



# THE TREE OF ONE PERCENT

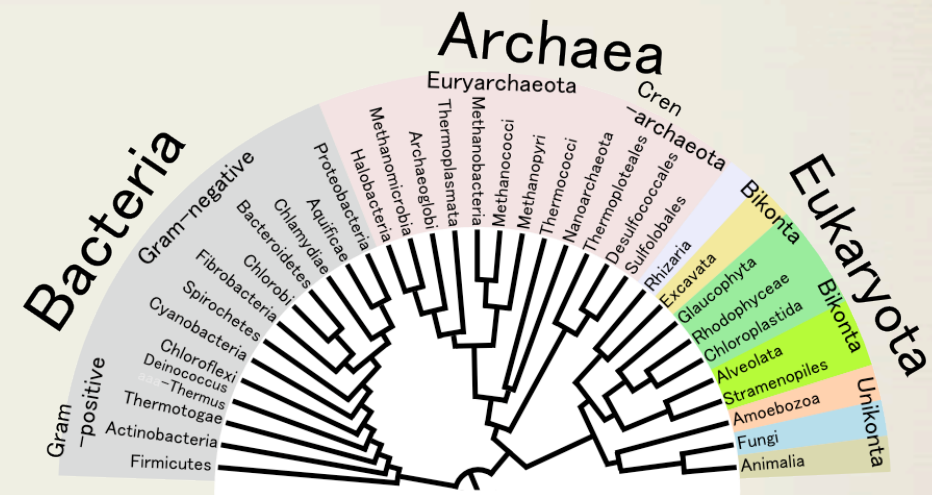
Paper by Tal Dagan and William Martin

Presentation by Daniel Standage and Duane Johnson

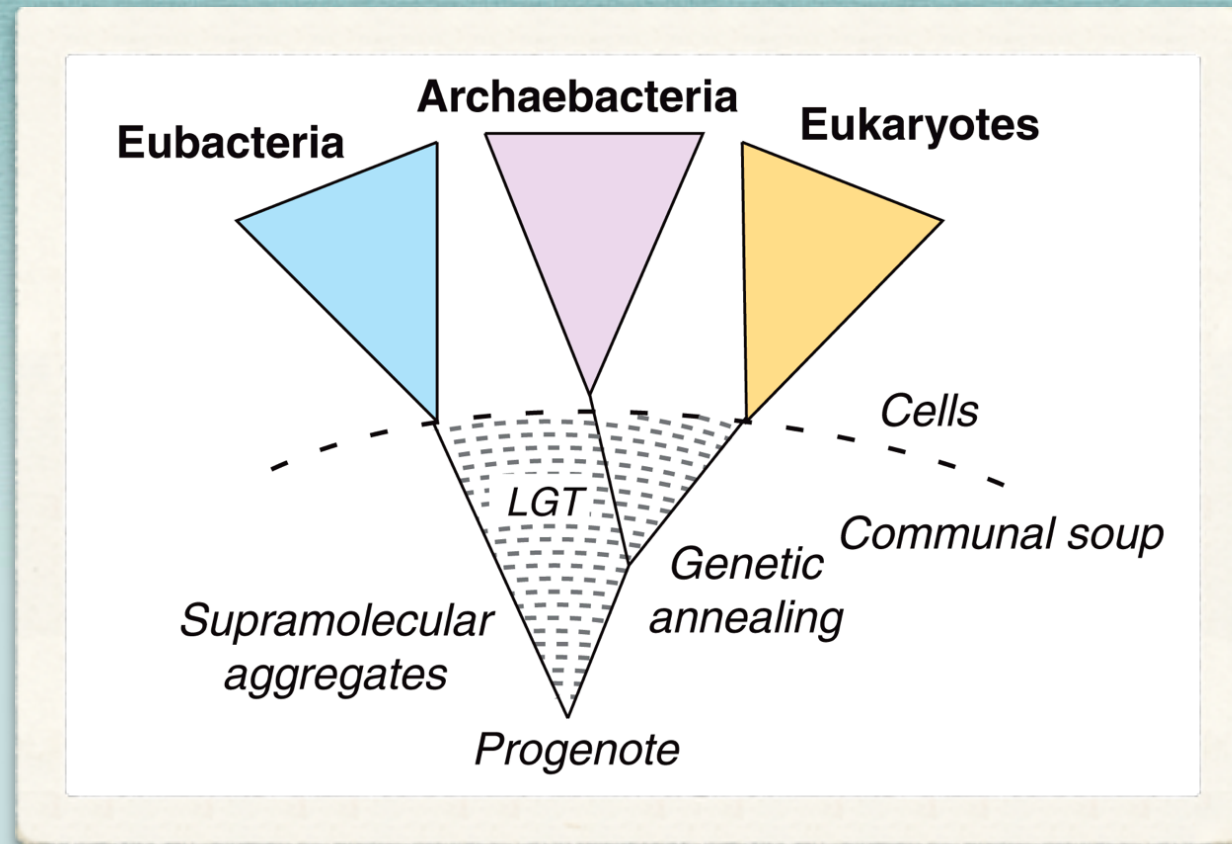


# 5 Origin Hypotheses

- \* RNA tree
- \* Introns-early tree
- \* Neomuran tree
- \* Symbiotic tree
