

History of Life 1



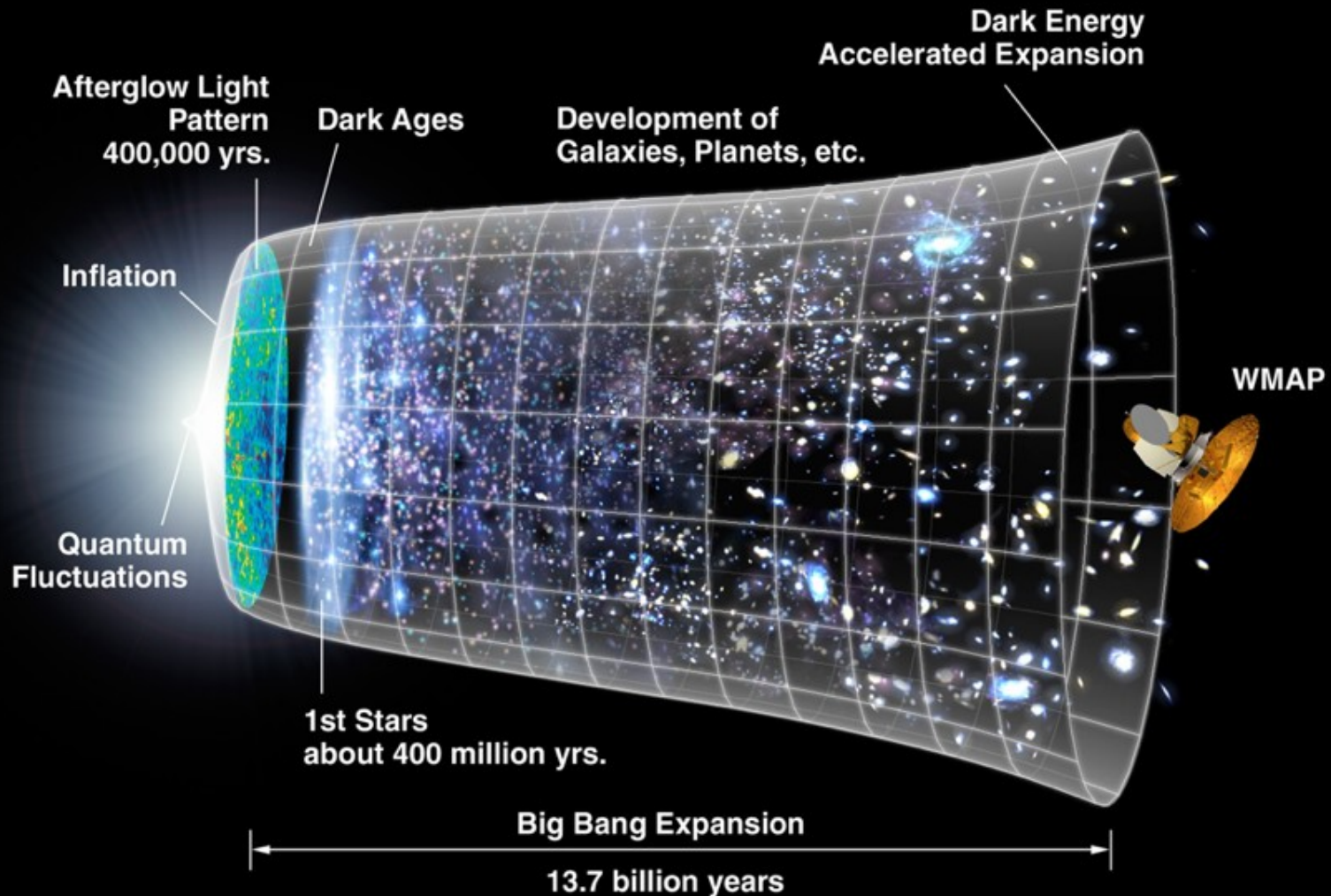
Tucson Botanical Gardens

Brian O'Meara
EEB464 Fall 2018

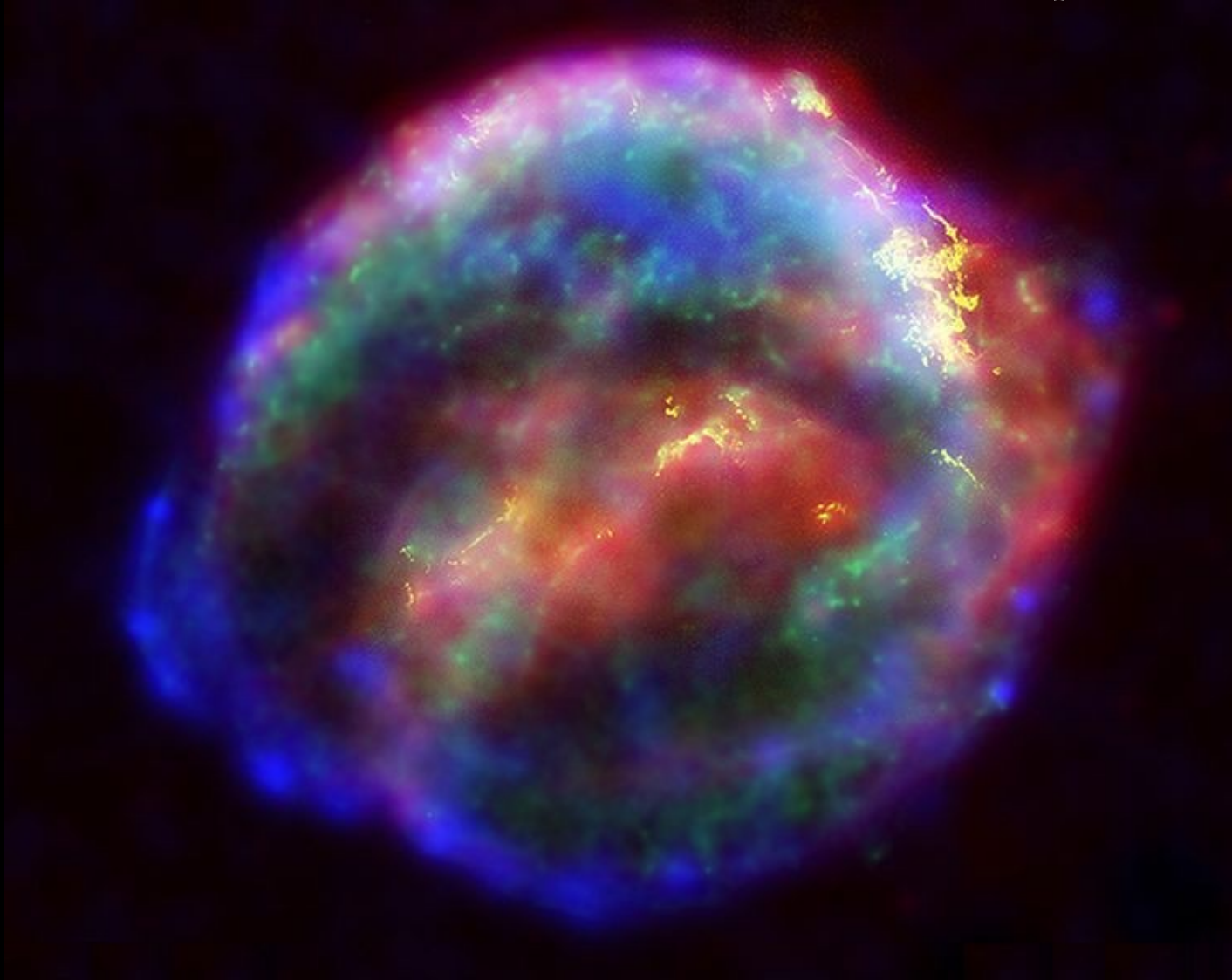
Learning outcomes:

