Hadean Eon Keywords

Dna --*transcribe* --> RNA --*translate*-->protein

Adhesion - Adhesion is the joining of unlike particles. For example it could be the force that keeps water drops on leaves, or two cells attaching to each other

Archaean eon - the eon when single celled prokaryote bacteria predominated (3.8-2.5 Ga). Comes after Hadeon

Biomonomers - A monomer is a molecule that may react chemically to another molecule of the same type to form a larger molecule. A biomonomer is a monomer produced by a living organism and includes amino acids, monosaccharides, isoprenes, and nucleotides

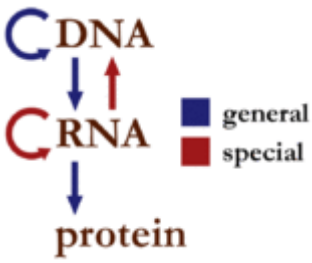
Biopolymers - Biopolymers are polymers produced by living organisms; in other words, they are polymeric biomolecules. Examples includes RNA, polysaccharides, and a plant's chitin.

Building phase of the earth - During the creation of the Earth, hot gases condensed, and the Earth was bombarded by many asteriods. (See Late Heavy Bombardment)

Carbon - a widely distributed element that forms organic compounds in combination with hydrogen, oxygen, etc.

Cenozoic - The Cenozoic Era is the current and most recent of the three Phanerozoic geological eras, following the Mesozoic Era and covering the period from 66 million years ago to the present.

Central dogma - The central dogma has also been described as "DNA makes RNA and RNA makes protein,"



Chemical evolution - The formation of complex organic molecules from simpler inorganic molecules through chemical reactions in the oceans during the early history of the Earth; the first step in the development of life on this planet.

Cohesion- The intermolecular force that holds together alike molecules in a substance. The cohesion in water gives it a "sticky" property

Crystal Lattice of Water

The structure that forms when water turns into ice. This form in particular helps keep ice afloat

Emergence -
Cell ---> Tissue ----> Organ ---> Organ System ---> Animal

It's the property where living things become more and more complex as it goes from cellular level (exp humans are made of cells) to organ system (exp humans are made of organ system composed of millions of cells).

It's based on the concept that "the whole is greater than the composition of its parts." Exp: heart is made of cells only, but if you just have heart cells (sum of its parts) it won't do anything but if the whole heart is there, it will perform the function of pumping blood (the whole is greater).

Eras - a major division of time that is a subdivision of an eon and is itself subdivided into periods.

Eukaryote - an organism with a complex cell or cells, in which the genetic material is organized into a membrane-bound nucleus or nuclei

Mesozoic - age of reptiles. One of three geologic eras of the Phranerozoic Eon.

Evaporation - Sometimes a liquid can be sitting in one place (maybe a puddle) and its molecules will become a gas. That's the process called *evaporation*

Geological time scale - The geologic time scale (GTS) is a system of chronological measurement that relates stratigraphy to time, and is used by geologists, paleontologists, and other Earth scientists to describe the timing and relationships between events that have occurred throughout Earth's history.

Goldilocks zone - the region around a star within which planetary-mass objects with sufficient atmospheric pressure can support liquid water at their surfaces.

Greenhouse Gas - A greenhouse gas is any gaseous compound in the atmosphere that is capable of absorbing infrared radiation, thereby trapping and holding heat in the atmosphere.

Habitable Zone - the relatively narrow range of distance from a star within which an orbiting planet (or in some cases a planet's moons) may be able to sustain life, at least the carbon-based forms we know and love, because the temperature is right for water to remain liquid.

Hadean eon - The name *Hadean* Eon comes from *Hades*, the underworld of Greek mythology. It refers to the "hellish" conditions of the Earth during the earliest part of its history, when much of the Earth's surface remained molten. The Hadean Eon of geologic time began with the birth of the solar system, including our planet, Earth, and ended with the formation of the oldest rocks that are still preserved on the surface of Earth.