- \* Prokaryotic tree with LGT



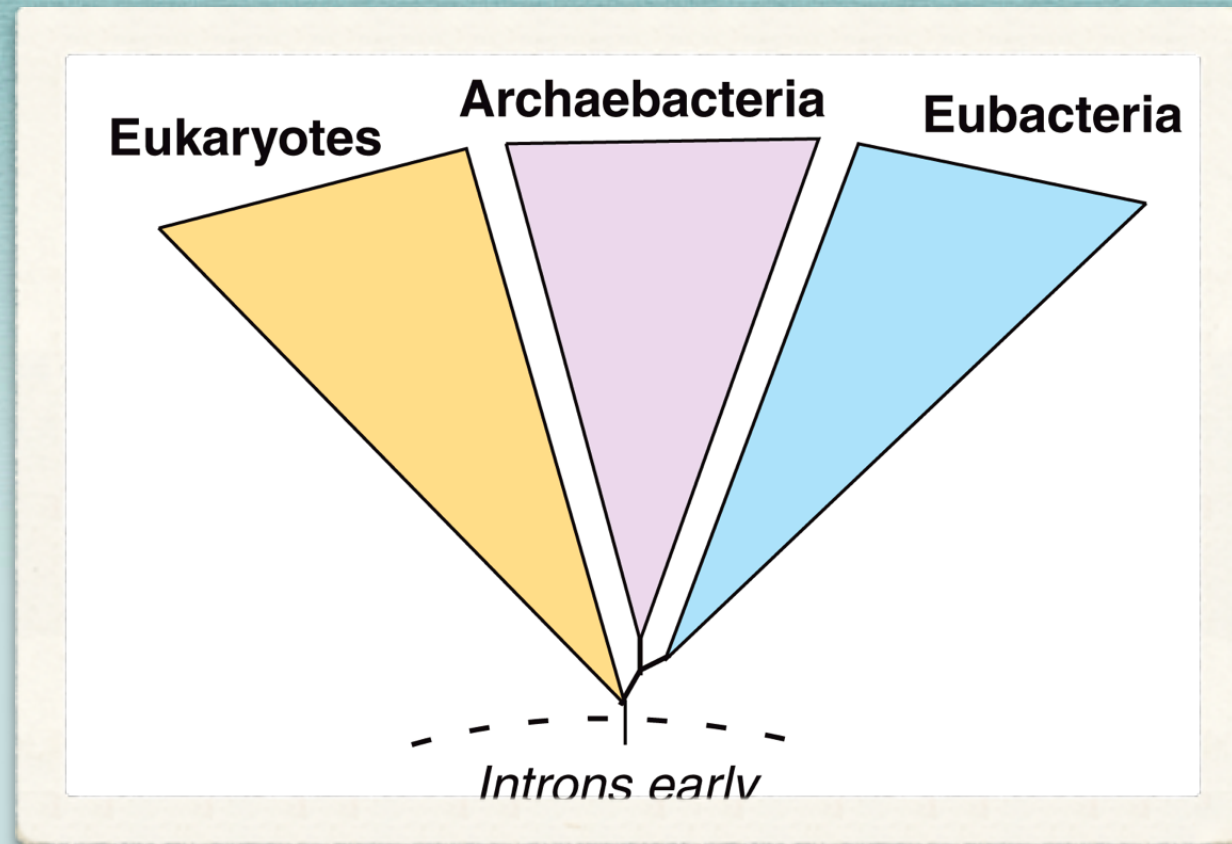




# RNA Tree

- \* Information-storing/processing mechanisms replaced by cellular
- \* Threshold of primary emergence of "life"
- \* Sister relationship between 3 domains
- \* Minimizes importance of mitochondrial genes in eukaryotes





