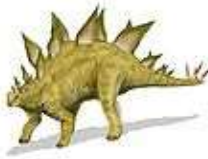

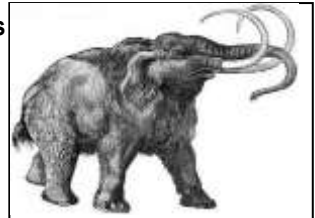


Earth Evolution

This Timescale is mainly based on The Paleology Database (TPD) with years in Mya. Other sources are Wikipedia, EU010, EU011, EU049, Medit.03, SYS002:I, GB99 ---> abbreviations.

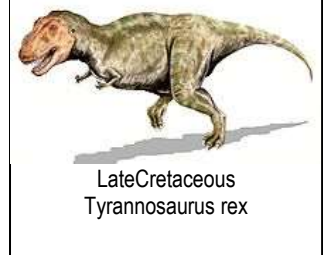
Eon	Era	Period	Epoch		
Phanerozoic 0-590	Cenozoic 0-65,5	Quaternary 0-1,81	Holocene 0-0,011		
		Appearance of Homo .	Pleistocene 0,011 -1,81		
		Tertiary 1,81-65,5 (now disused) O.Tert. 1,81-23,3 (Neogene)	Pliocene 1,81-5,33 O.Pli. 1,81-3,6 U.Pli. 3,6-5,33		
			Miocene 5,33-23,3 O.Mio. 5,33-11,61 M.Mio. 11,61-15,97 U.Mio. 15,97-23,3		
			Oligocene 23,3-33,9 O.Oli. 23,3-28,4 U.Oli. 28,4-33,9		
		U.Tert. 23,3-65,5 (Paleogene)	Eocene 33,9-55,8 O.Eoc. 33,9-40,4 M.Eoc. 40,4-48,6 U.Eoc. 48,6-55,8		
		Paleocene 55,8-65,5 O.Paleo. 55,8-58,7 M.Paleo. 58,7-61,7 U.Paleo. 61,7-65,5	Mesozoic 65,5-248	Cretaceous (Kreide) 65,5-145,5	O.Kreide 65,5-89,3 Senon 65,5-89,3
					M.Kreide 89,3-130 Gallic 89,3-130
					U.Kreide 130-145,5 Neocom 130-145,5
		Jurassic (Jura) 145,5-199,6	 Stegosaurus lived during the mid to late Jurassic	 Allosaurus was one of the largest land predators during the Jurassic	O.Jura 145,5-161,2 (Malm)
M.Jura 161,2-175,6 (Dogger)					
U.Jura 175,6-199,6 (Lias)					



Mammoth 1,8 Ma-4000 years

In the [Paleogene](#) mammals evolved after the extinction at the end of Cretaceous. There Species depending on [photosynthesis](#) declined or died out because of the reduction in [solar energy](#) reaching the Earth's surface due to atmospheric particles blocking the sunlight. As today, photosynthesizing organisms, such as [phytoplankton](#) and land [plants](#), formed the primary part of the [food chain](#) in the late Cretaceous. Evidence suggests that [herbivorous](#) animals, which depended on plants and plankton as their food, died out as their food sources became rare ; consequently, top [predators](#) such as [Tyrannosaurus rex](#) also perished.

The Cretaceous climate began cool, but increased then warmer. New groups of [mammals](#) and [birds](#) as well as [flowering plants](#) appeared. [Mammals](#) were a small and still minor component of the [fauna](#). The Cretaceous ended with one of the largest [mass extinctions](#) in [Earth history](#), the [K-T extinction](#), when many species, including the dinosaurs, [pterosaurs](#), and large marine reptiles, disappeared