The Hadean /ˈheɪdiən/ is the first geologic eon of Earth and lies before the Archean. It began with the formation of the Earth about 4.5 billion years ago and ended, as defined by the ICS, 4,000 million years ago.

HIV - The discovery of this virus reverse the information flow of the DNA

Hydrogen bond - a weak bond between two molecules resulting from an electrostatic attraction between a proton in one molecule and an electronegative atom in the other.

Hydrophilic - a molecule or other molecular entity that is attracted to, and tends to be dissolved by, water

Hydrophobic -is the physical property of a molecule (known as a **hydrophobe**) that is seemingly repelled from a mass of water.[1] (Strictly speaking, there is no repulsive force involved; it is an absence of attraction.)

Hydrothermal vents - A hydrothermal vent is a fissure in a planet's surface from which geothermally heated water issues. Hydrothermal vents are commonly found near volcanically active places, areas where tectonic plates are moving apart, ocean basins, and hotspots.

Interstellar organic compounds -
An *organic compound* is any member of a large class of gaseous, liquid, or solid chemical **compounds** whose molecules contain carbon. An interstellar organic compound is one found in space

Interstellar space dust
Clouds of fine solid particles of matter in interstellar space.

The Late Heavy Bombardment - A period that occurred approximately 4.1 to 3.8 billion years ago where a disproportionately large number of asteroids bombarded the early terrestrial planets including Mercury, Venus, Earth, and Mars.

Several hypotheses are offered to explain the sudden flux of asteroids and comets. One hypothesis is the nice model. The nice model postulates that the giant gas planets underwent orbital migration and scattered objects in eccentric orbits.

Liposome - A *liposome* is a tiny bubble (vesicle), made out of the same material as a cell membrane. Liposomes can be filled with drugs, and used to deliver drugs for cancer and other diseases.

Micelles -

In aqueous solution, molecules having both polar or charged groups and non polar regions (amphiphilic molecules) form aggregates called micelles. In a micelle, polar or ionic heads form an outer shell in contact with water, while non polar tails are sequestered in the interior. Hence, the core of a micelle, being formed of long non polar tails, resembles an oil or gasoline drop.

Miller-Urey experiment

- The **Urey-Miller** experiment showed how the early earth could have been an ideal environment for the formation of necessary organic compounds. In the experiement Miller, put the gases hydrogen, methane, ammonia, and watervapor, and exposed the gases to an energy sourse in the form of continously sparking electrodes. Water was added in one part of the apparatus and

subsequently condensed back into water by cooling in another part. After a week of running the experiement, a bunch of organic compounds were found in the water.

This experiment was used to find biomonomers.

Nice model

The nice model postulates that the giant gas planets underwent orbital migration and scattered objects in eccentric orbits.

Nonpolar compound

A molecule may be nonpolar either when there is an equal sharing of electrons between the two atoms of a diatomic molecule or because of the symmetrical arrangement of polar bonds in a more complex molecule. For example, the boron trifluoride molecule (BF3) has a trigonal planar arrangement of three polar bonds at 120°. This results in no overall dipole in the molecule.

Examples of household nonpolar compounds include fats, oil, and petrol/gasoline. Therefore (per the "oil and water" rule of thumb),[clarification needed] most nonpolar molecules are water-insoluble (hydrophobic) at room temperature.

Paleozic

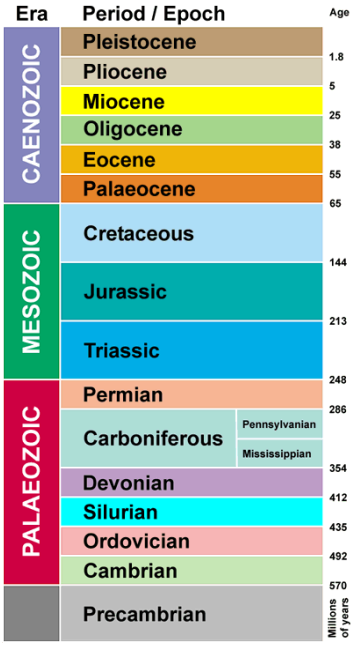
The **Paleozoic** (or **Palaeozoic**) **Era** (/ˌpæliəˈzoʊɪk/ or /ˌpeɪliəˈzoʊɪk/; from the Greek *palaios* (παλαιός), "old" and *zoe* (ζωή), "life", meaning "ancient life"[1]) is the earliest of three geologic eras of the Phanerozoic Eon, spanning from roughly 541 to 252.17 million years ago (ICS, 2004). It is the longest of the Phanerozoic eras

