

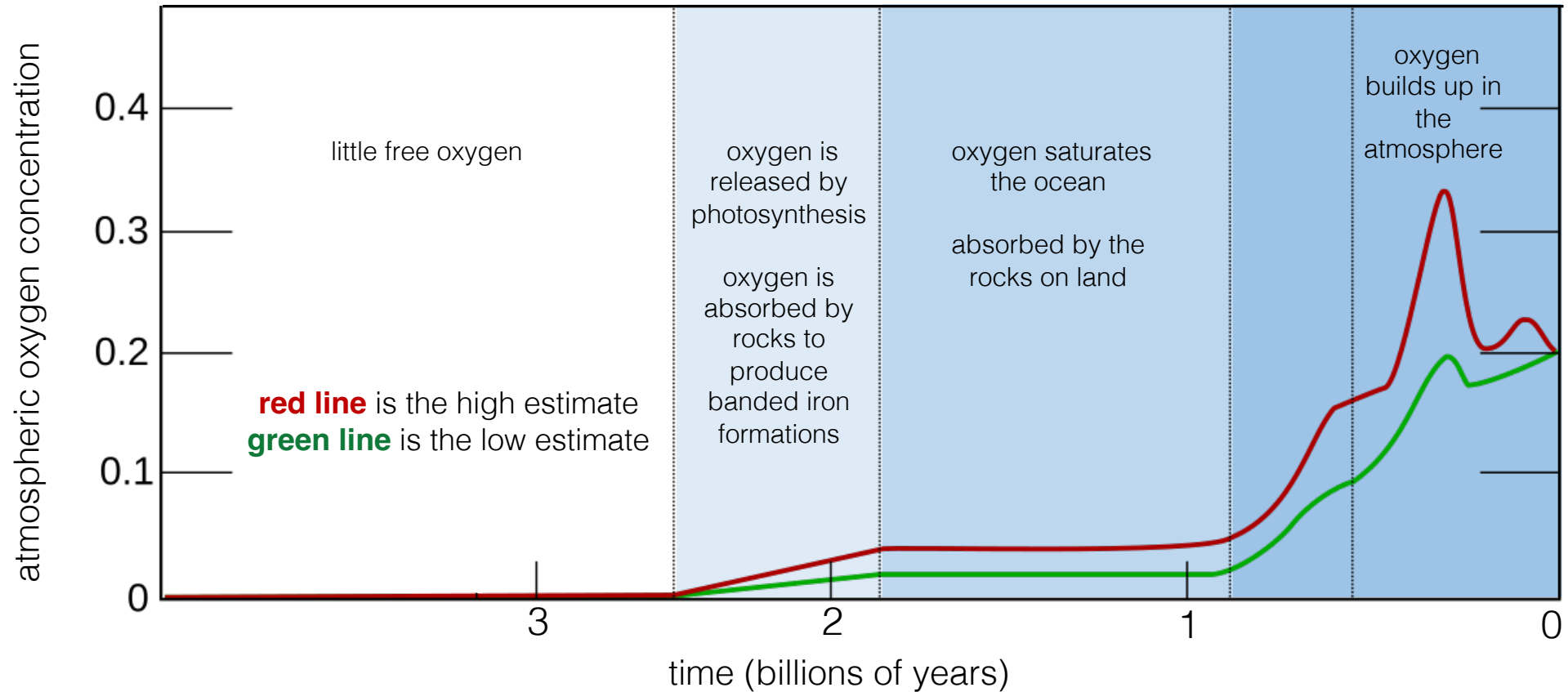
A2.1

Cell Origins

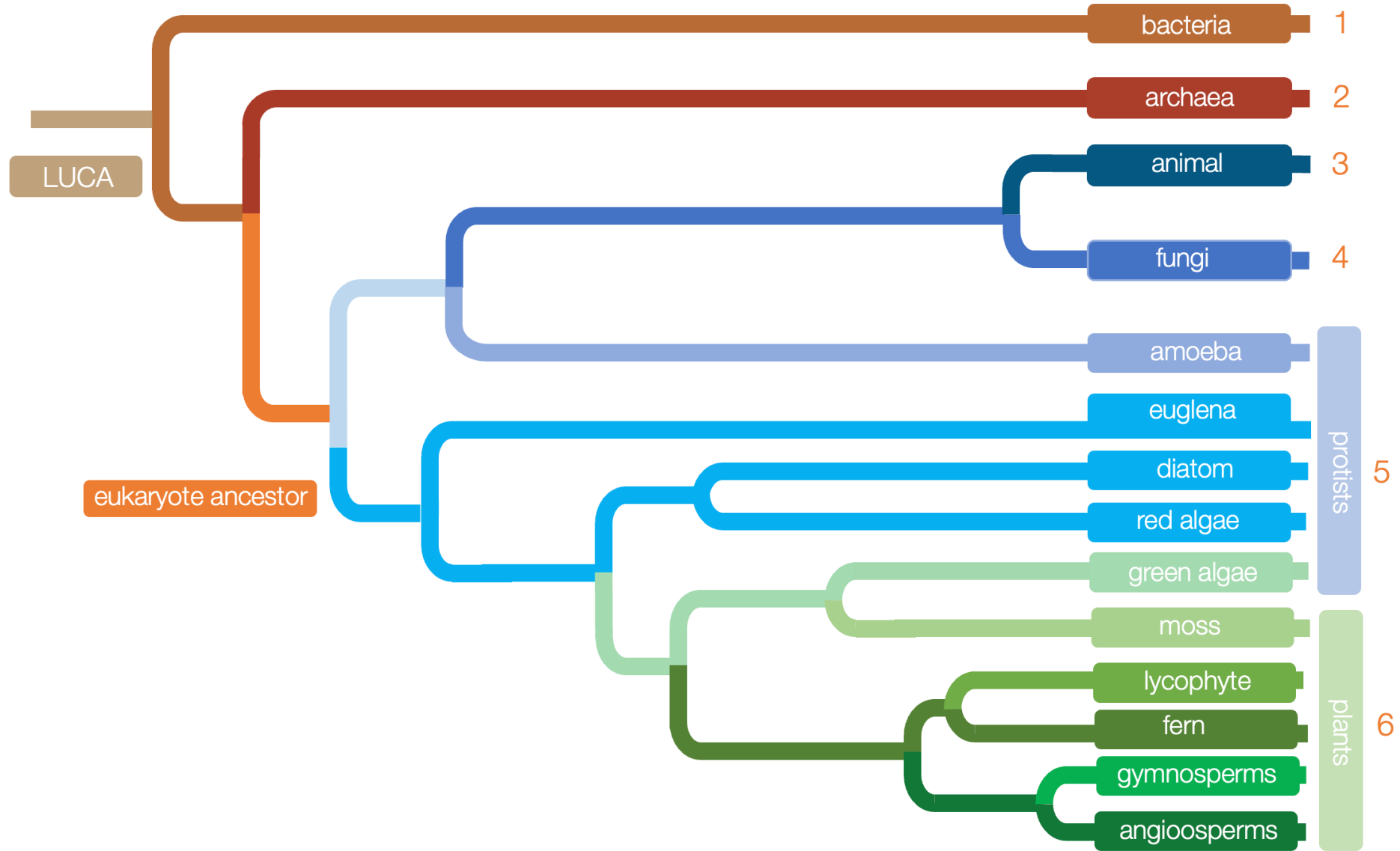
What plausible hypothesis could account for the origin of life?

