

Deep Time Milestones

Use the timeline bar at the top to navigate through the different eons and eras of earth's history. Click on the names of the eras, and the circles, triangle, and squares on the timeline to learn more information.

Each of the biological events or life forms on this sheet appears in the "Transformation" section of the timeline. For each one, note the approximate timeframe it first appeared on earth, basic information about it, any effects from surrounding geological and/or extinction events, and any relevant information about the period, era, or eon.

****NOTE**:** This answer key should be used as a guideline or departure point for discussion only rather than a grading key. Student answers will likely vary from the answers shown here; it is acceptable for students to write more, less, or slightly different answers than the ones shown here. It is recommended that educators review the website before conducting the activity with students to determine acceptable answers.

I. PRECAMBRIAN EON

First Evidence of Life: ___3,850 million years ago in what is now SW Greenland. Carbon isotope ratios, signifying life, found in volcanic and sedimentary rock. At the end of the Hadean era, which was uninhabitable. ___

Bacteria Diversify: _____3,800 mya. Bacteria reproduce through fission, show staggering diversity, lateral transfer of genetic information. Beginning of Archaean era, very little or no oxygen in atmosphere. Bacterial formations known as stromatolites form, first continents form. ___

First Eukaryotes: ___2,500 mya. First eukaryotes evolve from free living bacteria inside host bacteria, carry out cellular respiration. More oxygen being produced in oceans at the end of Archaean/beginning of Proterozoic eras. _____

True Algae: _____1,200 mya. Multicellular algae fossils found. Biodiversity greatly increasing from eukaryote ancestors. Rodinia supercontinent forms. In Proterozoic era oxygen collects in oceans and atmosphere. Soft-bodied animals evolve and then are scarce. Extinction event at the end of era. ___

II. PALEOZOIC ERA

The Cambrian Explosion: ___530 mya. Basic body plans of major animal phyla – including all existing today – are established. Land is still devoid of life during Cambrian period. Animals with hard-shelled bodies, chordates, and marine reefs emerge around this time. 2 extinction events at the end of the Cambrian wipe out 40-50% of marine genera.___

Land plants: ___480 mya. Green algae likely washed ashore, evolve shallow root systems, occupy freshwater areas. In Ordovician period species exhibit greater diversity than Cambrian. Plants adapt to open air living. Catastrophic extinction wipes out 70% of marine species at end of era.___

Arthropods on land: ___420 mya. First animals to adapt to land, ultralight body and spindly, strong legs. This is when great mountain ranges are starting to form on earth. On the cusp of the Silurian and Devonian periods, the climate is warm and stable.___

Reptiles: ___350 mya, early reptiles are similar to amphibians but share similarities with later reptiles as well, first amniotes, complete the evolution of life from water to land. The Carboniferous period is hot and humid in the north, cold in the south. Large plants and animals flourish. Coal is formed from carbon-rich organic matter.___

III. MESOZOIC ERA

Mammals: ___220 mya, mammal-like reptiles evolve into true mammals and possess several traits exhibited by reptilian ancestors, earliest are rodent-like, nocturnal, and solitary. Triassic period follows a near-complete extinction of life at the end of the Permian period, critical for land vertebrates.___

Dinosaurs: ____ 220 mya, emerge following extinction eliminating mammal-like reptiles. Reign spans 150 million years. In Jurassic era dinosaurs range in size, in Cretaceous they dominate the landscape, disappearing with mass extinction approximately 65 mya. ____

Birds: _____
____ 150 mya, evolved directly from small feathered dinosaurs but without a breastbone or a beak at first.

Flowering plants: _____ 130 mya, angiosperms use color and scent to attract pollinating insects. They become the dominating plant life on land. Evolution of angiosperms and pollinating insects is connected – bees, ants, and butterflies also thrive. ____

Click on the square for the “End Cretaceous” extinction event, and read the text. The Earth has now changed in significant ways. What changes are to come in the next and most recent stage of Earth’s history, the Cenozoic era?