Panspermia

Panspermia is a hypothesis proposing that microscopic life forms that can survive the effects of space, such as extremophiles, become trapped in debris that is ejected into space after collisions between planets and small Solar System bodies that harbor life. Some organisms may travel dormant for an extended amount of time before colliding randomly with other planets or intermingling with protoplanetary disks. If met with ideal conditions on a new planet's surfaces, the organisms become active and the process of evolution begins. Panspermia is not meant to address how life began, just the method that may cause its distribution in the Universe.

Period

A geologic period is one of several subdivisions of geologic time enabling cross-referencing of rocks and geologic events from place to place.



Phanerozoic Eon

The Phanerozoic (British English Phanærozoic) /ˌfænərəˈzoʊɪk/ is the current geologic eon in the geologic timescale, and the one during which abundant animal life has existed. It covers roughly 542 million years (541.0 ± 1.0) and goes back to the period when diverse hard-shelled animals first appeared. Its name derives from the Ancient Greek words φανερός (fanerós) and ζωή (zo͟ḯ), meaning visible life, since it was once believed that life began in the Cambrian, the first period of this eon. The time before the Phanerozoic, called the Precambrian supereon, is now divided into the Hadean, Archaean and Proterozoic eons.

Polar compound

A polar compound is a molecule that has a charge on at least one side of it. It either wants to add an electron or wants to give away an electron to be more stable. Basically it does this by sharing it's electron or borrowing it from another molecule. Because it is "attracted" to another molecule to share a charge , we call it "polar"... just like one end of a magnet is attracted to the North Pole.

Prebiotic soup

Biochemist Robert Shapiro has summarized the "primordial soup" theory of Oparin and Haldane in its "mature form" as follows:[1]

1. Early Earth had a chemically reducing atmosphere.
2. This atmosphere, exposed to energy in various forms, produced simple organic compounds ("monomers").
3. These compounds accumulated in a "soup", which may have been concentrated at various locations (shorelines, oceanic vents etc.).
4. By further transformation, more complex organic polymers – and ultimately life – developed in the soup.

Prokaryote

A prokaryote is a single-celled organism that lacks a membrane-bound nucleus (karyon), mitochondria, or any other membrane-bound organelles

Proteins first hypothesis

The origins of life -- the 'protein interaction world' hypothesis: protein interactions were the first form of self-reproducing life and nucleic acids evolved later as memory molecules.

Proterozoic eon

The Proterozoic /ˌproʊtərəˈzoʊ.ɨk/ is a geological eon representing the time just before the proliferation of complex life on Earth. The name Proterozoic comes from Greek and means "earlier life". The Proterozoic Eon extended from 2500 Ma to 542.0±1.0 Ma (million years ago), and is the most recent part of the Precambrian. It is subdivided into three geologic eras (from oldest to youngest): the Paleoproterozoic, Mesoproterozoic, and Neoproterozoic.

The well-identified events of this eon were the transition to an oxygenated atmosphere during the Paleoproterozoic; several glaciations, including the hypothesized Snowball Earth during the Cryogenian period in the late Neoproterozoic; and the Ediacaran Period (635 to 542 Ma) which is characterized by the evolution of abundant soft-bodied multicellular organisms.

Protobionts
Protobionts are systems that are considered to have possibly been the precursors to prokaryotic cells. If RNA is trapped inside, the system can use the RNA or select for it.