What intermediate stages were there between non-living matter and the first living cells?

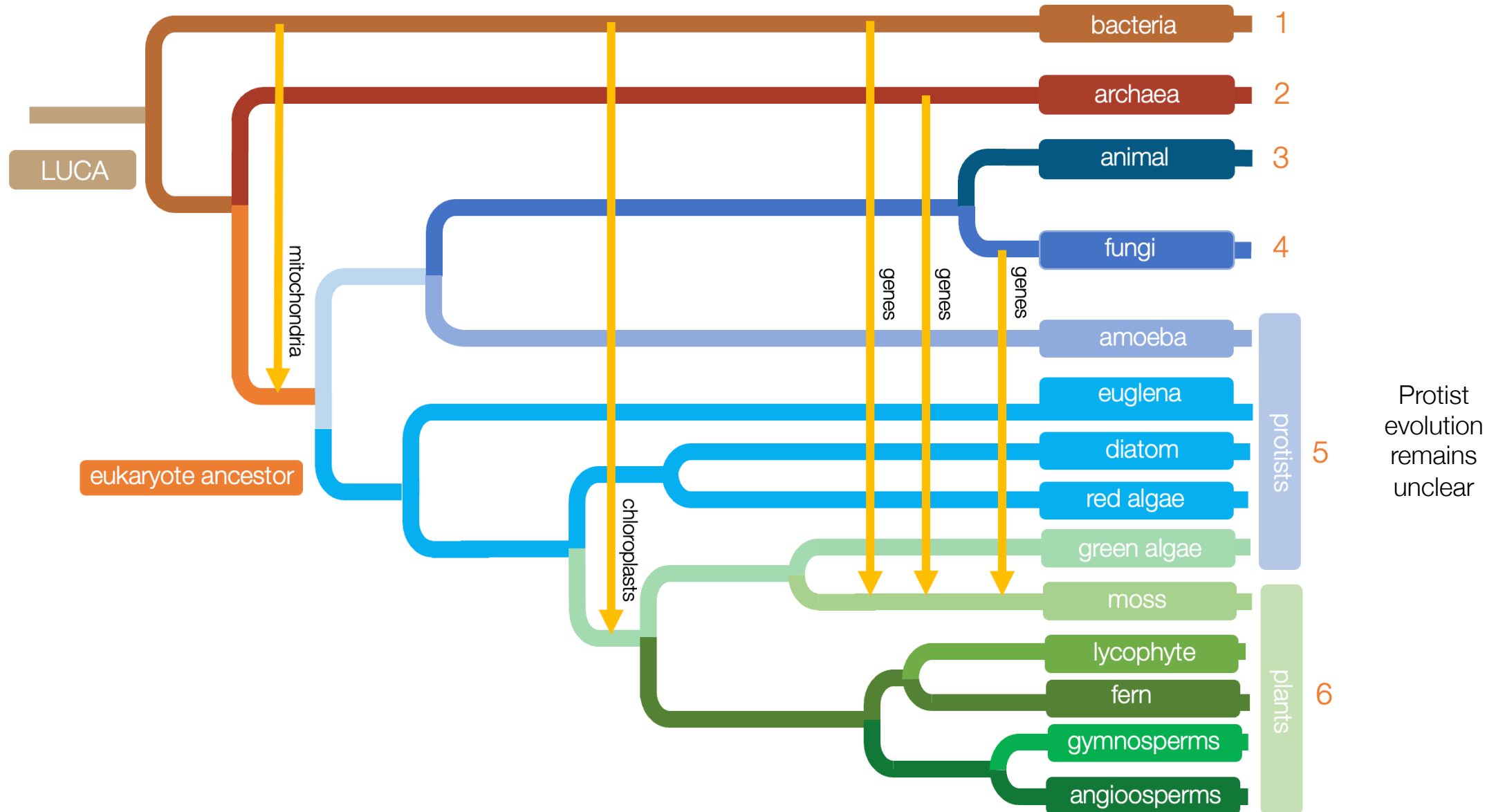
Great Oxygenation Event



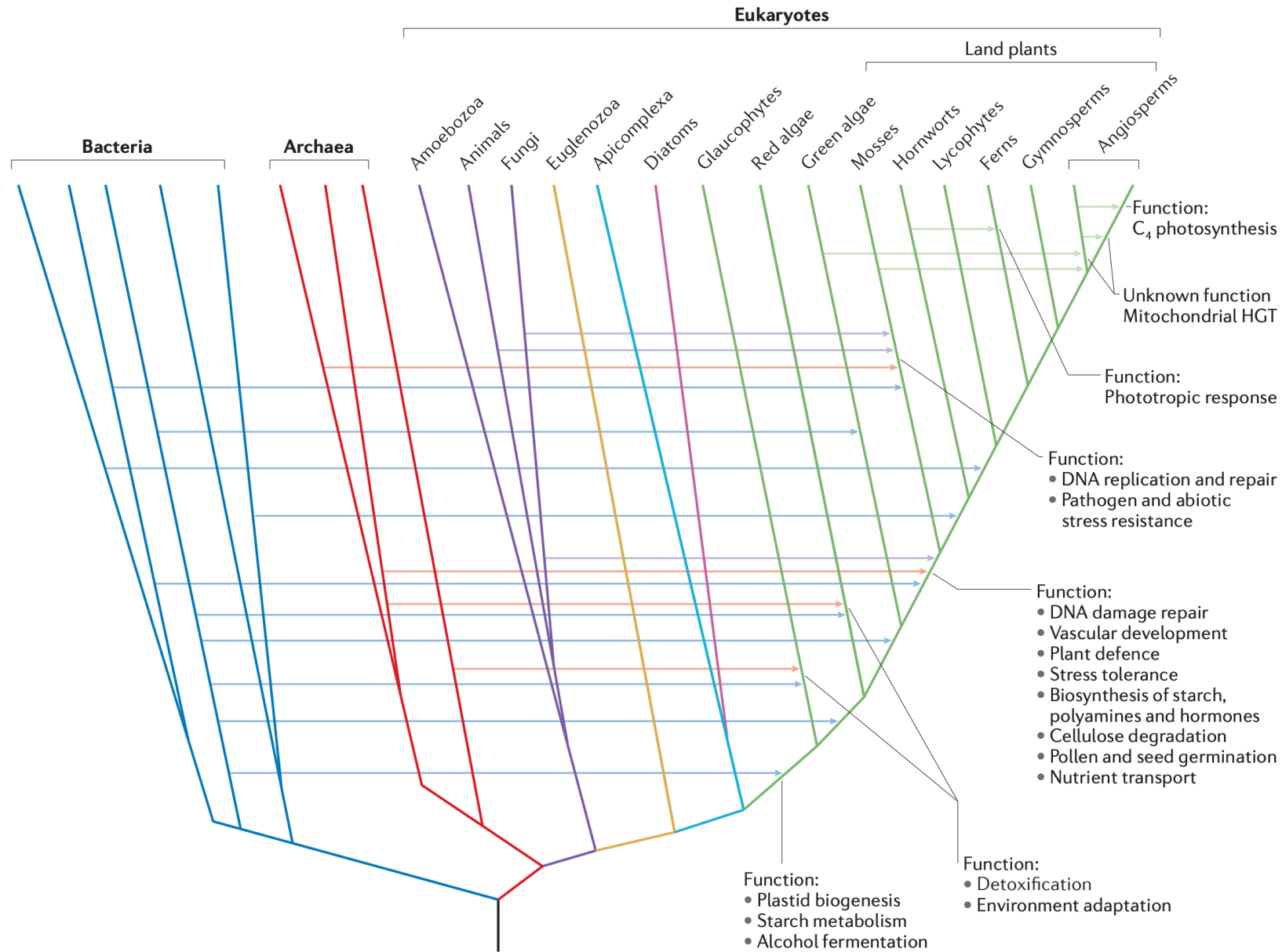
The Tree of Life Model - Six Kingdoms



The Tree of Life Model - Six Kingdoms



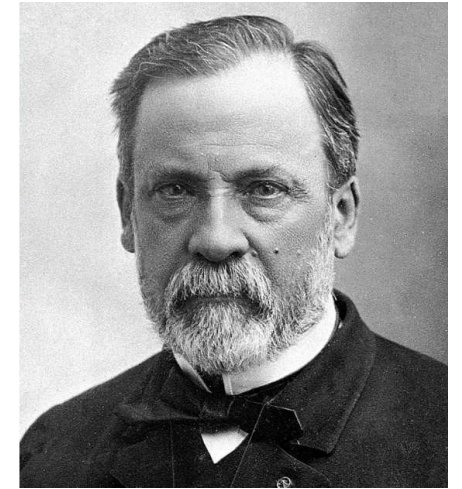
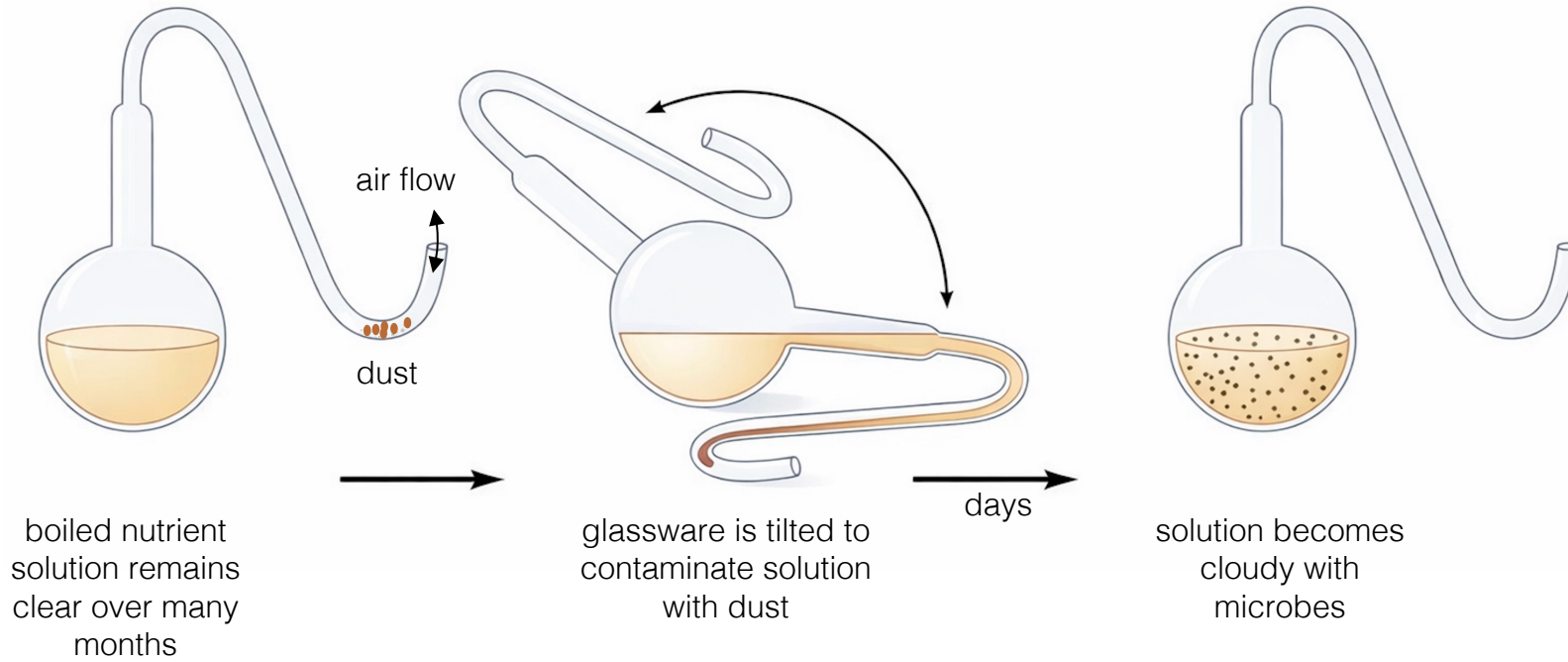
Horizontal Gene Transfer (HGT) is the sharing of genetic material between organisms that are not in a parent-offspring relationship.



The 'tree of life' model shows the descent of species from a common ancestor by vertical sharing of genes from parents to offspring.

The 'web of life' model takes into account the horizontal sharing of genes - especially between prokaryotes.

These genes were not passed from parent to offspring but from other species.



[Britannica](#)

Never will the doctrine of spontaneous generation recover from the mortal blow struck by this simple experiment.