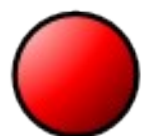
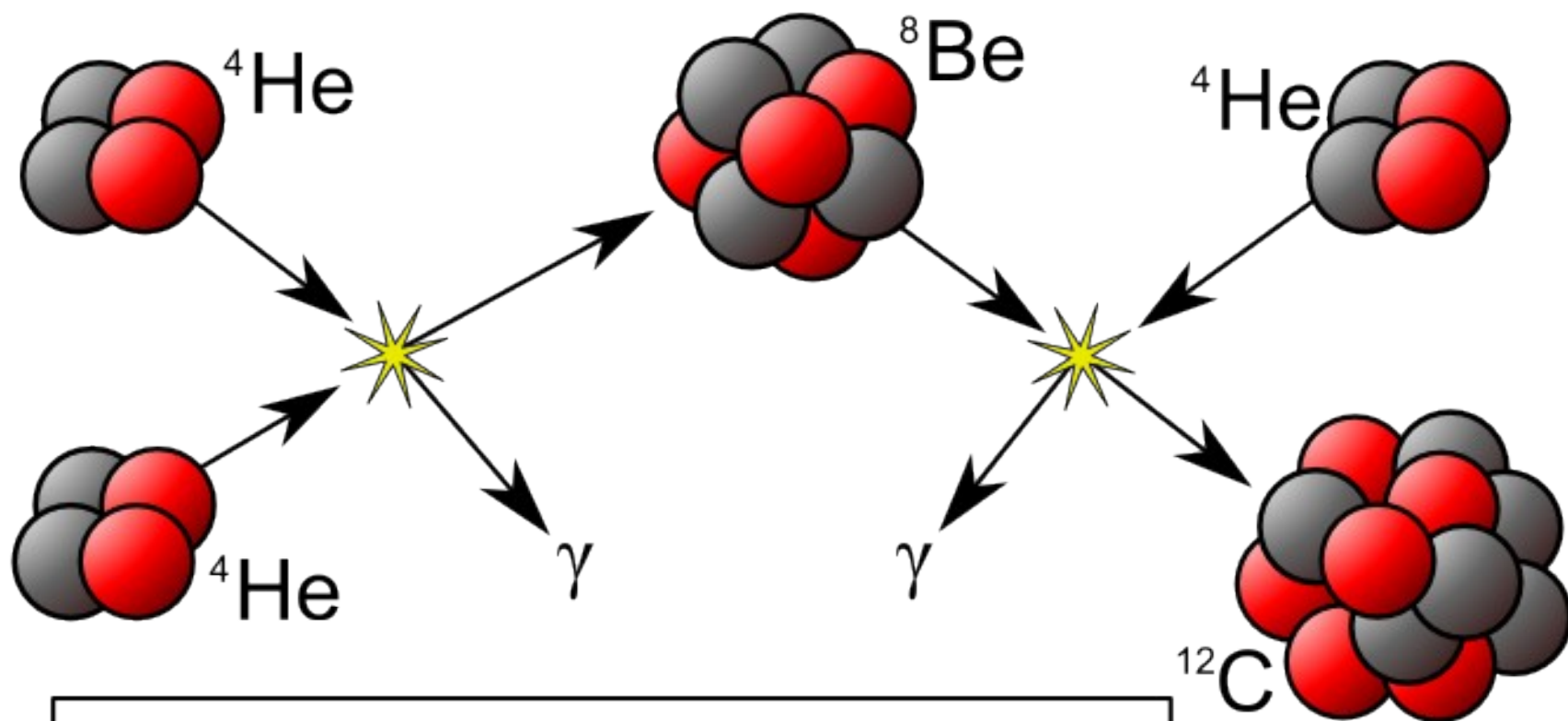
- Get a deep perspective on time
- Understand major events in earth history
- Generate hypotheses regarding what happens after mass extinctions

