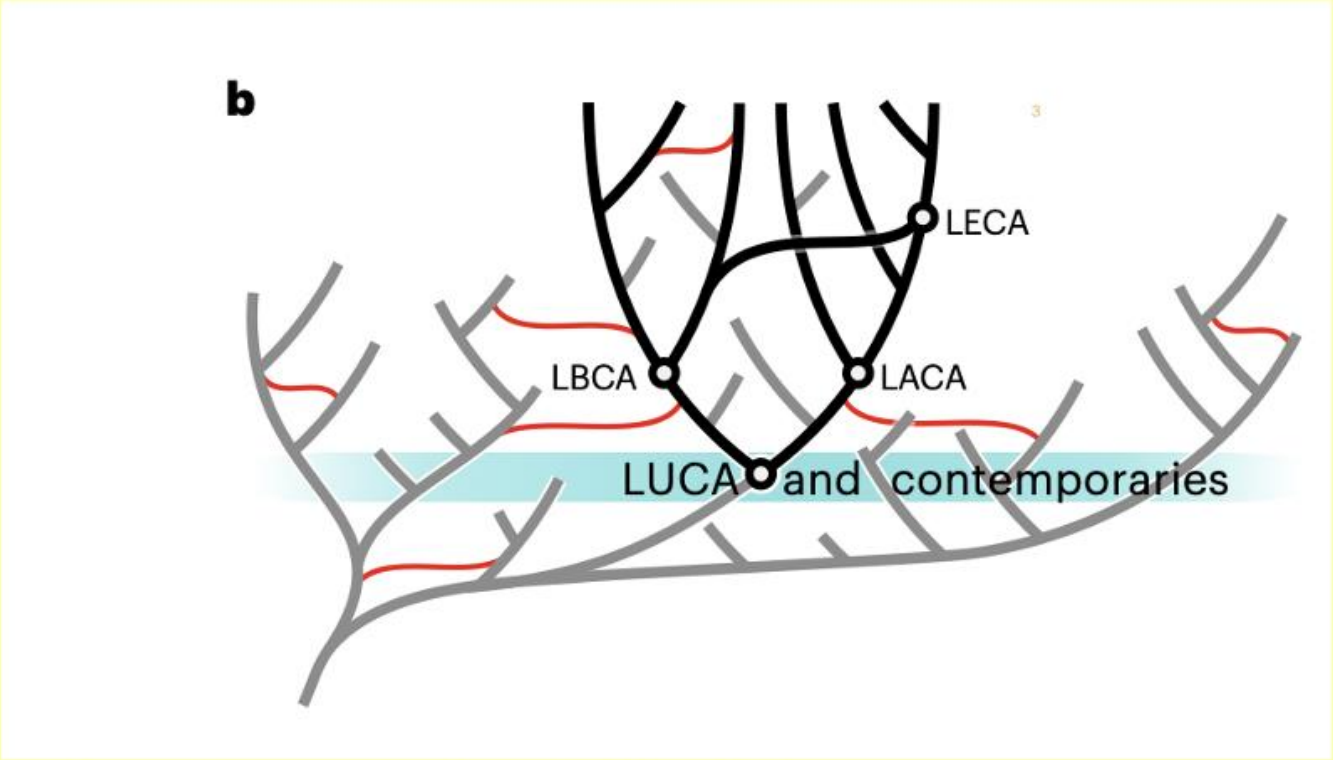


Fig 3b in Nature Ecology and Evolution, 2024, 8, 1654

-Where do non-orthologous genes come from?

-Can massive sequence divergence occur for essential genes?