Louis Pasteur

adapted from Pearson 2004

Optional Extension
SETI



Fort Worth Star-Telegram

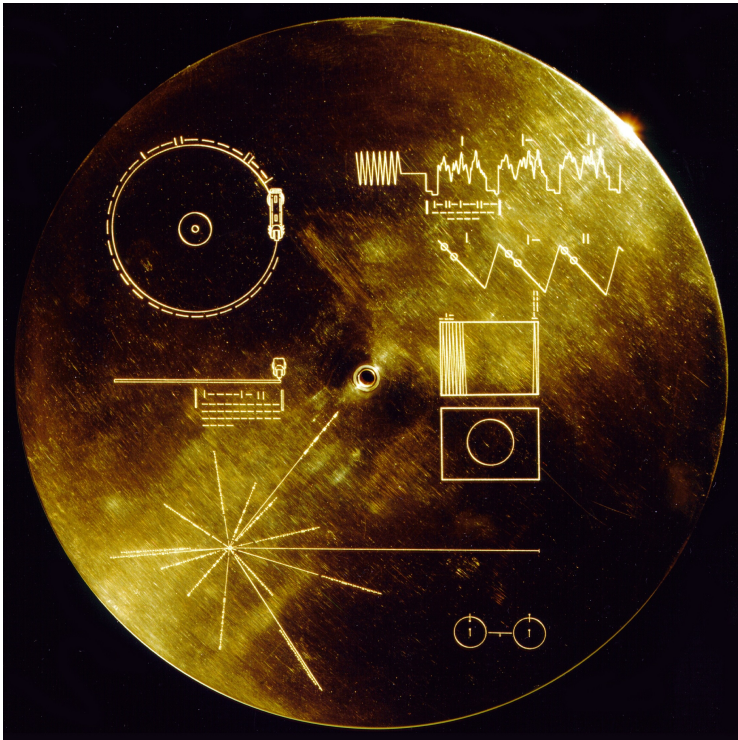
Was life seeded on Earth by aliens?

SETI is the search for extraterrestrial intelligence.

Is detection of intelligence scientifically testable?

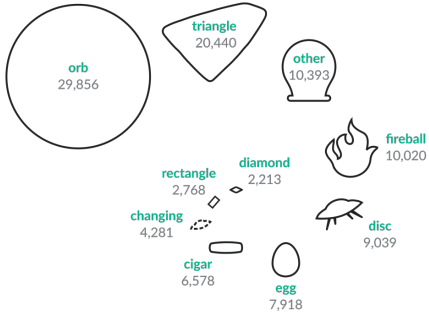
What travel distances are possible for physical beings?

Astrobiology is the study of the origin of life in the universe.



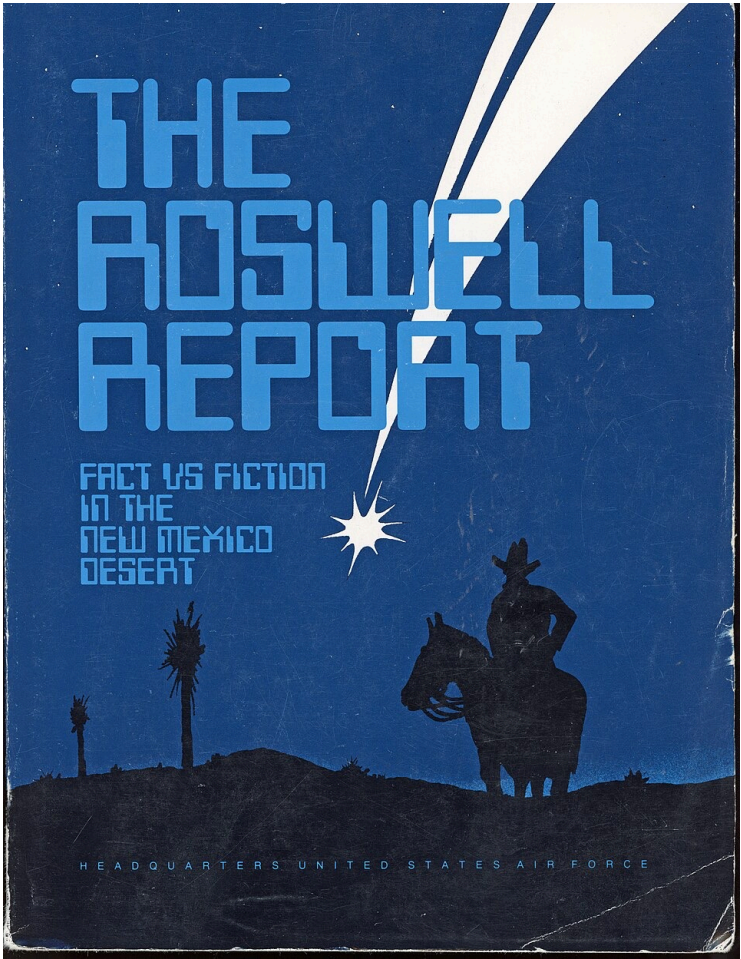
Public Domain

Contents of The Golden Record



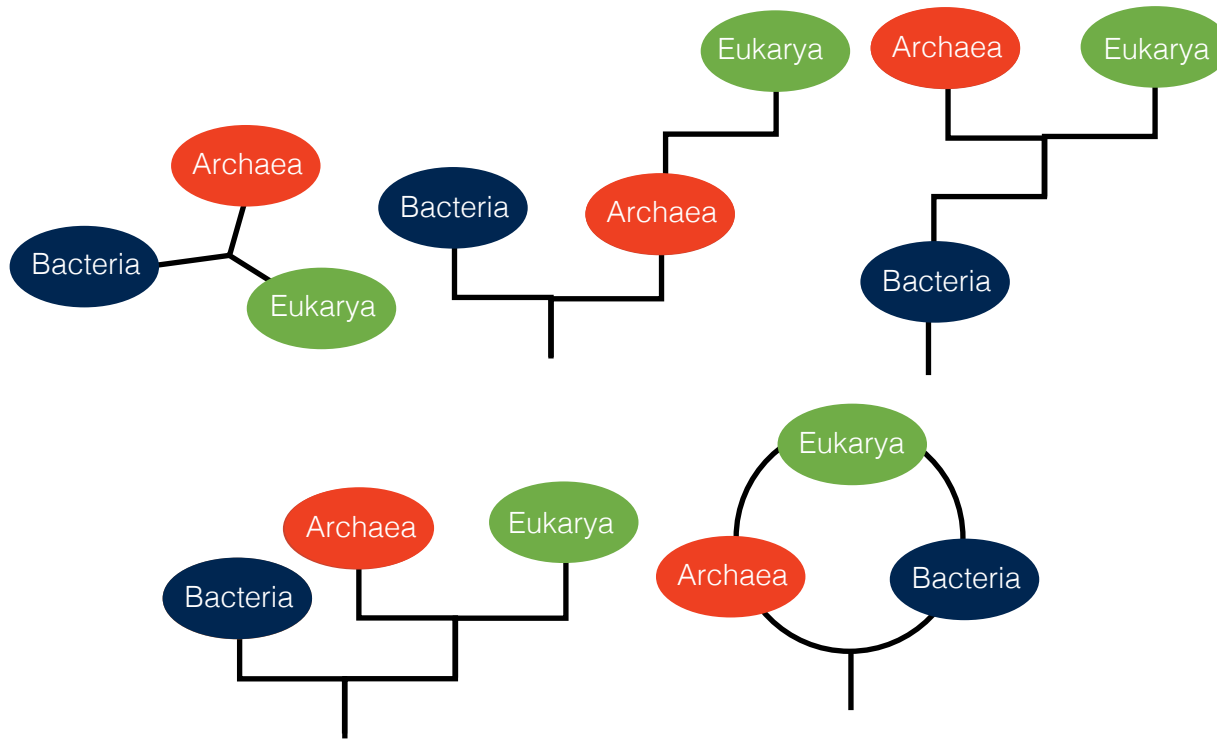
Jones et al

Commonly reported UFO shapes



Weaver and McAndrew

Is there an Alien Intrusion?