Big Bang 13.73 BYA



First stars produce more complex elements, then (some) explode





Proton

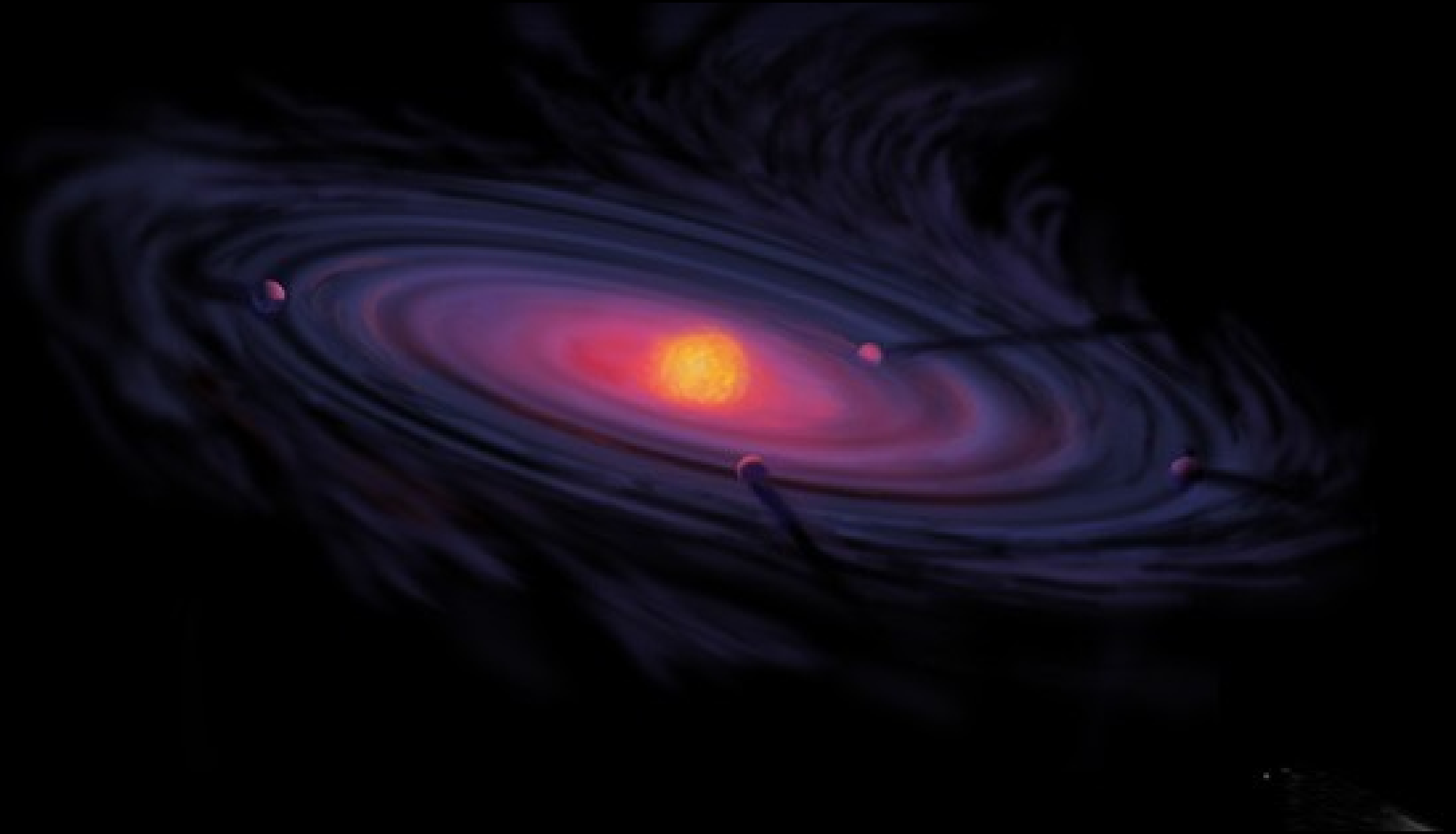
γ

Gamma Ray



Neutron

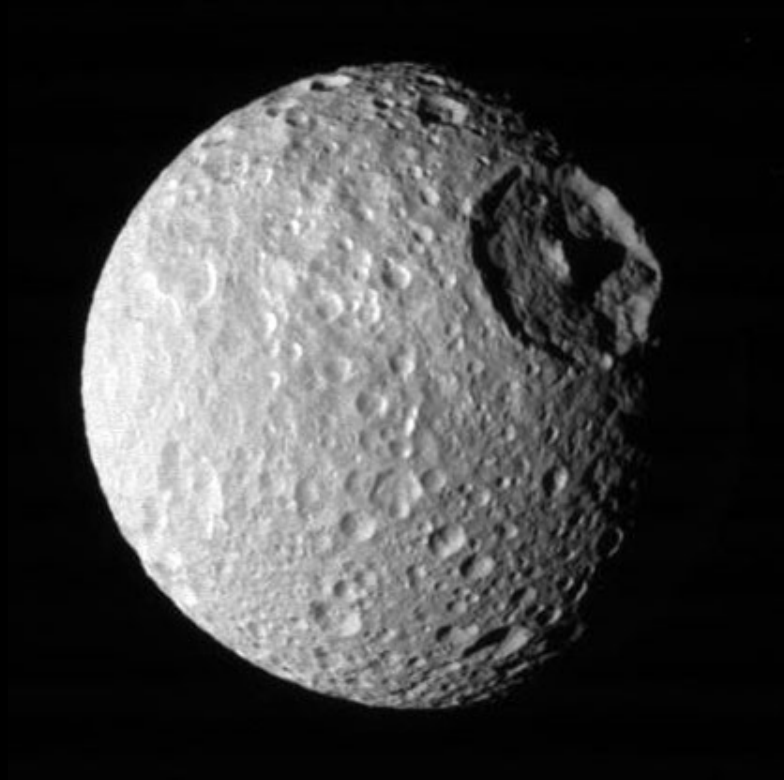
Solar system (sun, planets) form 4.6 BYA