-Can NOGD occur for essential genes?

nature ecology & evolution

Article

https://doi.org/10.1038/s41559-024-02461-1

The nature of the last universal common ancestor and its impact on the early Earth system

Conclusions

By treating gene presence probabilistically, our reconstruction maps many more genes (2,657) to LUCA than previous analyses and results in an estimate of LUCA's genome size (2.75 Mb) that is within the range of modern prokaryotes. The result is a picture of a cellular organism that was prokaryote grade rather than progenotic[2] and that probably existed as a component of an ecosystem, using the WLP for acetogenic growth and carbon fixation. We cannot use phylogenetics to reconstruct other members of this early ecosystem but we can infer their physiologies based on the metabolic inputs and outputs of LUCA. How evolution proceeded from the origin of life to early communities at the time of LUCA remains an open question, but the inferred age of LUCA (~4.2 Ga) compared with the origin of the Earth and Moon suggests that the process required a surprisingly short interval of geologic time.

Trends in
Microbiology

Letter

Retracing lineage history: time to emphasize genetic turnover

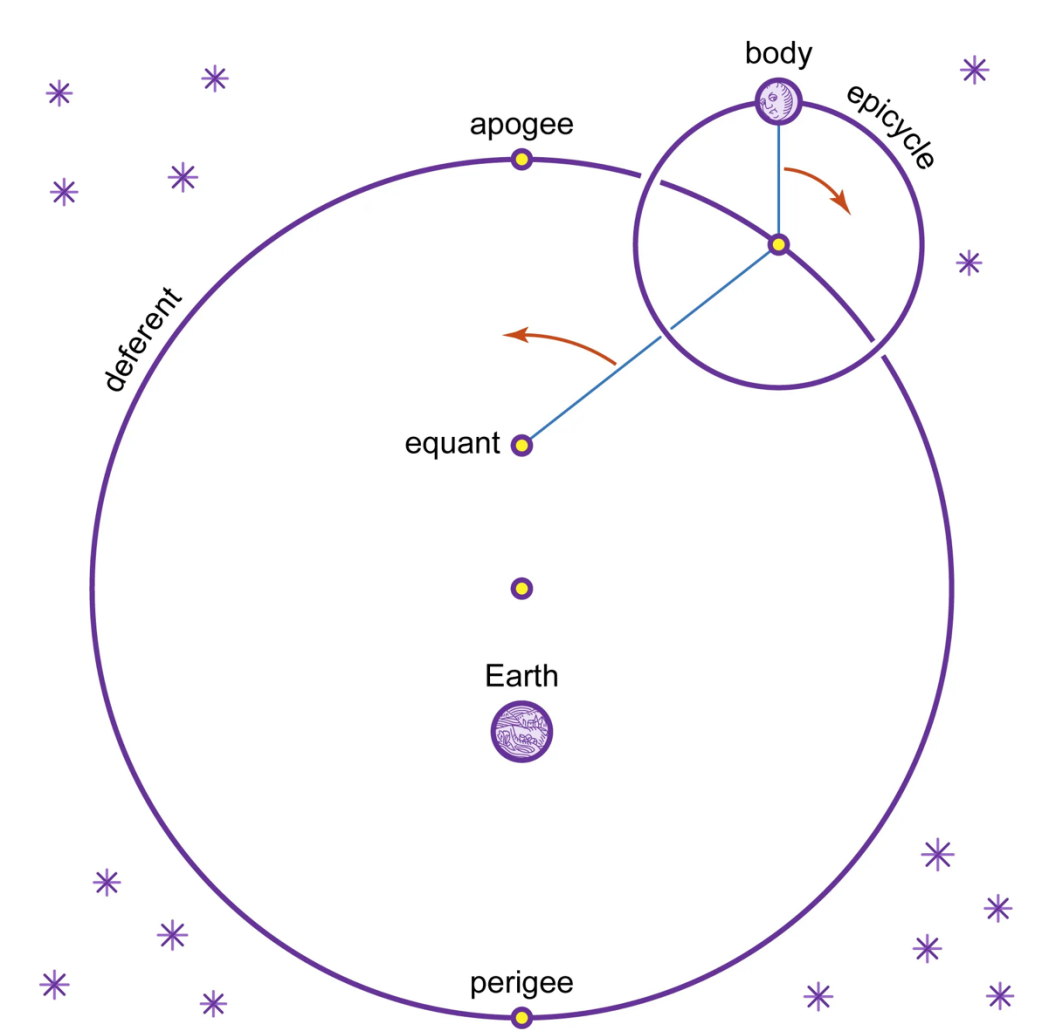
Andrew K. Watson,[1]
Philippe Lopez,[1] and
Eric Bapteste[1,*]