The nested hierarchy is not perfect. Groups that are unrelated with no evolutionary relationship often share a certain number of genes and features.

How did these encode themselves in unrelated groups?

Explanations include:

- horizontal gene transfer
- endosymbiosis
- convergent evolution

Extension:

Another hypothesis would be intelligent design - just as software engineers reuse certain coding in separate programs - it appears some genes are reused in unrelated groups where the coding is most efficient. This would produce a netted nested hierarchy.

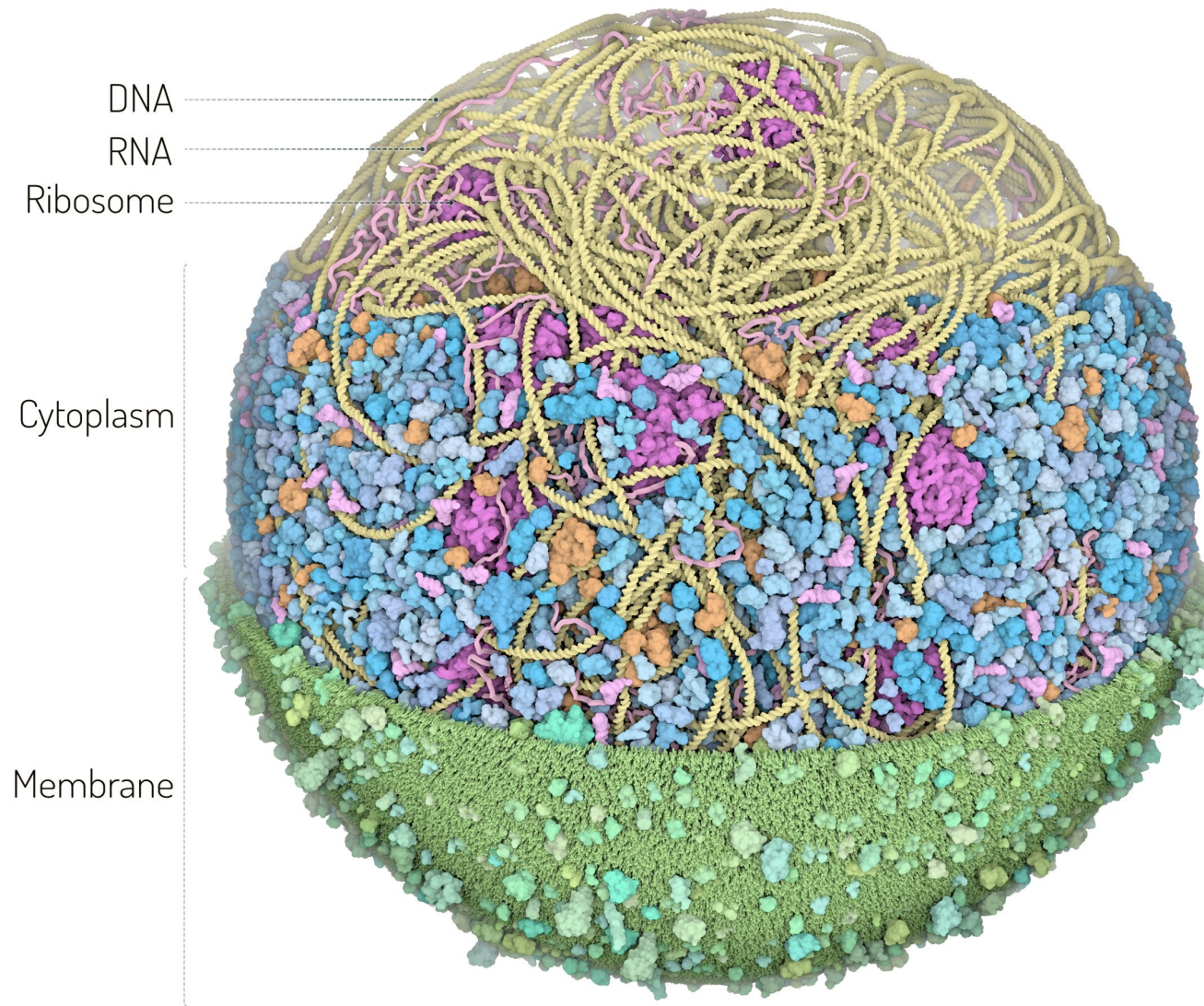


[obelisk art history](#)

Moss contain genes from unrelated groups making it an example of a chimera species.

chimera – a mythical creature from Greek mythology

Horizontal gene transfer produces organisms that have features of different species.



[Image by Martina Maritan, Scripps Research](#)

Mycoplasma genitalium - a bacteria with one of the smallest known genomes.