Moon broken off from Earth, 4.53 BYA



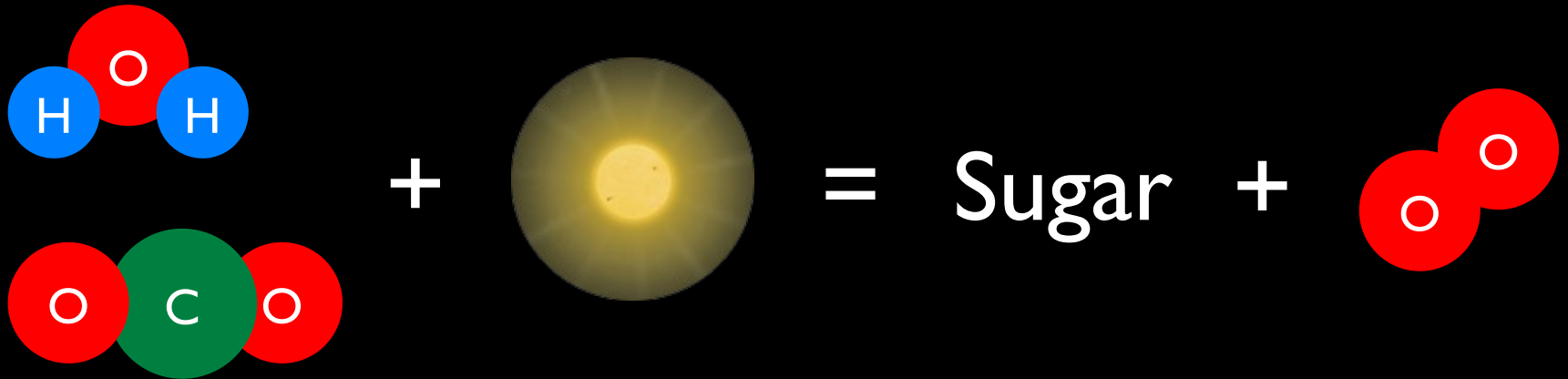
Heavy bombardment, 4.1 - 3.8 BYA



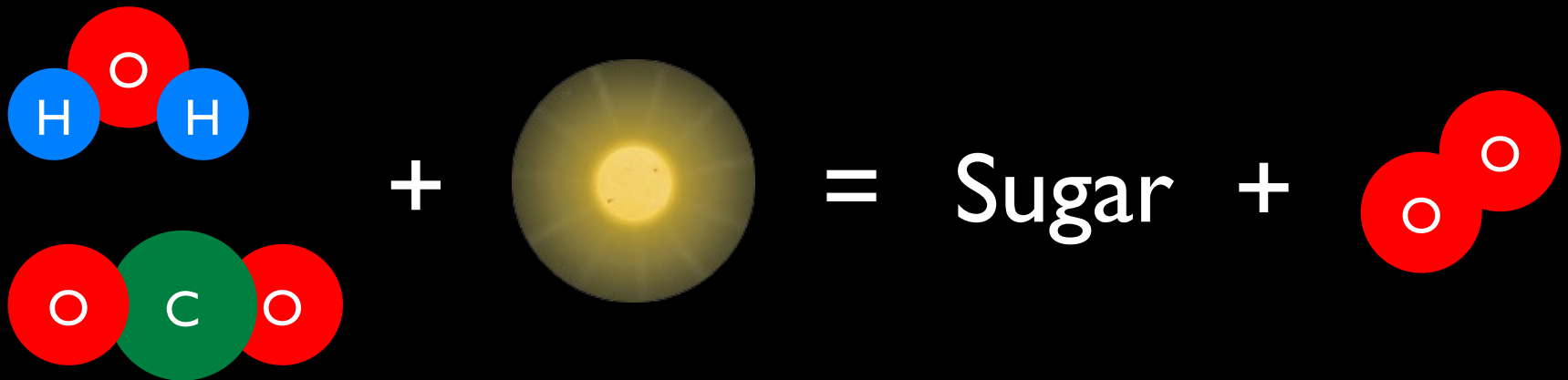
Life evolves ~3.8 BYA



Photosynthesis evolves somewhere 3.5 - 2.8 BYA



Great oxidation event 2.45 - 2.22 BYA



Huronian glaciation

3.2 - 2.4 BYA

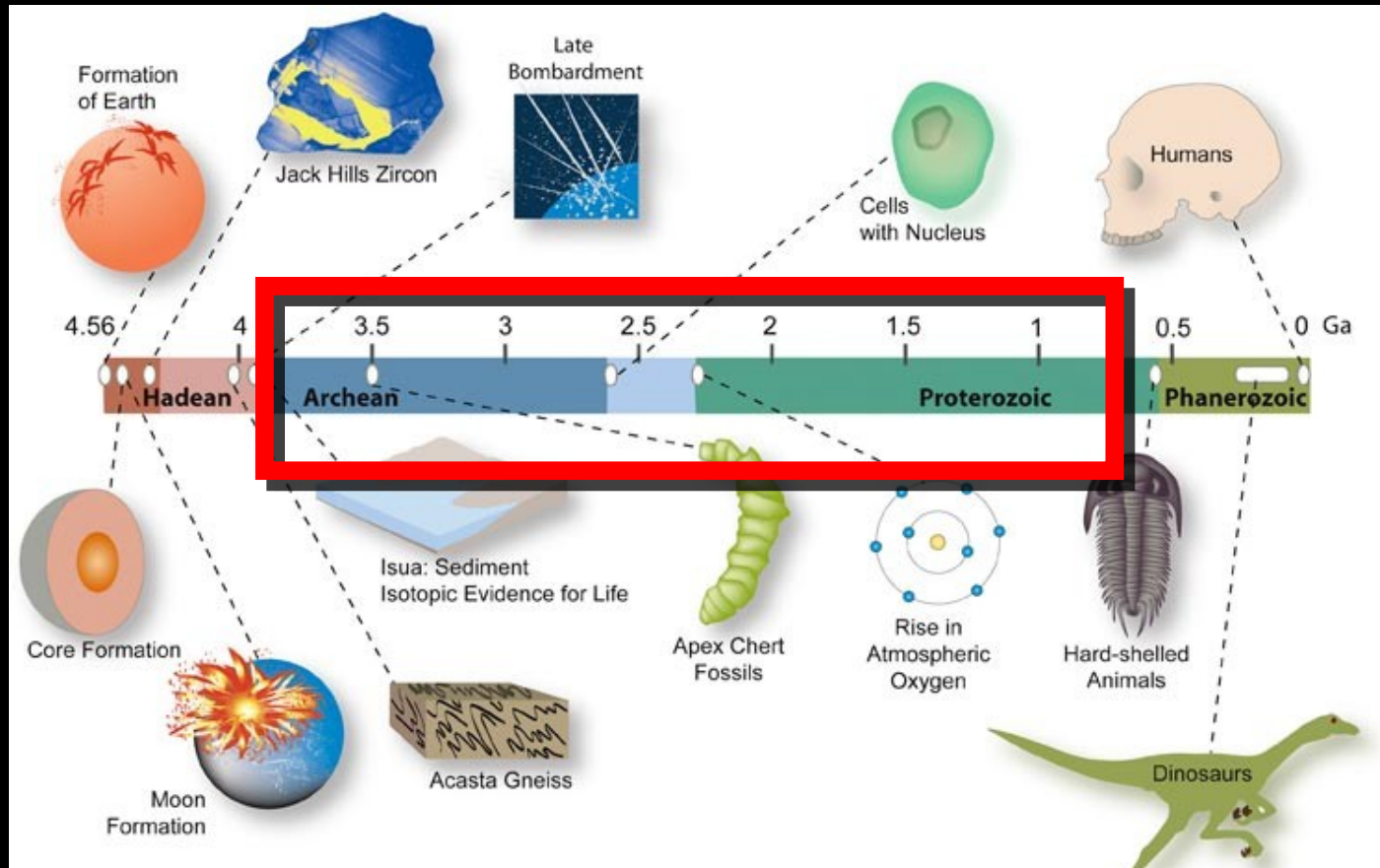


