

variation already exists; selection just decides which of it sticks around

Origin of life

- spontaneous generation: life springing suddenly from non-living matter, a disproved idea
- controlled experiments showed life arises only from pre-existing life, never spontaneously
- Oparin and Haldane: first life arose gradually via chemical reactions among simple inorganic molecules
- these reactions proceeded under the physical and chemical conditions of early Earth

From a bare planet to us



four points on the same timeline, oldest to most recent: Earth's formation, the first simple life, the rise of oxygen-releasing life, and the appearance of our own species

Miller-Urey experiment vs the early atmosphere it modelled

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Feature	Early atmosphere (proposed)	Miller-Urey flask
Gases used	methane, ammonia, hydrogen, water vapour	methane, ammonia, hydrogen, water vapour
Energy source	lightning, UV radiation, heat (proposed)	an electric discharge (spark)
Result	simple organic molecules (hypothesised)	amino acids formed and detected

the flask reproduced the reducing atmosphere Oparin and Haldane proposed, and amino acids appeared with no living cell involved