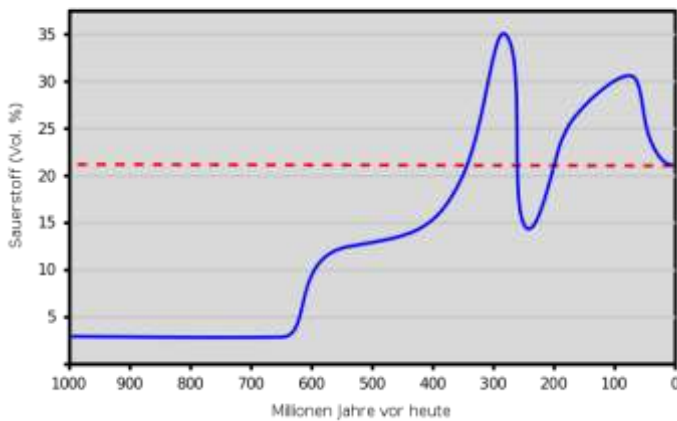


LateCretaceous
Tyrannosaurus rex










In Jurassic primary vertebrates living in the seas were [fish](#) and marine [reptiles](#). [Archosaurian](#) reptiles remained dominant .The first [birds](#), like [Archaeopteryx](#), evolved. The climate was warm with no evidence of [glaciation](#). During the early Jurassic period, [Pangaea](#) broke up into the northern [Laurasia](#) and the southern continent [Gondwana](#).


Sauerstoffanteil der Erdatmosphäre

im Verlauf der letzten 1000 Mio. Jahre



<http://www.wikinfo.org/Multilingual/upload/9/92/Sauerstoffgehalt-1000mj.svg>

 <p>Proterosuchus, a genus of carnivorous reptile, existed in the Early Triassic</p>	<p>Triassic (Trias) 199,6-251</p>	<p>O.Trias 199,6-228</p> <p>M.Trias 228-245</p> <p>U.Trias 245-251</p>	<p>In the Triassic the first flying vertebrates, the pterosaurs, evolved. The climate was hot and dry. The ammonites recovered, diversifying from a single line that survived the Permian extinction. Late Triassic extinction was accompanied by huge volcanic eruptions, when the supercontinent Pangaea began to break, or global cooling or even a bolide impact caused it.</p>
<p>Paleozoic 248-542 or 590</p>	<p>Permian 251-299 O.Perm 251-268</p>	<p>Lopingian 251-260,5</p>	
<p>The Permian is characterized among land vertebrates by the diversification of the early amniotes into the ancestral groups of the mammals, turtles, lepidosaurs and archosaurs. The climate varied between warm and cool cycles. The Permian ended with the Permian-Triassic extinction. 90-95 % of the marine and 70 % of the land species died out, may be caused by large volcanic activities which raised temperatures 5°C, or a meteorite with a crater of 500 km in the Antarktis or a combination of this and other reasons. The ginkgos appeared.</p>	<p>M.Perm 268-284</p>	<p>Guadalupian 260,5-272,5</p>	 <p>Coelophysis, one of the first Dinosaurs, appeared in the mid-Triassic</p>
	<p>U.Perm 284-299</p>	<p>Cisuralian 272,5-299</p>	
 <p>Permian Titanophoneus and Ulemosaurus</p>	<p>Carboniferous (Karbon) 299-360,7 Pennsylvanian 299-318,1</p>	<p>O.Pennsylvanian (O.Karbon) 299-305</p> <p>M.Pennsylvanian (o.M.Karbon) 305-312</p> <p>U.Pennsylvanian (u.M.Karbon) 312-318,1</p>	<p>The Carboniferous climate was warm, but cooled to the end. Flora and fauna increased. It was a time of glaciation, low sea level and mountain building with a minor marine extinction</p>
 <p>Early Permian Edaphosaurus poganias and Platyhystrix</p>	<p>Mississippian (U.Karbon) 318,1-360,7</p>	<p>O.Mississippian 318,1-326,4</p> <p>M.Mississippian 326,4-345,3</p> <p>U.Mississippian 345,3-360,7</p>	 <p>Late Carboniferous giant dragonfly-like insect Meganeura grew to wingspans of 0,75 m</p>
<p>The Devonian period marks the beginning of extensive land colonization by plants. In the late Devonian extinctions, of which the reasons are still unknown, many marine genera disappeared. The climate was warm, and probably lacked any glaciers.</p>	<p>Devonian 360,7 - 418,1</p>	<p>O.Devon (Neodevon) 360,7 - 383,7</p> <p>M.Devon (Mesodevon) 383,7-391,9</p> <p>U.Devon (Eodevon) 391,9-418,1</p>	 <p>Hylonomus, the earliest sauropsid reptile, appeared in the Pennsylvanian</p>
<p>The Devonian period marks the beginning of extensive land colonization by plants. In the late Devonian extinctions, of which the reasons are still unknown, many marine genera disappeared. The climate was warm, and probably lacked any glaciers.</p>	<p>Silurian 418,1-443,7</p>	<p>Pridoli (o.O.Silur) 418,1-418,7</p> <p>Ludlow (u.O.Silur) 418,7-422,9</p> <p>Wenlock (M.Silur) 422,9-428,2</p>	 <p>The early Carboniferous Pulmonoscorpion reached a length of up to 1 metre.</p>
 <p>Devonian http://www.creationism.ws/devonian_land_scape_501a.jpg</p>	 <p>Devonian Trilobites Denver Musum of Natural History</p>	<p>Llandovery (U.Silur) 428,2-443,7</p>	<p>Silurian Climate warm, glaciers retreated back into the South Pole until they almost disappeared in the middle of the Silurian. The first fossil records of vascular plants, that is, land plants with tissues that carry food, appeared in the second half of the Silurian. Sea Scorpions, some of them several meters in length, exist. Brachiopods, bryozoa, molluscs, hederelloids and trilobites were abundant and diverse.</p>