Strikingly, a glaring proportion of gene families is simply not shared between most cellular lineages. This observation holds true at the microevolutionary scale, for strains and species with open pangenomes [4,7].

However, the prevalence of nonshared gene families is even more true at broader evolutionary scales, that is, for lineages such as major microbial groups (Figure 1A).

otes, and bring forward an emerging question relevant at all taxonomic scales: how and why is Life massively reinventing its genes?

This hypothesis seems to me to be reminiscent of the extraordinary steps taken to try to save the geocentric model of the solar system



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Very Recent Discovery:

Sets of essential genes for different species of archaea and bacteria differ greatly. There is no universal genetic core of life!

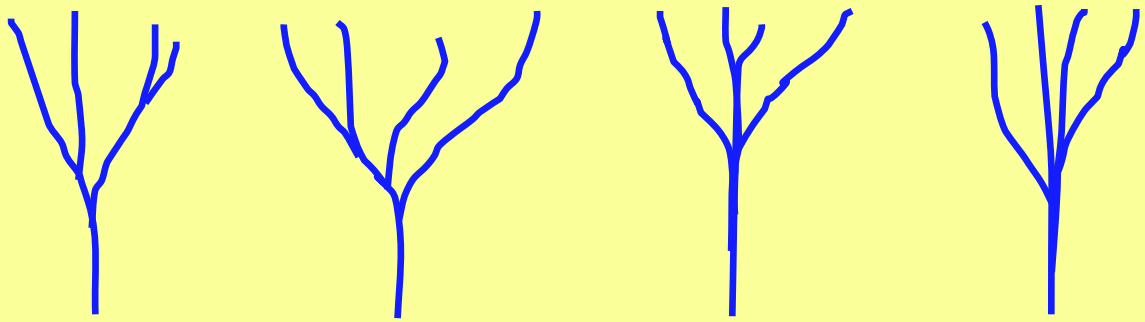
MY VIEW - The data support intelligent design!

top down

~~"tree of life"~~

~~LUCA~~

genomic data supports independent designs



First Life

---

bottom up

chemistry to life

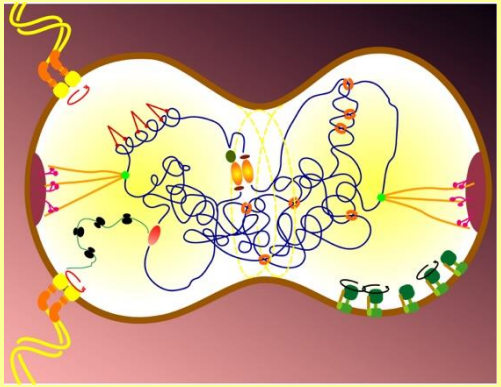
impossible!

chemistry



simplest cell

very high information density



~ 473 genes

Summary:

New hypotheses that are even more improbable (far-fetched) than the original hypotheses:

Bottom up:
Chemical "evolution" or selection prior to life

Top Down:
Non-orthologous gene displacement of essential genes

Summary: Ideas to explain life:

1. **Infinite universes**

my view

2. **A simpler form of "life" came before the current forms and has since vanished.**

3. **Life was designed by an intelligence**

   i). **Life on earth was seeded by aliens**

   ii). **Life on earth is the result of a computer programmer**

   ii). **Life on earth is the result of an intelligence outside of nature (God)**