The Earth

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EON	ERA	PERIOD		EPOCH	PIVOTAL EVENTS
Phanerozoic Eon "Visible Life" Organisms with skeletons or hard shells. 540 mya through today. P	**Cenozoic Era** "The Age of Mammals" 65 mya through today	**Quaternary Period** "The Age of Man" 1.8 mya to today		**Holocene** 11,000 ya to today	Human civilization
				Pleistocene The Last Ice Age 1.8-.011 mya	The first humans (Homo sapiens) evolve. Mammoths, mastodons, saber-toothed cats, giant ground sloths, and other Pleistocene megafauna A mass extinction of large mammals and many birds happened about 10,000 years ago, probably caused by ice ages.
		Tertiary Period 65 to 1.8 mya	**Neogene** 24-1.8 mya	**Pliocene** 5-1.8 mya	 First hominids (australopithecines). Modern forms of whales. Megalodon swam the seas
				Miocene 24-5 mya	 More mammals, including the horses, dogs and bears. Modern birds. South American monkeys, apes in southern Europe, Ramapithecus.
			Paleogene 65-24 mya	**Oligocene** 37-24 mya	Starts with a minor extinction (36 mya). Many new mammals (pigs, cats, rhinos, tapirs appear). Grasses common.
				Eocene 58-37 mya	Mammals abound. Rodents appear. Primitive whales appear.
				Paleocene 65-58 mya	First large mammals and primitive primates, plesiadapiforms.

Phanerozoic Eon "Visible Life" Organisms with skeletons or hard shells. 540 mya through today. **Phaneroz**	**Mesozoic Era** "The Age of Reptiles" 248 to 65 mya	**Cretaceous Period** 146 to 65 mya  	Upper 98-65 mya	High tectonic and volcanic activity. Primitive marsupials develop. Continents have a modern-day look. Minor extinction 82 mya. Ended with large extinction (the K-T extinction) of dinosaurs, pterosaurs, ammonites, about 50 percent of marine invertebrate species, etc., probably caused by asteroid impact or volcanism.
			Lower 146-98 mya	The heyday of the dinosaurs. The first flowering plants, crocodilians, and feathered dinosaurs appear. The earliest-known butterflies appear (about 130 million years ago) as well as the earliest-known ants and bees. Minor extinctions at 144 and 120 mya.
		Jurassic Period 208 to 146 mya 		Many dinosaurs, including the giant Sauropods. The first birds appear (Archaeopteryx). Many ferns, cycads, gingkos, rushes, conifers, ammonites, and pterosaurs. Minor extinctions at 190 and 160 mya.
		Triassic Period 248 to 208 mya 		The first dinosaurs, mammals, and crocodyloformes appear. Mollusks are the dominant invertebrate. Many reptiles, for example, turtles, ichthyosaurs. True flies appear. Triassic period ends with a minor extinction 213 mya (35% of all animal families die out, including labyrinthodont amphibians, conodonts, and all marine reptiles except ichthyosaurs). This allowed the dinosaurs to expand into many niches.

o i c E o n "Visible Life" Organisms with skeletons or hard shells. 540 mya through today. P h a n e r o z o i c E o	Paleozoic Era 540 to 248 mya	Permian Period "The Age of Amphibians" 280 to 248 mya 	"The Age of Amphibians" - Amphibians and reptiles dominant. Gymnosperms dominant plant life.The continents merge into a single super-continent, Pangaea. Phtyoplankton and plants oxygenate the Earth's atmosphere to close to modern levels. The first stoneflies, true bugs, beetles, and caddisflies, The Permian ended with largest mass extinction. Trilobites go extinct, as do 50% of all animal families, 95% of all marine species, and many trees, perhaps caused by glaciation or volcanism.
		Carboniferous Wide-spread coal swamps, foraminiferans, corals, bryozoans, brachiopods, blastoids, seed ferns, lycopsids, and other plants. Amphibians become more common. 360 to 280 mya	Pennsylvanian Period 325 to 280 mya First reptiles. Many ferns. The first mayflies and cockroaches appear.
			Mississippian Period 360 to 325 mya  First winged insects.
	Paleozoic Era 540 to 248 mya	Devonian Period "The Age of Fishes" 408 to 360 mya 	Fish and land plants become abundant and diverse. First tetrapods appear toward the end of the period. First amphibians appear. First sharks, bony fish, and ammonoids. Many coral reefs, brachiopods, crinoids. New insects, like springtails, appeared. Mass extinction (345 mya) wiped out 30% of all animal families) probably due to glaciation or meteorite impact.