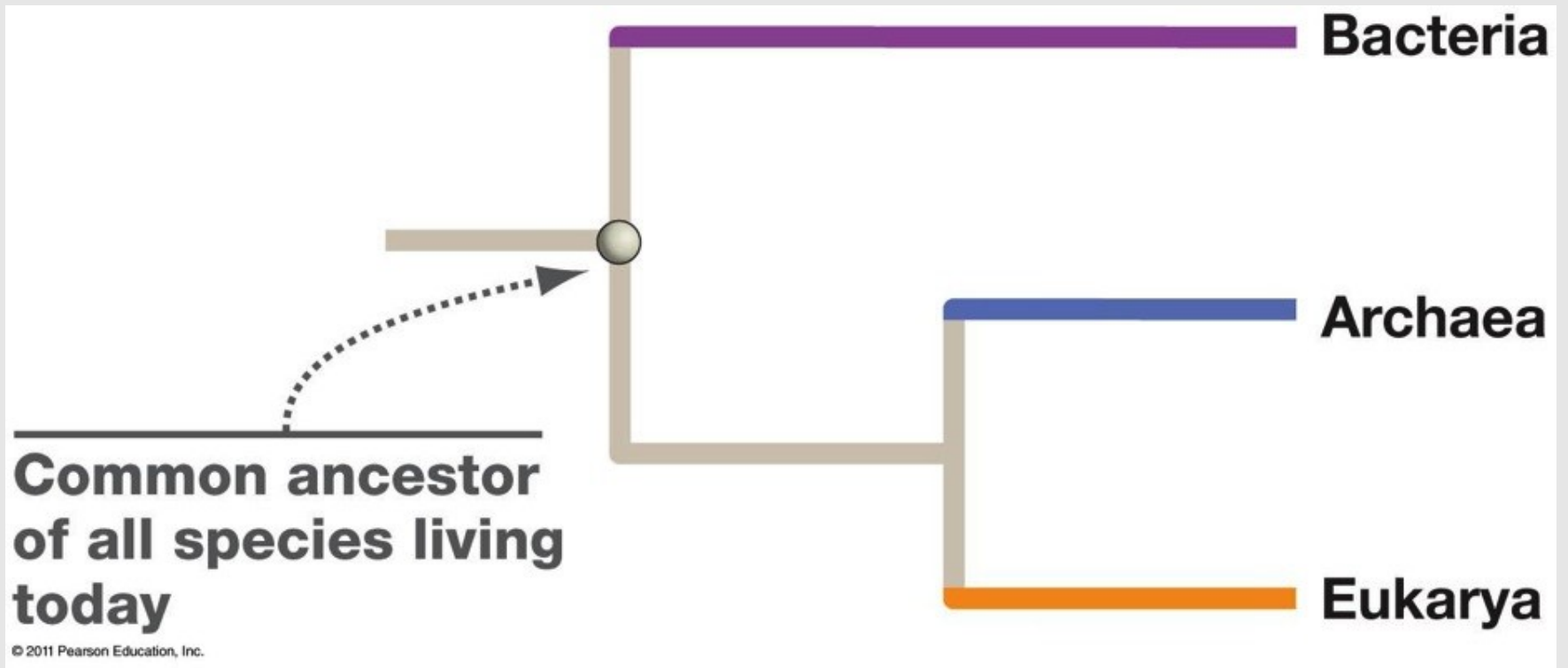
a long time passes

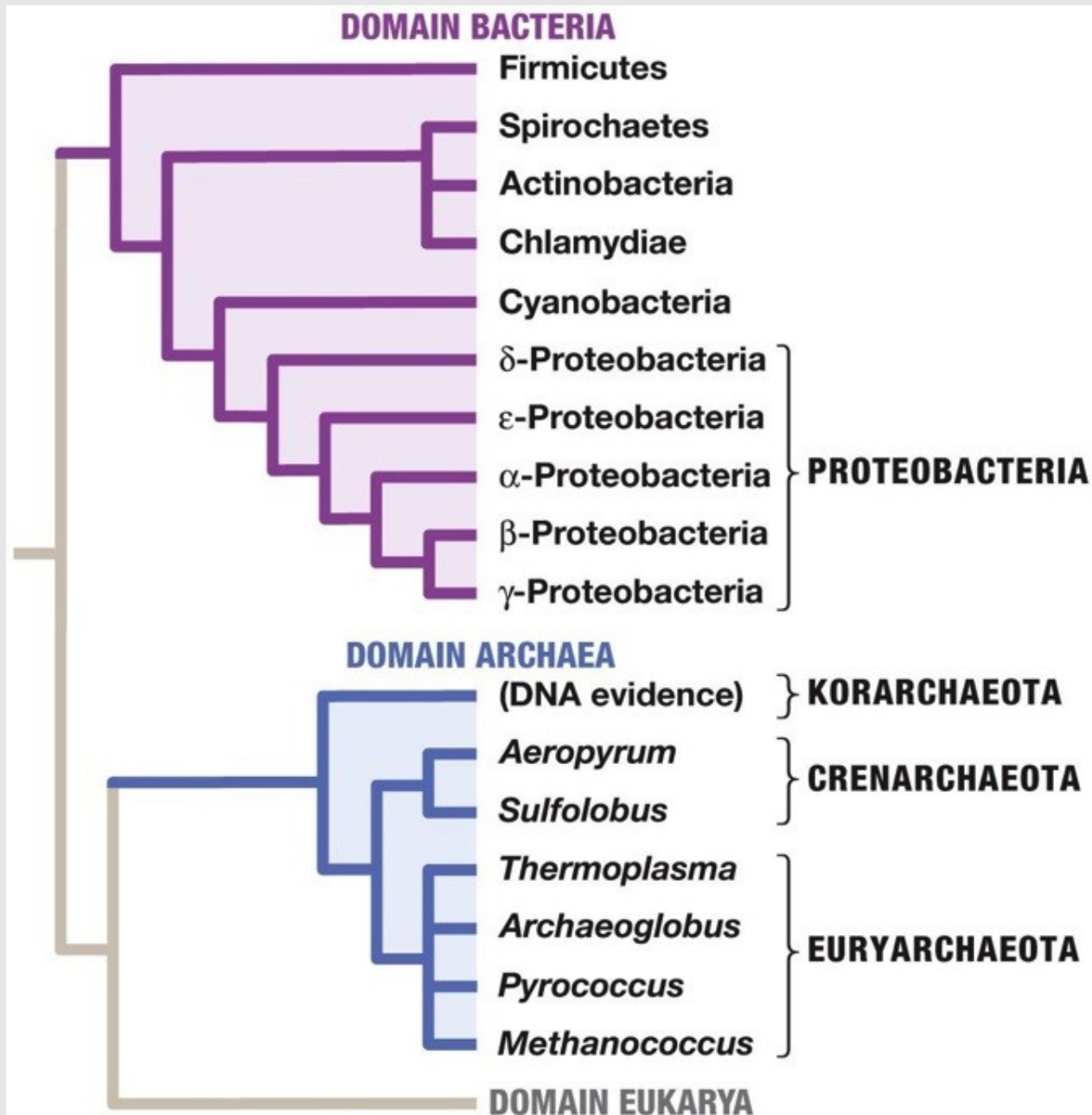
Archaea+Eukaryotes and Eubacteria diverge

Eukaryotes diverge from Archaea

Life is still single-celled







	Bacteria	Archaea	Eukarya
Circular chromosome	Y	Y	N
Histones with DNA	N	Y	Y
Flagella	Spinning	Spinning	Waving
Unicellular	Y	Y	Varies
Organelles	~N	N	Y