A protobiont is an aggregate of abiotically produced organic molecules surrounded by a membrane or a membrane-like structure. Protobionts exhibit some of the properties associated with life, including simple reproduction, metabolism and excitability, as well as the maintenance of an internal chemical environment different from that of their surroundings. It has been suggested that they are a key step in the origin of life on earth. Experiments by Sidney W. Fox and Aleksandr Oparin have demonstrated that they may be formed spontaneously, in conditions similar to the environment thought to exist on an early Earth. These experiments formed liposomes and microspheres, which have membrane structure similar to the phospholipid bilayer found in cells.

Protocell

Water filled cells with a bilipid layers

A protocell (or protobiont) is a self-organized, endogenously ordered, spherical collection of lipids proposed as a stepping-stone to the origin of life.[1] A central question in evolution is how simple protocells first arose and began the competitive process that drove the evolution of life. Although a functional protocell has not yet been achieved in a laboratory setting, the goal to understand the process appears well within reach.

Reducing Atmopshere

A reducing atmosphere, also known as a reduction atmosphere, is an atmospheric condition in which oxidation is prevented by removal of oxygen and other oxidising gases or vapours, and which may contain actively reducing gases such as hydrogen, carbon monoxide and gases that would oxidize in the presence of oxygen, such as hydrogen sulfide.

Reverse Transcriptase

Reverse transcriptase, also called RNA-directed DNA polymerase, an enzyme encoded from the genetic material of retroviruses that catalyzes the transcription of retrovirus RNA (ribonucleic acid) into DNA (deoxyribonucleic acid). This catalyzed transcription is the reverse process of normal cellular transcription of DNA into RNA, hence the names reverse transcriptase and retrovirus.

Ribozyme

A ribozyme is a **ribo**nucleic acid en**zyme or** RNA enzyme that catalyzes a chemical reaction. The ribozyme catalyses specific reactions in a similar way to that of protein enzymes.

Also called catalytic RNA, ribozymes are found in the ribosome where they join amino acids together to form protein chains. Ribozymes also play a role in other vital reactions such as RNA splicing, transfer RNA biosynthesis, and viral replication.

RNA world Hyptothesis

The RNA world hypothesis proposes that self-replicating ribonucleic acid (RNA) molecules were precursors to current life,[1] which is based on deoxyribonucleic acid (DNA), RNA and proteins.[2][3] It is generally accepted that current life on Earth descends from an RNA world,[4] although RNA-based life may not have been the first life to exist.[5][6]

Specific Heat

The specific heat is the amount of heat per unit mass required to raise the temperature by one degree Celsius.

Spontaneous Origins

Spontaneous generation or anomalous generation is an obsolete body of thought on the ordinary formation of living organisms without descent from similar organisms. Typically, the idea was that certain forms such as fleas could arise from inanimate matter such as dust, or that maggots could arise from dead flesh

Surface Tension

At liquid-air interfaces, surface tension results from the greater attraction of water molecules to each other (due to cohesion) than to the molecules in the air (due to adhesion). The net effect is an inward

force at its surface that causes water to behave as if its surface were covered with a stretched elastic membrane. Because of the relatively high attraction of water molecules for each other, water has a high surface tension (72.8 millinewtons per meter at 20°C) compared to that of most other liquids. Surface tension is an important factor in the phenomenon of capillarity.

Surfactant
Surfactants are compounds that lower the surface tension (or interfacial tension) between two liquids or between a liquid and a solid. Surfactants may act as detergents, wetting agents, emulsifiers, foaming agents, and dispersants.

Vesicles
In cell biology, a vesicle is a small organelle within a cell, consisting of fluid enclosed by a lipid bilayer membrane. Vesicles can form naturally, for example, during the processes of secretion (exocytosis), uptake (phagocytosis and endocytosis) and transport of materials within the cytoplasm. Alternatively, they may be prepared artificially, in which case they are called liposomes.

Volcanic Outgassing
Outgassing is the release of gases either trapped in liquid rock (magma) or generated by the contact of the heated rock with underground water. These gases include water vapor, carbon dioxide, sulfur dioxide, and hydrogen sulfide. The sulfur compounds are especially dangerous to humans and animals, and can lead to "acid rain" when released into the atmosphere.

Eon
The Earth is divided into 4 Eons