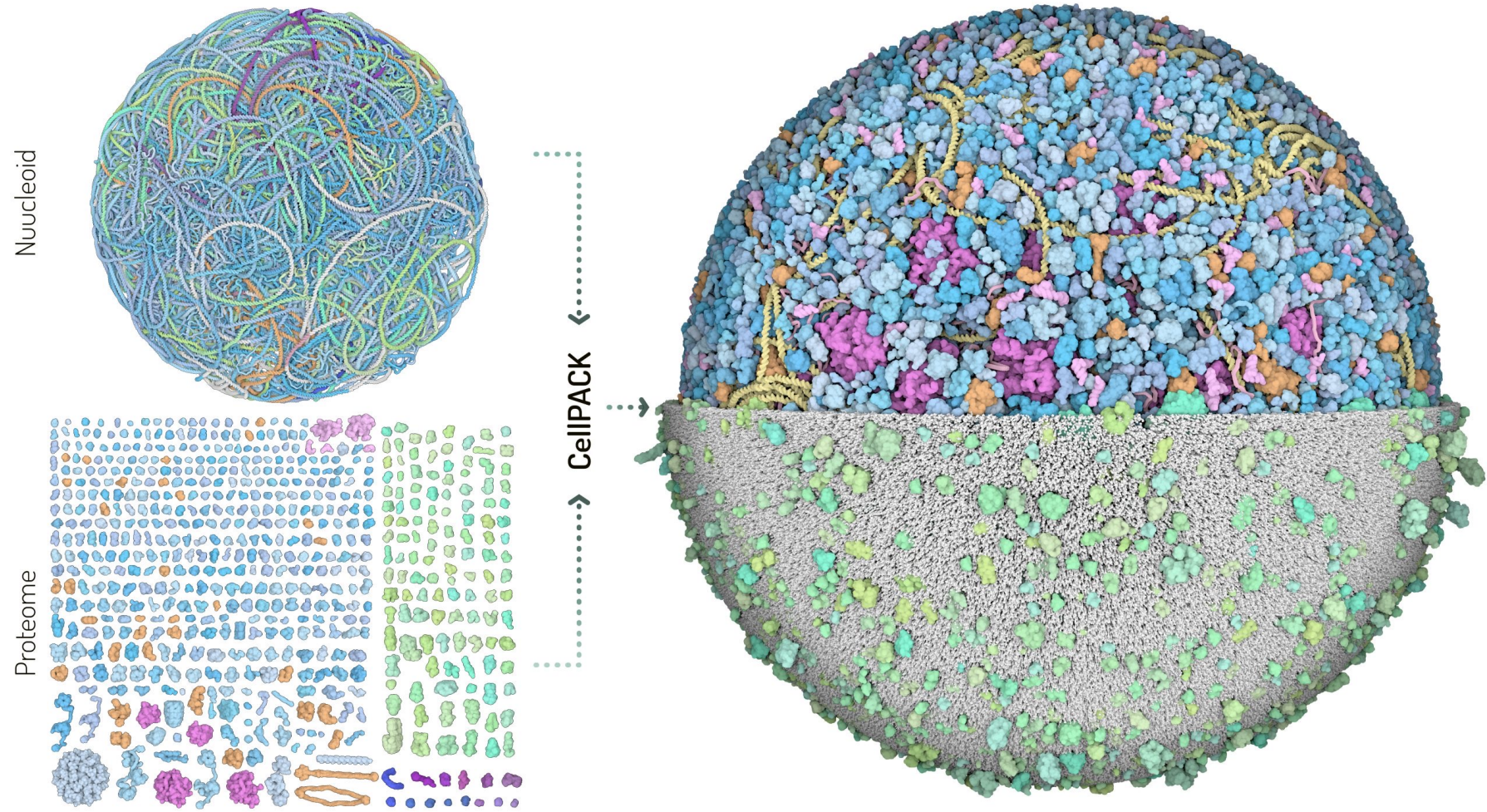
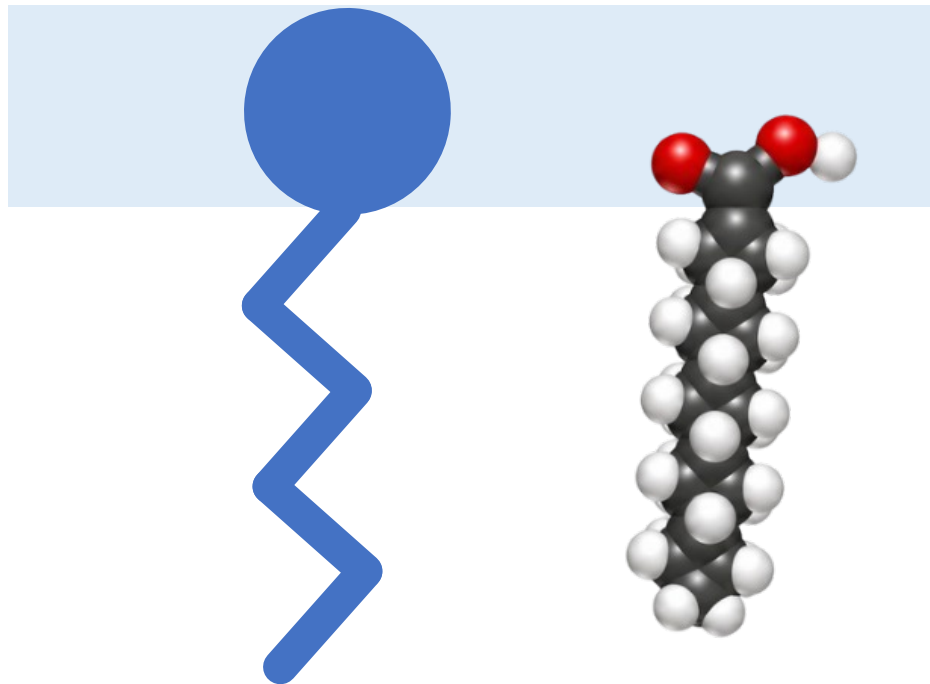


Image by Martina Maritan, Scripps Research

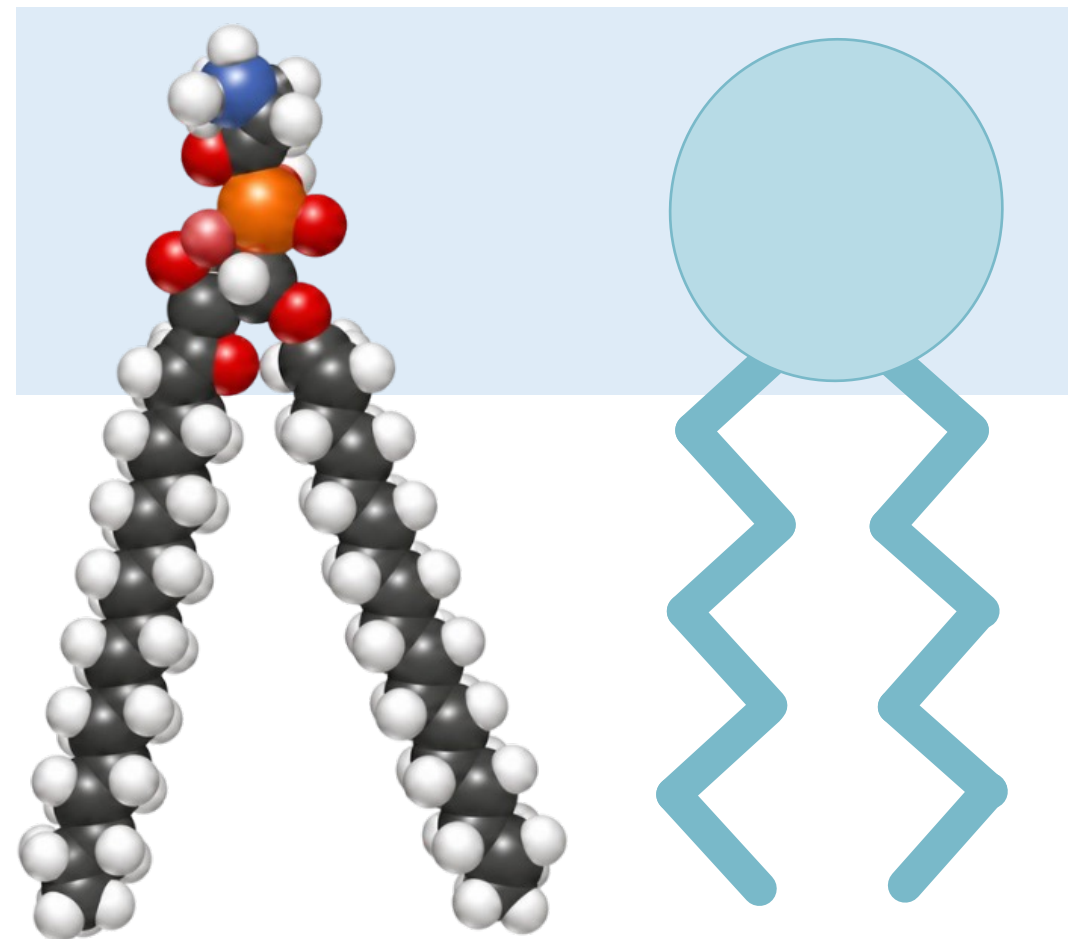
Mycoplasma genitalium a bacteria with one of the smallest known genomes.