100

GREATEST
Discoveries

ARCHAEA

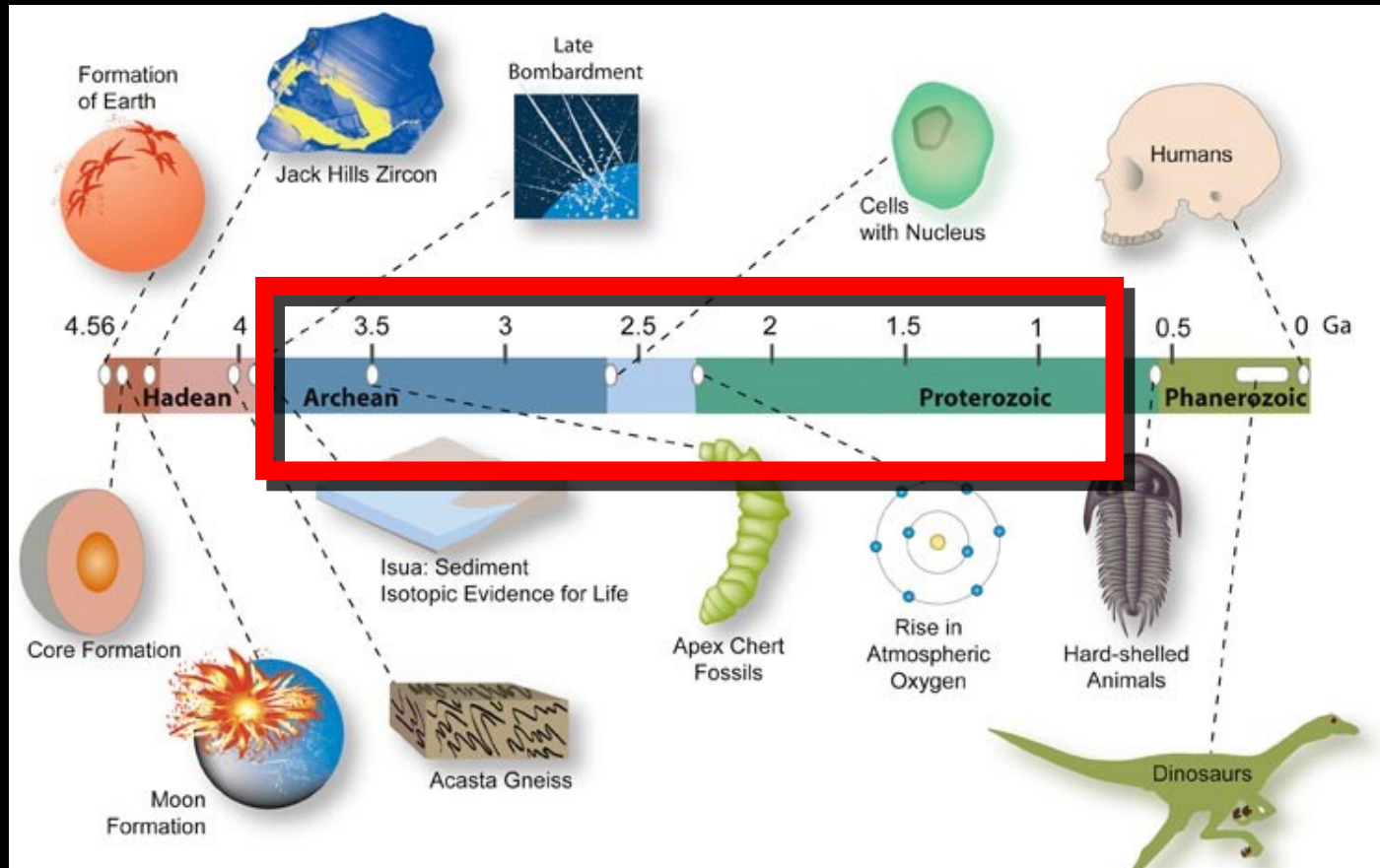
DISCOVERY
HD

a long time passes

Archaea+Eukaryotes and Eubacteria diverge

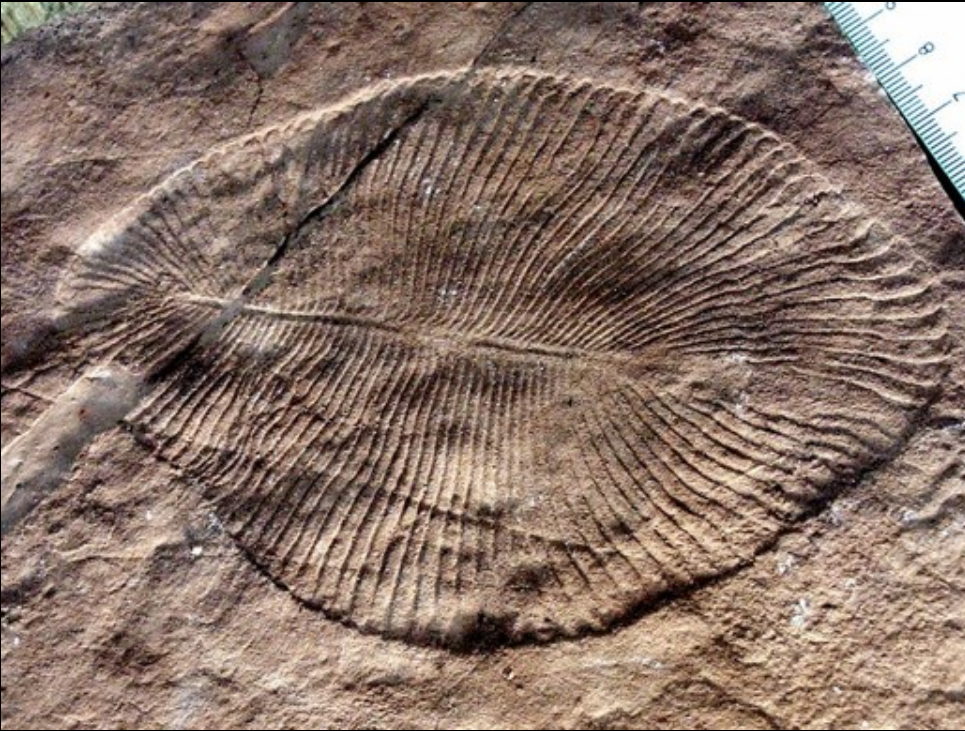
Eukaryotes diverge from Archaea

Life is still single-celled



Ediacaran fauna