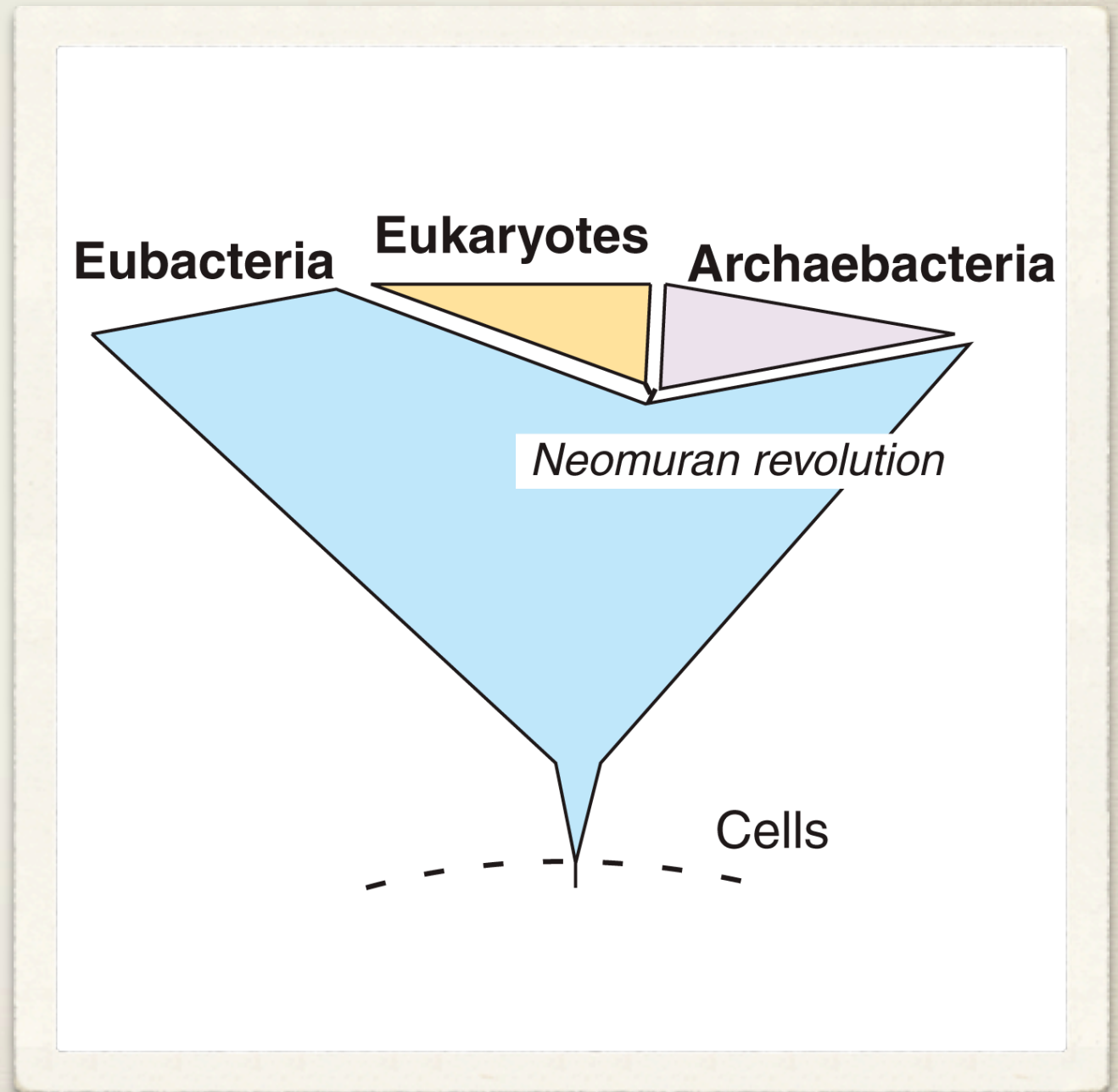
# Introns Early

- \* Eukaryotes came first, with introns
- \* Prokaryotes seen as "derived condition"
- \* View mostly abandoned



