Earth - Moon System Formed 4.6 Ga

Late Heavy Bombardment (4.1-3.8 Ga)
Earliest rock formations known (4 Ga?)
Earliest zircons studied (4.4 Ga)

Formations in this era are rare
High $^{12}$C to $^{13}$C ratios in some formations - life possible?
High methane low oxygen atmosphere
Stromatolites - bacterial fossils?

Pongola - oldest ice age?
Vaalbara – earth’s first supercontinent?
Prokaryotic microfossils - life for sure

Oxygenation of atmosphere begins
Cyanobacteria
CO$_2$ plus H$_2$O photosynthesis

Ediacaran biota 630 Ma–542 Ma
Cryogenian glaciations (snowball?)
Breakup of Rodinia

Rodinia supercontinent
Sexual reproduction
O$_2$ – today’s level and beyond

Start of eukaryotic life (that’s us!)
Huronian glaciation (snowball?)
Banded iron formations
Build-up of O$_2$

First dinosaurs, cycads, conifers, modern corals, first mammals, frogs, lizards, ancestral Andes, Pangea supercontinent

First flowering plants, ginkgoes, birds, sauropods, theropods, pterosaurs, ichthyosaurs, plesiosaurs, ancestral Appalachians

First flowering plants, broad-leaf trees, figs, magnolias, bees, mammals, dinosaurs, butterflies, moths, crocodiles

First flowering plants, ginkgoes, birds, sauropods, theropods, pterosaurs, ichthyosaurs, plesiosaurs, ancestral Sierra Nevada, Peninsular Ranges

First flowering plants, ginkgoes, birds, sauropods, theropods, pterosaurs, ichthyosaurs, plesiosaurs, ancestral Sierras, Pangea supercontinent

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