

Geologic Time Scale

EON	ERA	PERIOD	EPOCH	Ma ¹	PLANTS	ANIMALS	GEOLOGY	
Phanerozoic Pz <small>"make life appear"</small>	CENOZOIC Cz <small>"new life"</small> "The Age of Mammals"	Quaternary Q ² An addition to the 18 th C system "The Age of Man"	Holocene H <small>"entirely new"</small>	0.01	Modern	Human civilization	Himalayan Orogeny continues; rifting continues elsewhere	
			Pleistocene P _s <small>"most new"</small>	2.6	Boreal plants migrate south into refugia; tundra becomes dominant in their place where land is ice-free	First humans; mass extinction with ice age	Ice Ages cover up to 30% of earth's surface	
		Tertiary ³ T Third and final 18 th C division first two no longer used	Neogene N <small>"new born"</small>	Pliocene P _b <small>"more new"</small>	5.3	Grasses become dominant; temperate deciduous trees; boreal evergreen trees	First hominids, modern whales	Arctic ice cap develops, earth much colder: Cascadian & Sierra Orogenies
				Miocene M _i <small>"less new"</small> "The Age of Grasses"	23.0	Grasses greatly diversify with the cooling climate; widespread forests dramatically reduce the amount of CO ₂ in the atmosphere	Modern birds; horses, dogs, bears, So. American monkeys; first apes: <i>Sahelanthropus</i> , <i>Sivapithecus</i>	Antarctica becomes permanently frozen surrounded by a great southern ocean; Tethys Sea closes forming modern Mediterranean
			Paleogene P _b <small>"old born"</small>	Oligocene O _a <small>"little, few new"</small>	33.9	Grasses common, forests became temperate. Fabaceae increases.	Pigs, deer, cats, rhinos, tapirs	Himalayan Orogeny : India collides with Asia
		Eocene E _o <small>"dawn of new"</small>	55.8	Tropical forests, including the poles; warm	Mammals abound: rodents & primitive whales appear	Alpine Orogeny Rockies reach their maximum		
		Paleocene P _e <small>"old and new"</small>	65.5	Angiosperms take on important ecological roles	First large mammals, primitive primates	Australia separates from Antarctica		
	MESOZOIC Mz <small>"middle life"</small> "The Age of Dinosaurs"	Cretaceous K <small>"chalk" from English Channel</small>	Late	99.6	Angiosperms rapidly take over land niches; Moraceae, Platanaceae appear	Huge increase in dinosaurs; primitive marsupials; bees coevolve w/ plants; major extinction at end	Laramide Orogeny : India separates from Antarctica; meteor impact?	
			Early	145.5	Betulaceae, Araliaceae, Magnoliaceae, Cornaceae, Fagaceae, Lauraceae, Palmae develop in localized populations	Dinosaurs nearing peak including those with feathers; butterflies, snakes, ants, bees	Sevier Orogeny ancestral Rockies; Tethys Sea develops with rise in world ocean levels	
		Jurassic J Jura Mountains of France	Late	161	First Angiosperms. Gymnosperms <i>Aracarioxylon</i> , Ferns, cycads, ginkgoes, rushes, conifers remain dominant	Dinosaurs & pterosaurs appear; first "bird" <i>Archaeopteryx</i> appears; ammonites abundant	Ancestral Sierra Nevada mountains batholiths form	
			Middle	176				
			Early	201.6				
		Triassic T _r From the German 3 part division	Late	235	Rapid development of conifers & cycads after Permian extinction makes way. Liverworts, horsetails & club moss decline while <i>Cheilepitys</i> conifer and the seed fern <i>Glossopteris</i> dominate	First dinosaurs, mammals and crocodiles. Turtles, ichthyosaurs. Mollusks are the dominant invertebrate. True flies	Pangaea rifts apart forming the Atlantic Ocean in a quiet, semi-arid period with Pangaea about half of earth's surface	
			Middle	245				
			Early	251				
		Permian P Perm region of Russia "The Age of Amphibians"	Late	260	Gymnosperms abundant; liverworts, horsetails & club moss dominant. Phytoplankton & plants oxygenate atmosphere to near modern levels	Amphibians & reptiles dominant; stoneflies, true bugs, beetles, caddisflies. Massive extinction: 50% of families, 95% of marine species	Alleghanian Orogeny and others form Pangaea; much glaciation & volcanic activity leads to massive extinction at the end of the period.	