# Neomuran Tree

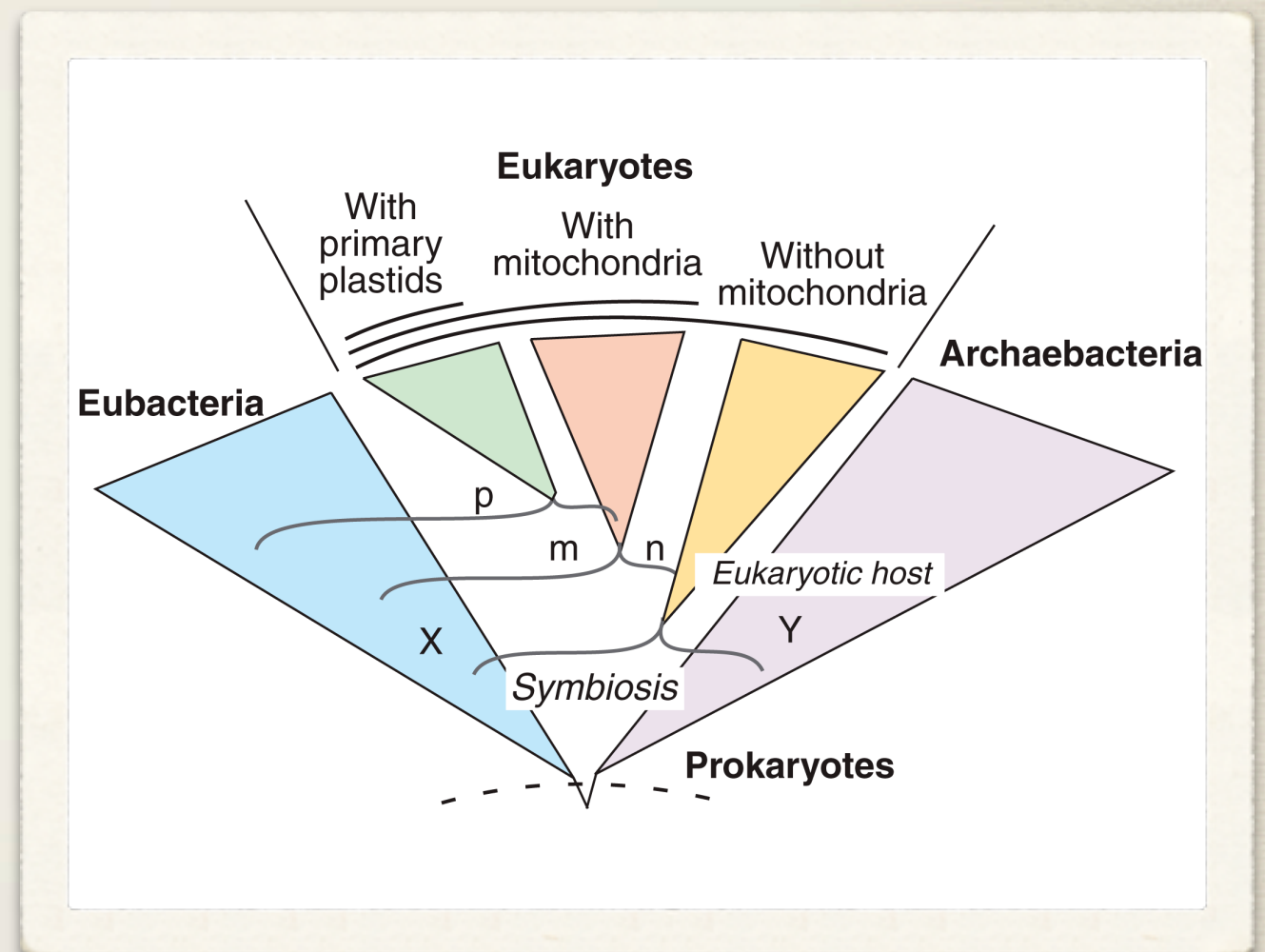
- \* First cell was free-living eubacterium
- \* Eukaryotes and archaebacteria emerged only 900M years ago
- \* At that time, murein-containing cell wall replaced by new wall ("neo-muran")
- \* Divergence of two domains:
  - \* archaebacteria capable of isoprene ether lipid synthesis
  - \* eukaryotes became phagotrophic (capable of eating other cells)
- \* Theory accounts for observed similarities but not genetic similarities