hydrophilic
heads

hydrophobic
tails

fatty acid



phospholipid



carbon



hydrogen



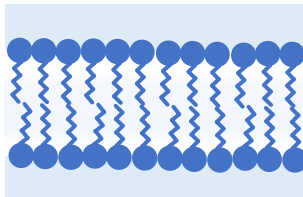
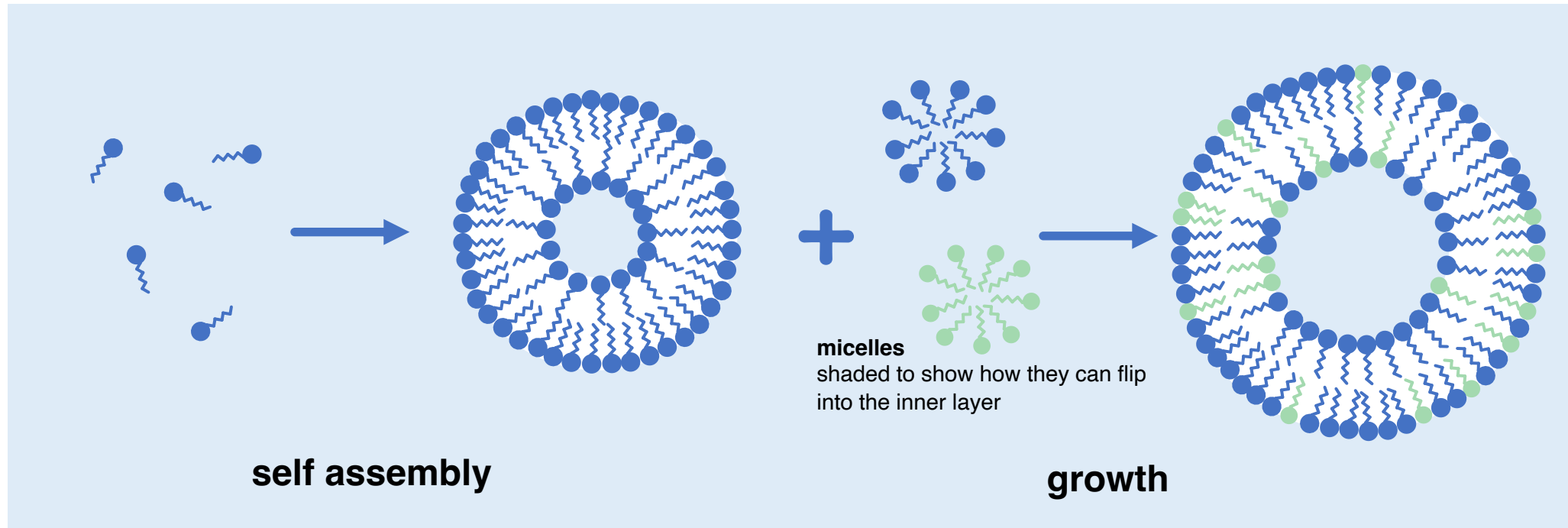
oxygen