			Middle	271				
	Early		299					
	Carboniferous C From the abundance of coal	Pennsylvanian P	318	Vast coal forests of scale trees, ferns, club trees, giant horsetails	First reptiles; First winged insects - mayflies & cockroaches	Great swamps and lowlands in Laurasia		
		Mississippian M	359	Pteridospermatophyta (seed ferns) <2 m tall; vast coal-forming swamps; first large trees	Amphibious sea scorpions, rhizodonts, crinoids, blastoids; corals, bryozoan, brachiopods common; sharks common & diverse	Vast limestone deposits formed in passive margins of Laurasia and Gondwana during interorogenic calm		
	Devonian D Devonshire, UK	Late	385	Psilophyta <i>Psilophyton</i> and <i>Rhynia</i> , become abundant and diverse; first clubmosses, horsetails and ferns; first primitive gymnosperm <i>Archaeopteris</i>	Fish become abundant and diverse. First amphibians, sharks, bony fish appear	Acadian Orogeny : much glaciation; meteor impact?		
		Middle	398					
		Early	416					
	Silurian S Ancient British tribe	Late	423	First vascular plants such as the Psilophyta (plants that lack leaves and roots but have a vascular system) <i>Cooksonia</i> appear on land	First jawed fish, primitive centipedes; brachiopods, corals	High sea level with calm, shallow seas during interorogenic calm with deserts leading to vast salt deposits		
Middle		428						
Early		444						
Ordovician O Ancient British tribe	Late	461	Primitive plants something like liverworts appear on land with spores gathered in a case; fungi; marine algae proliferate	First corals, primitive fish, bryozoans, gastropods, bivalves, echinoids	Taconic Orogeny : High sea level followed by global cooling and glaciation; much volcanism.			
	Middle	472						
	Early	488						
Cambrian C Cambria, Roman name for Wales "The Age of Trilobites"	Furongian ⁴	501	Marine algae Land devoid of plants Atmospheric CO ₂ content ~20-35 times present-day	"Cambrian Explosion" of life where all existent phyla develop. Marine invertebrates dominate such as Trilobites; first vertebrates, earliest fish	Rodinia breaks up, sediments collect, mild climate world-wide in an interorogenic calm			
	Series 3 ⁴	510						
	Series 2 ⁴	521						
	Terreneuvian ⁴	542						
"PRE-CAMBRIAN" pC <small>"before the Cambrian"</small> This is an informal but well entrenched name for the "super eon" before the Phanerozoic	EON	ERA	Neoproterozoic Z	1000	Land devoid of plants	Multi-cellular animals dominant. Oxygen begins to increase in the atmosphere. Stromatolites.	Grenville Orogeny forms Rodinia, the first supercontinent; shallow continental shelves develop	
				Mesoproterozoic Y				1600
				Paleoproterozoic X				2500
	Archean A <small>"arkhaios", ancient</small>	Neoproterozoic Z	Neoarchean W	2800	Simple, single cell life appears in the Eoarchean from microfossil evidence. No oxygen in the atmosphere.	Heat flow 3x more than today providing energy for vigorous plate movement of small felsic protocontinents moving on a mafic convection currents; deep oceans at end and normal surface temperature		
			Mesoarchean V	3200				
			Paleoarchean U	3600				
	Hadean <small>"hades", underworld</small>	Eoarchean	3850	The first life forms and self-replicating RNA molecules may have evolved on earth around 4000 Ma during this eon	Napier Orogeny in Antarctica, 4000 ma; oldest rock-orthogneiss 4030 ma; oldest mineral-zircon 4406 ma			
4600								

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Plant, animal and geologic events adapted from a myriad of sources. Geologic time is a work in progress, always changing with new evidence.

¹ Ma = millions of years ago from the beginning (bottom) of the time period. ² Letters and ligatures after the name are standard abbreviations. ³ Entrenched Western name no longer in international use. ⁴ Names not yet adopted by the International Commission on Stratigraphy (ICS) that established names and abbreviations.