		Ordovician 443,7-490	O.Ord. 443,7-460,5 Llandeilo 443,7-460,5 M.Ord. 460,5-472 U.Ord. 472-490
<p><u>Ordovician</u> Life mostly marin Sponges, Bryozoans, Trilobites, Graptolites, Conodonts, first Arthropods on land http://www.ucmp.berkeley.edu/ordovician/ordovician.html</p>		Cambrian (Kambrium) 490-542	Merionethian, Furongian (O.Kam.) 490-542 St. Davids (M.Kam.) 501-513 Caerfai (o.U.Kam.) 513-530 Manikayan (u.U.Kam.) 530-542
<p>In the <u>Ordovician</u> the climate is quite warm, but glaciers exist. At the end of the period, many forms died out or were reduced, which may have been caused by a very cold ice age. The first Bryozoa and coral reefs appeared, Mollusca became common.</p>		Vendian 542-610	Ediacara 530-590 Varanger 590-610
<p>First Molluscs appear in <u>Vendian / Ediacaran</u></p>		Ediacaran, Cryogenian, Tonian 542-1000 Sinian 542-1050	Karatan 610-1050 Yurmatin 1050-1350 Burzyan 1350-1650
Proterozoic 590-2500	Neoproterozoic 590-1000	Sturtian 610-1050 Riphean 610-1650	
	Mesoproterozoic 1000-1600	Stenian, Ectasian, Calymnian 1000-1600	
	Paleoproterozoic 1600-2500	Statherian 1600-1800 Orosirian 1800-2050 Rhyacian 2050-2300 Siderian 2300-2500	Huronian
Archaean 2500-3850	Neoarchean 2500-2800 Mesoarchean 288-3200 Paleoarchean 3200-3600 Eoarchean 3600-3850		Animikean, Randian, Swazian, Isuan
Hadean 3850-4650	Nectarian 3850-3950 Basin Groups 1-9 3950-4150 Cryptic 4150-4650		



Ordoevian Orthoceras



Ordoevian Ammonites



Cambrian life
<http://www.astrobio.net/albums/origins/agb.jpg>

In the Cambrian rapid appearance of representatives of nearly all of the modern phyla and perhaps venturing on to land. Climate rather warm. First Gastropoda appear.



Cambrian Nectocaris pteryx (Reconstruction), 5-7 cm, certainly an ancestor of the modern Species
Foto: Marianne Collins dpa



Vendian / Ediacaran fauna
Some of the earliest known multicellular animals from about 570 million years ago
Smithsonian Natural History Museum Ediacara Diorama

In the Cryogenian first appearance of amoeba and sponges, and several glaciations
In the Tonian begins breakup of supercontinent Rodinia

During the Statherian the first complex singlecellular life appeared. Probably during the Orosirian Earth's atmosphere changed to oxygen-rich due to photosynthesis. The Huronian glaciation extended from 2400 Ma to 2100 Ma, during the Siderian and Rhyacian.



Archaean Halobacteria
each cell about 5 µm long.



Archaea were first detected in extreme environments, such as volcanic hot springs.



Impression of a magma ocean on the Hadean Earth