phosphorus



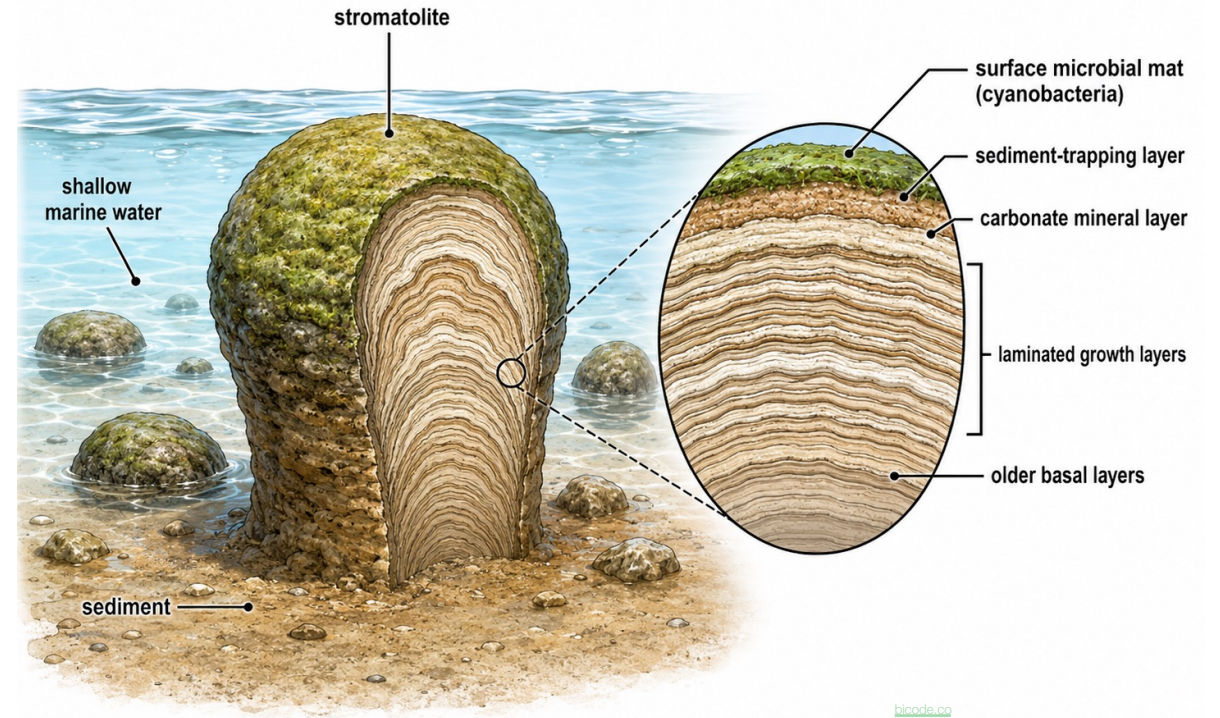
nitrogen



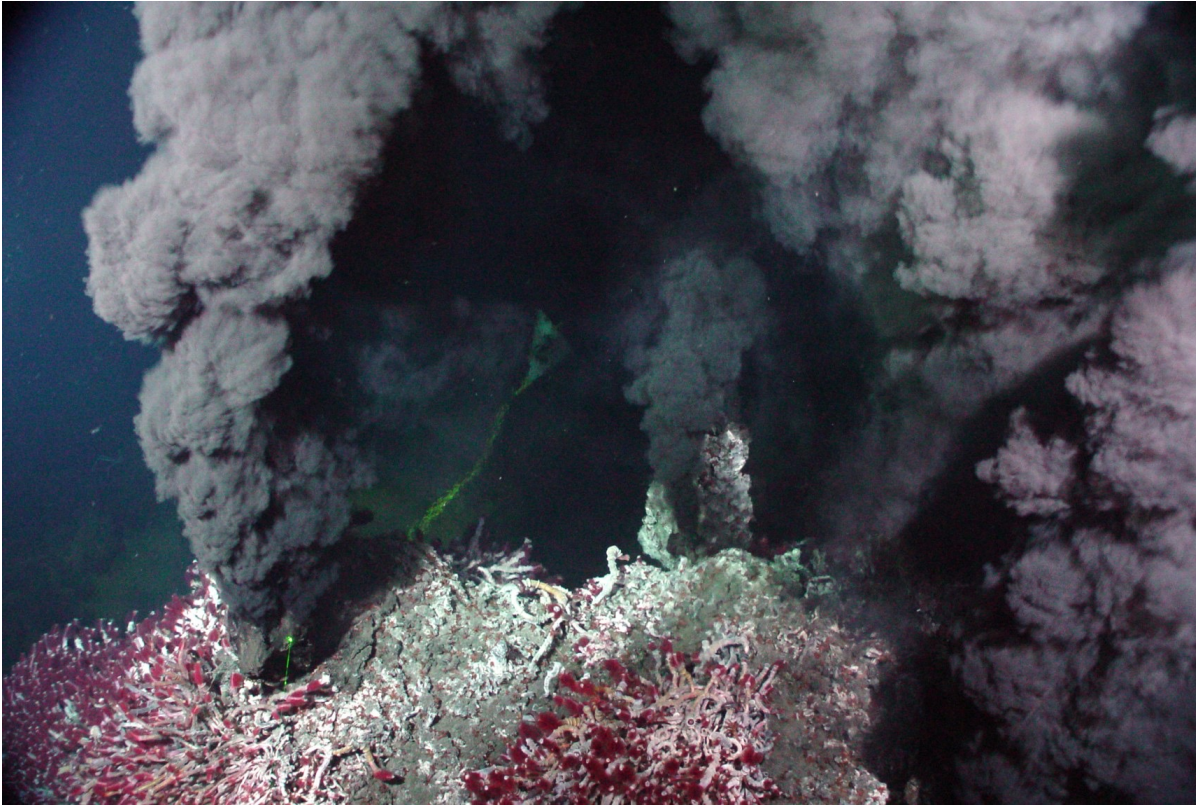


[wikimedia](#)

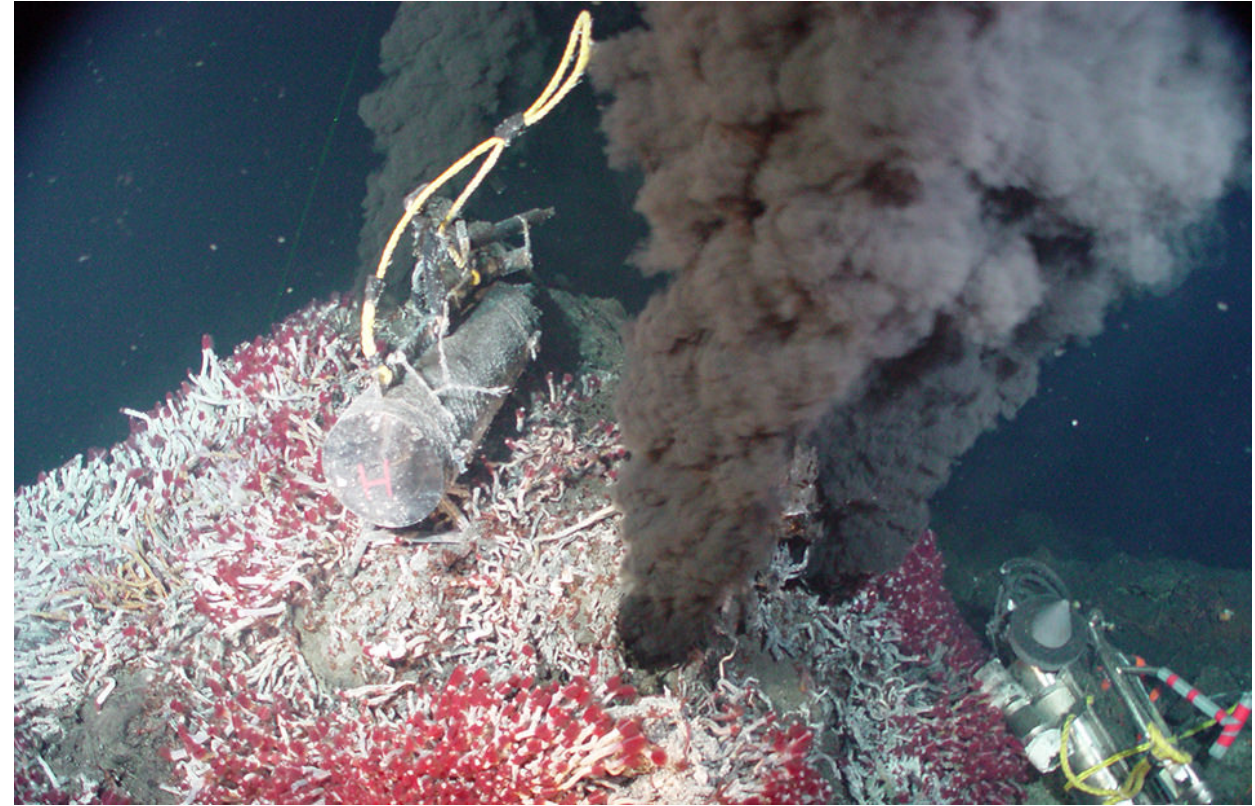
fossil stromatolite



[picode.cn](#)



NOAA



NOAA

One hypothesis is that life originated from shallow or deep sea hydrothermal vents. Each hypothesis comes with various possibilities and challenges.

RNA and DNA are clearly too unstable to exist in a hot prebiotic environment.

Stanley Miller and Antonio Lazcano 1995

*You think you're alone out on the range
Sittin' silent under starry sky,
Just a marvelin' at the universe
And wonderin' 'bout that ol' question: why?*

*You shake your head at worlds of worry,
Knowin' it ain't often that you'll find,
All the answers to your queries
Beneath the clear black sky and pine.*

*You wonder if we rose up from mud
And walked straight and tall upon this earth—
Or was it all created in a moment—
A conception that gave us true birth.*

*Are we all no more than those monkeys
Evolvin' slowly down life's long line?
Or is there more to earth and heaven
Touched by something truly sublime?*

*We keep on punchin' clocks and cattle
And tryin' to get through each new morn—
But is there more to life than dyin'
And will we somehow be reborn?*

*All the cattle know my hard proddin'
As I lead them along time's sad way—
We live for but a flashin' moment,
As we watch life go by in one short day.*

*So make the best of trails you ride, cowboy—
Each tomorrow is both yours and mine—
And gaze long at stars in that vast sky
Placed there by intelligent design.*

By L. Glen Enloe



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Jack Sorenson Fine Art