# Symbiotic Tree

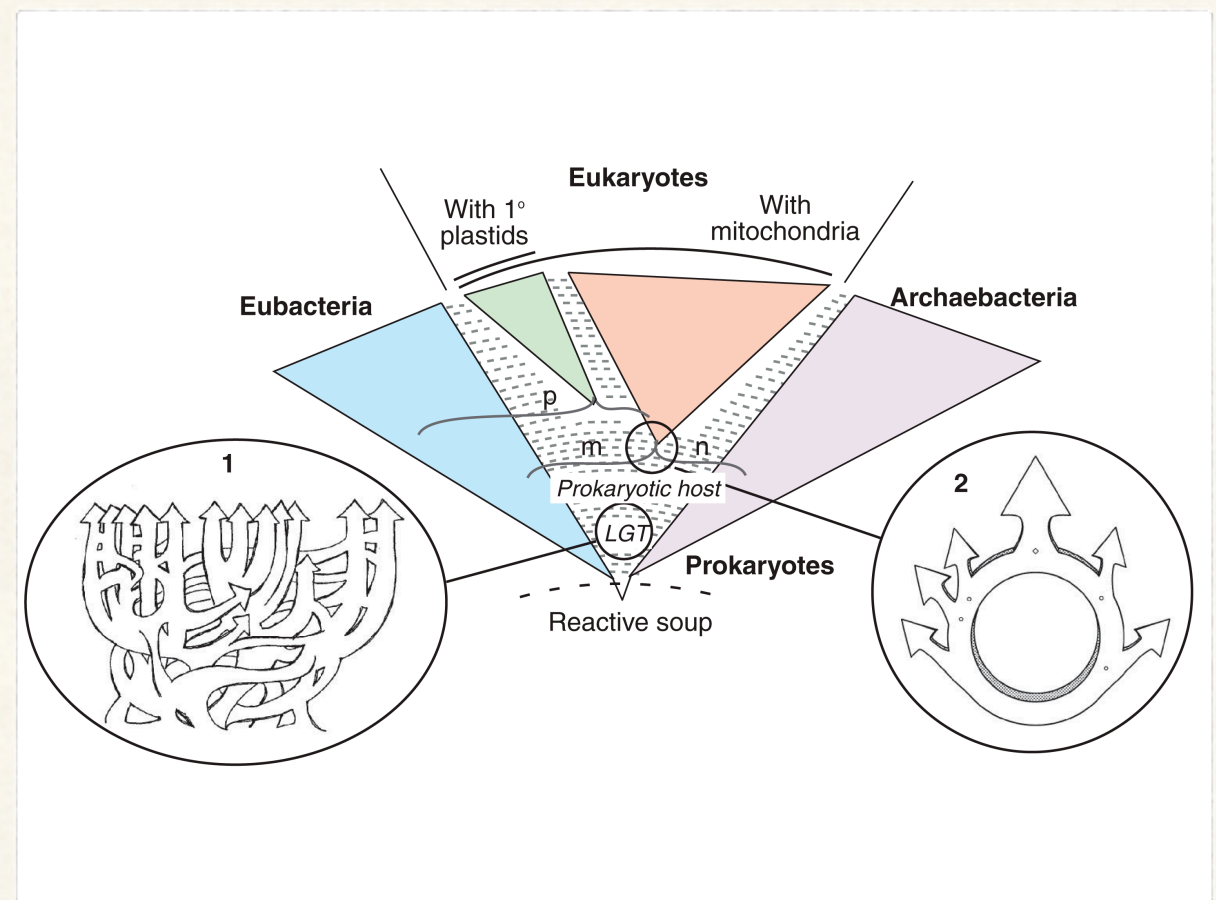
- \* Explanation of origin of nucleus
- \* Possible merger of eukaryote and archaebacteria
- \* Details of hypothesis mostly abandoned, but nuclear origin still debated





# Prokaryotic Tree with LGT

- \* Rejects the idea that primitive eukaryotes lacked mitochondria; mitochondrion acquisition is predicted to have occurred with an archaeon
- \* Similar to symbiotic tree hypothesis; difference lies in the number of symbiotic partners and the existence of amitochondriate eukaryotes
- \* Suggests a ring-like structure for biological relationships
- \* Testable with genomic data (tests aren't easy)





- \* "So, are we close to having a microbial tree of life? Or are we closer to rejecting a single tree as the null hypothesis for the process of microbial genome evolution? All in all, the latter seems more likely..."
- \* Google "Tree of One Percent"