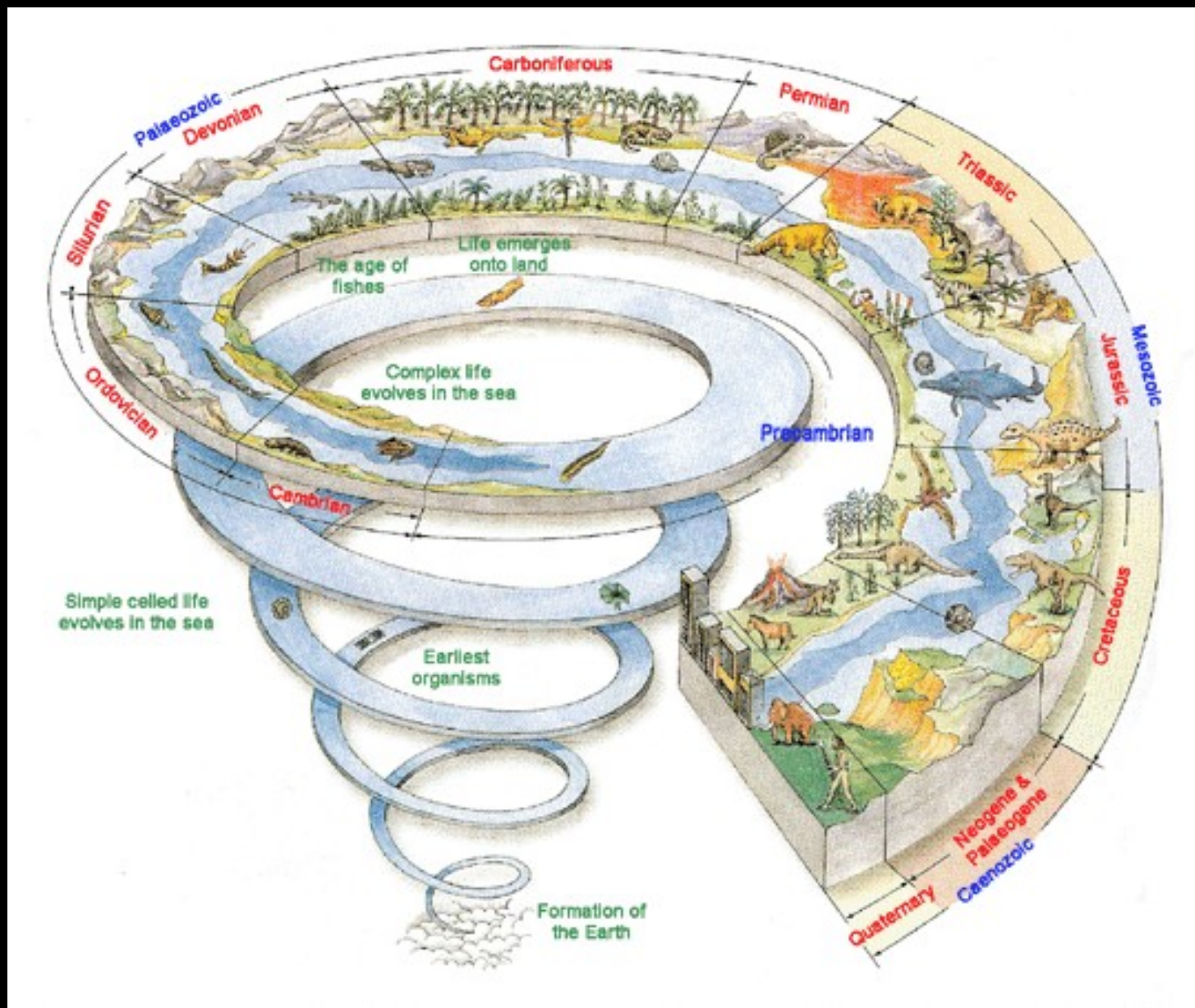
0.63 BYA = 630 MYA



Cambrian 542 MYA

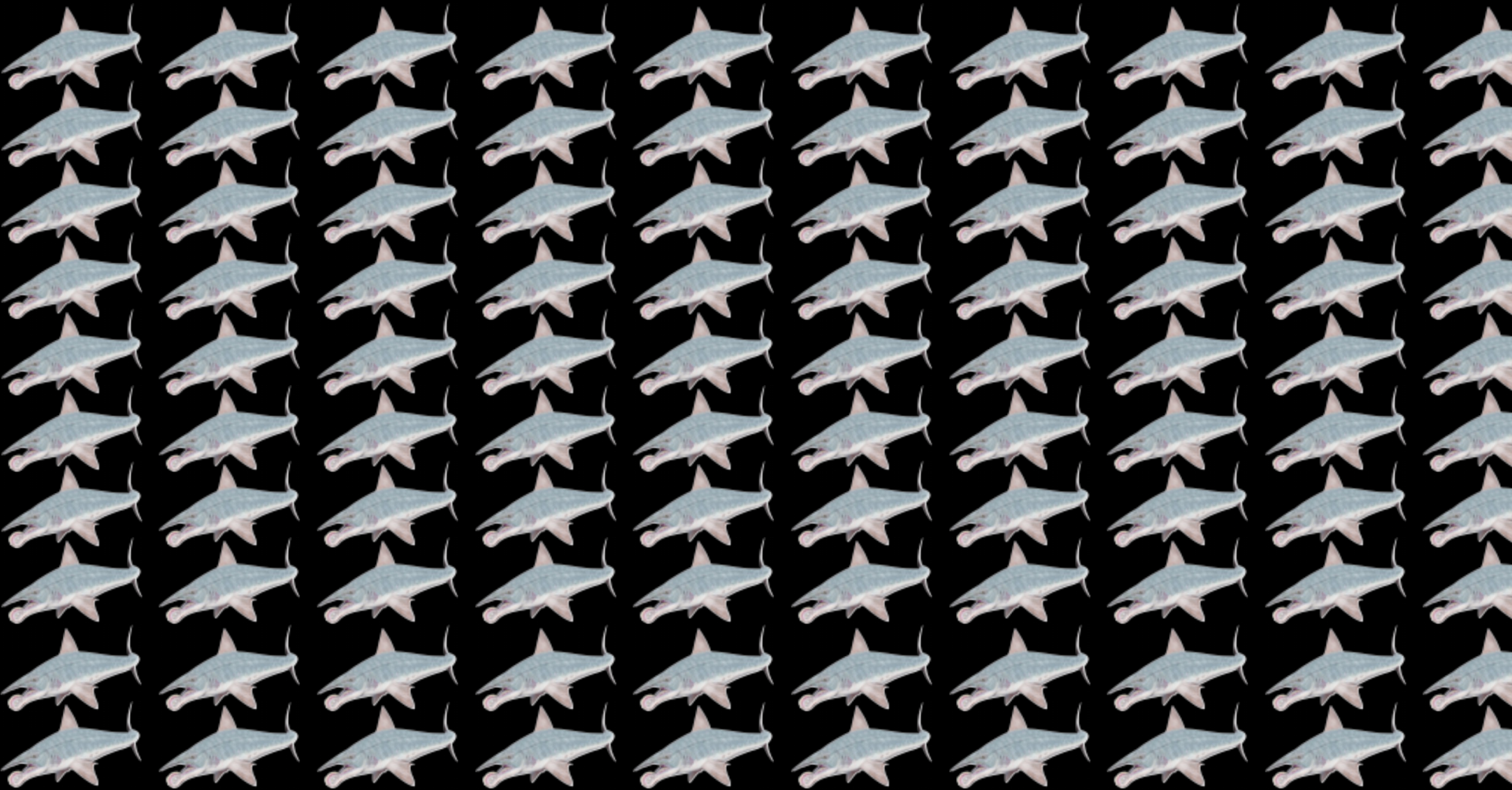


John Sibbick



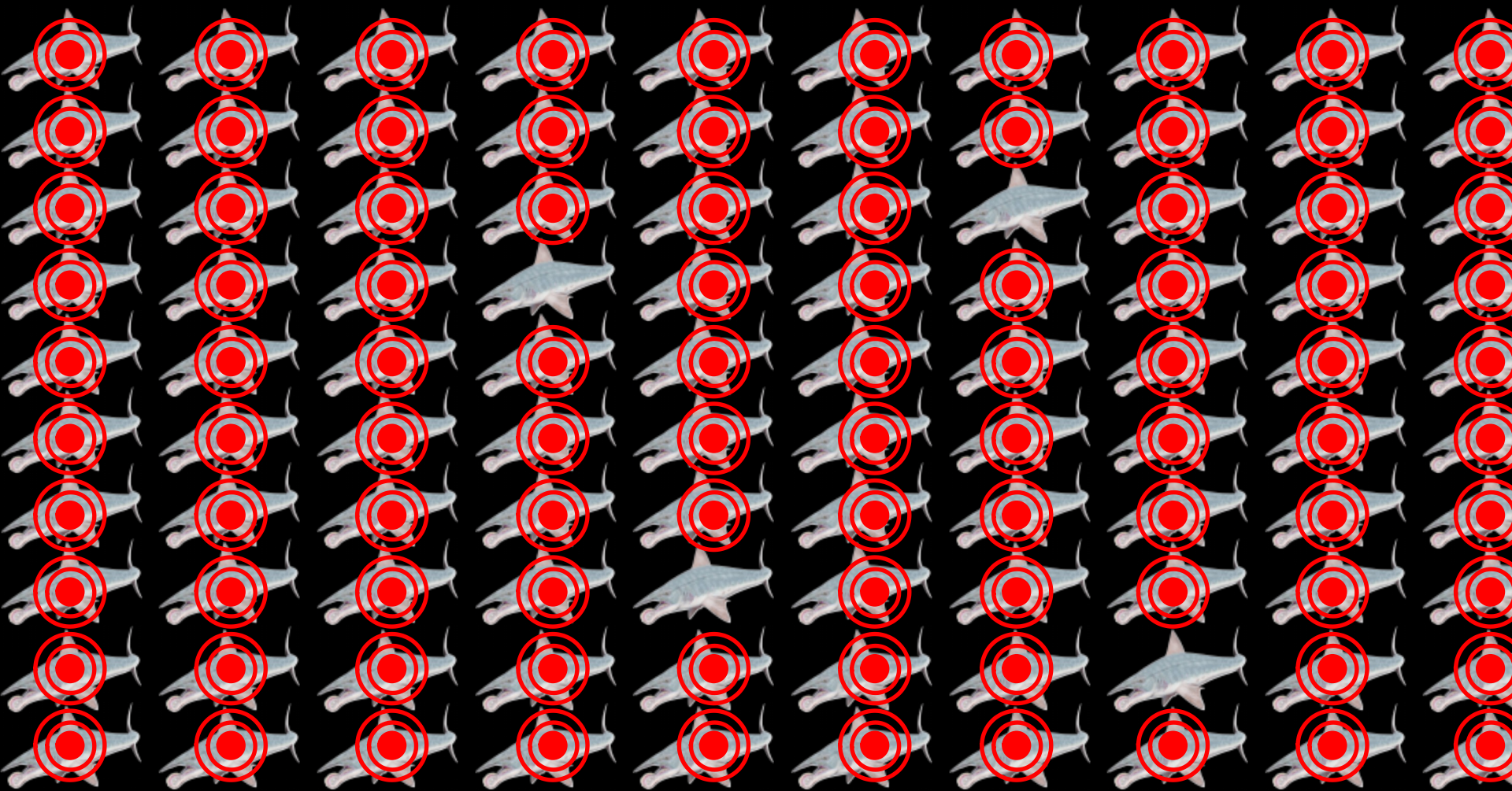
Permian-Triassic extinction

251 MYA



Permian-Triassic extinction

251 MYA



