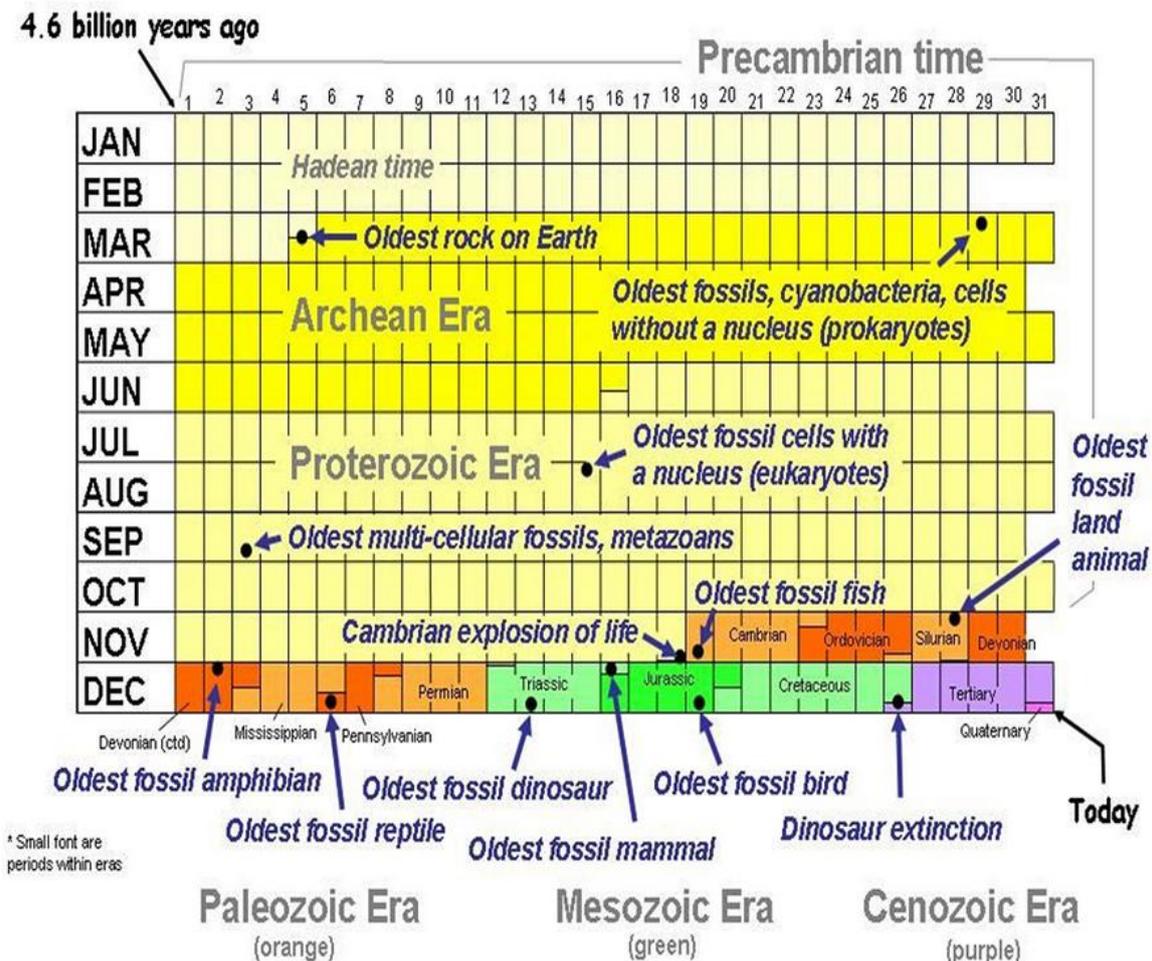


# Tutorial Earth History and Evolution: A Matter of Time

Our earth is around 4.6 billion years old. It is easy to say such a huge number, but the true proportions of this age are hard to grasp for our imagination: In order to become clear about the meaning and the size of the periods of time we are talking about, we have to do a little thought experiment. Let's just imagine that we would run the entire history of the earth in a single calendar year.

## Geologic Time on a Calendar

1 second = 146 years, 1 minute = 8,752 years, 1 hour = 525,114 years, 1 day = 12,602,740 years



If the earth arises on January 1st at 00:00, it will take until middle of January until a solid crust has formed on the earth surface. The oceans appear around End of January, but our earth is still a poisonous, hostile planet that would appear completely alien to us. There is no oxygen in the atmosphere, but much more methane and CO<sub>2</sub>, so that during the day the sky was not blue, but rather red to orange. Our sky is blue nowadays because sunlight is mainly dispersed into short-wave blue light by nitrogen and oxygen molecules in the earth's atmosphere.

It rains again and again and huge thunderstorms, volcanic eruptions and meteorite impacts ensure proper action on the young earth. In addition, the individual days and nights only last a few hours, as the earth rotates around itself much faster.

Minerals such as limestone or chalk do not exist yet - these presuppose the existence of life! But life still does not exist, because the first life only emerges in the spring in the form of the first single-cell organisms. The first single-celled organisms are now beginning to convert substances much more quickly and are increasingly enriching our atmosphere with oxygen. We humans couldn't breathe there yet, the oxygen content is still far too low for. But at least it's a start. Now we have the blue sky we know. However, our planet cools down extremely: time and again there are ages in which the earth completely freezes over, even the oceans, too. Otherwise, the history of early is actually pretty boring. Apart from a few microbes, we actually can't see anything exciting during the whole summer and autumn. The history of the earth also has its own summer slump. But at the beginning of November we finally put our microscope aside. That is how long it would take before the first forms of life that could be seen with the naked eye emerged in the sea. Now it gets interesting for the paleontologists, because now evolution puts in overdrive. After all, life has to prepare for New Year's Eve.

From the second week of November, the sea creatures get bigger and bigger and start to eat each other. This arms race of attack and defense strategies is still driving evolution today. Some milestones that are produced during this time are a solid exoskeleton, like you see in Trilobites, or the development of the eyes, which evolved more than 40 (!) times independently. In the middle of November, numerous cnidarians, sea scorpions and octopuses already live in the seas.

Vertebrate evolution begins on November 16, when the first fish in the ocean is finally tossed onto the stage of life. The first plants appear on land just ten days later. And within a short time our earth will finally become a green planet.

On St. Nicholas' Day, December 6th, the earth is covered by the carboniferous forests and giant insects buzz through the air. The dinosaurs conquer the earth on December 15th and rule it until the 2nd. Christmas Day at the end of the Cretaceous Period. This beautiful Christmas comes to a tragic end, because a huge meteorite hits the earth and causes the extinction of the dinosaurs - That's a fine mess! But now the age of the mammals begins.

Humans appear only very late on New Year's Eve, at around 11:30 p.m. on December 31st on our calendar. The glaciers of the last ice age only melt a good minute before the end of the year. Half a minute later the Egyptians are already building the pyramids. When the 10 second countdown begins, the Roman Empire falls and the Middle Ages begin. After the five second Columbus lands in America. One second before midnight we would still be in the German Empire, and Bismarck would be our chancellor.

Let the champagne corks pop, because our journey through time has come to an end. As we can see, our own history is extremely short when we compare it to the age of the earth as a whole. We should become aware of this fact. We often take ourselves far too seriously and only keep an eye on the time

on our own wristwatch. Use your time wisely!