n **"Visible Life"** **Organisms with skeletons or hard shells.** **540 mya through today.**	**Silurian Period** **438 to 408 mya**	The first jawed fishes and uniramians (like insects, centipedes and millipedes) appeared during the Silurian (over 400 million years ago). First vascular plants (plants with water-conducting tissue as compared with non-vascular plants like mosses) appear on land (Cooksonia is the first known). High seas worldwide. Brachiopods, crinoids, corals.
	Ordovician Period **505 to 438 mya**	Plants appear on land. First corals. Primitive fishes, seaweed and fungi. Graptolites, bryozoans, gastropods, bivalves, and echinoids. High sea levels at first, global cooling and glaciation, and much volcanism. North America under shallow seas. Ends in huge extinction, due to glaciation.
	Cambrian Period **"The Age of Trilobites"** **540 to 500 mya** 	"Age of Trilobites" -The Cambrian Explosion of life occurs; all existent phyla develop. Many marine invertebrates (marine animals with mineralized shells: shell-fish, echinoderms, trilobites, brachiopods, mollusks, primitive graptolites). First vertebrates. Earliest primitive fish. Mild climate. The supercontinent Rodinia began to break into smaller continents (no correspondence to modern-day land masses). Mass extinction of trilobites and nautiloids at end of Cambrian (50% of all animal families went extinct), probably due to glaciation.

Proterozoic Eon **2.5 billion years ago to 540 mya**		Vendian Period 600 to 540 Million Years Ago	Vendian biota (Ediacara Fauna), multi-celled, animals appear including sponges. A mass extinction occurred. The continents had merged into a single supercontinent called Rodinia.
			First multicellular life: colonial algae and soft-bodied invertebrates appear. Oxygen build-up in the Mid-Proterozoic.
Archeozoic Eon (Archean) **3.9 to 2.5 billion years ago**			"Ancient Life" - The first life forms evolve - one celled organisms. Blue-green algae, archaeans, and bacteria appear in the sea. This begins to free oxygen into the atmosphere.
Hadean Eon **4.6 to 3.9 billion years ago**			"Rockless Eon" - The solidifying of the Earth's continental and oceanic crusts.

Geologic Time Scale

Era	Period		Epoch	Dates	Age of	Events
			Holocene	11,000-today		Modern human civilization
	Quaternay		Pleistocene	.011-1.8		Last ice age, *Homo sapiens* , mammoths, saber-toothed cats
			Pliocene	2-5		First hominids (*australopithecines*), modern whales
		Neogene	Miocene	5-24		Modern birds, horse, dogs, bears
			Oligocene	24-37		New mammals, pigs, rhinos, grasslands
			Eocene	37-58		First rodents, primitive whales, Himalayas form
Cenozoic	Tertiary	Paleogene	Paleocene	58-66	Mammals	Extinction of dinosaurs, first primitive primates
	Cretaceous			66-144		Flowering plants, butterflies, ants, modern continents, Rocky Mountains form
	Jurassic			144-208		Dinosaurs dominant, first birds, mammals
Mesozoic	Triassic			208-245	Reptiles	First dinosaurs, turtles, crocodiles, flies
	Permian			245-286		End of trilobites, Pangaea forms, modern levels of oxygen
		Pennsylvanian		286-320		First reptiles, cockroaches, ferns abundant
	Carboniferous	Mississippian		320-360	Amphibians	Large primitive trees, winged insects
	Devonian			360-408		First amphibians, bony fish
	Silurian			408-438	Fishes	First jawed fish, vascular plants, insects
	Ordivician			438-505		First fish, land plants, coral, seaweed, fungi
Paleozoic	Cambrian			505-570	Invertebrates	First shells, trilobites dominant
				570-2,500		First multi-celled organisms, sponges
				2,500-3,800		First one-celled organisms, algae, bacteria
Precambrian				3,800-4,600		Oldest rocks

Dates in millions of years