Permian-Triassic extinction

251 MYA

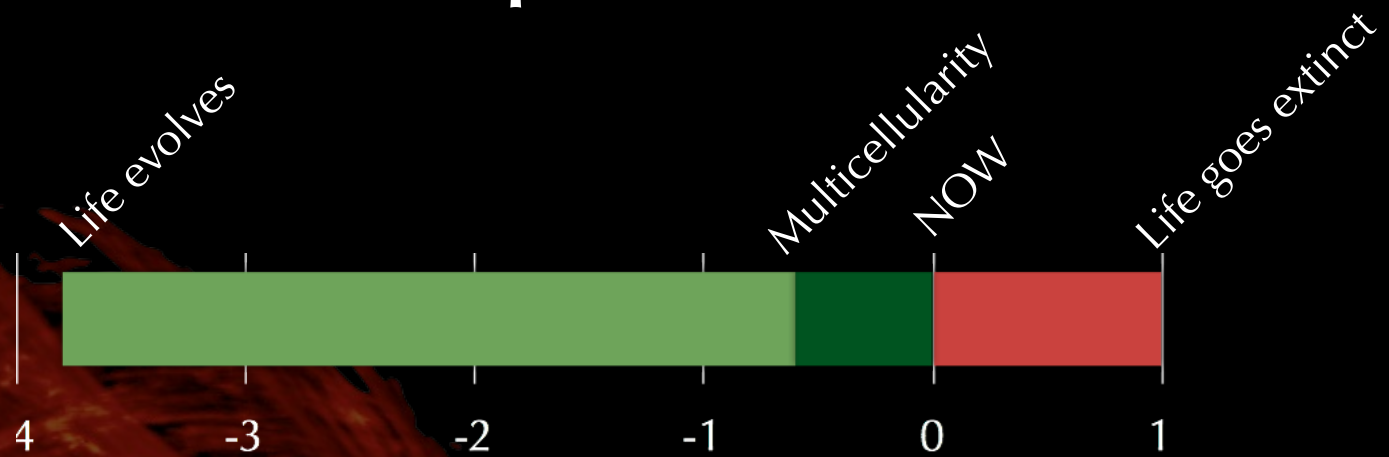


KT (Cretaceous-Tertiary) extinction 65.5 MYA



Brian Franczak

Sun eventually becomes red giant, expands



Discussion: how might a major extinction like the one at the end of the Permian affect life?