

WEEK 1 LIFE ON EARTH

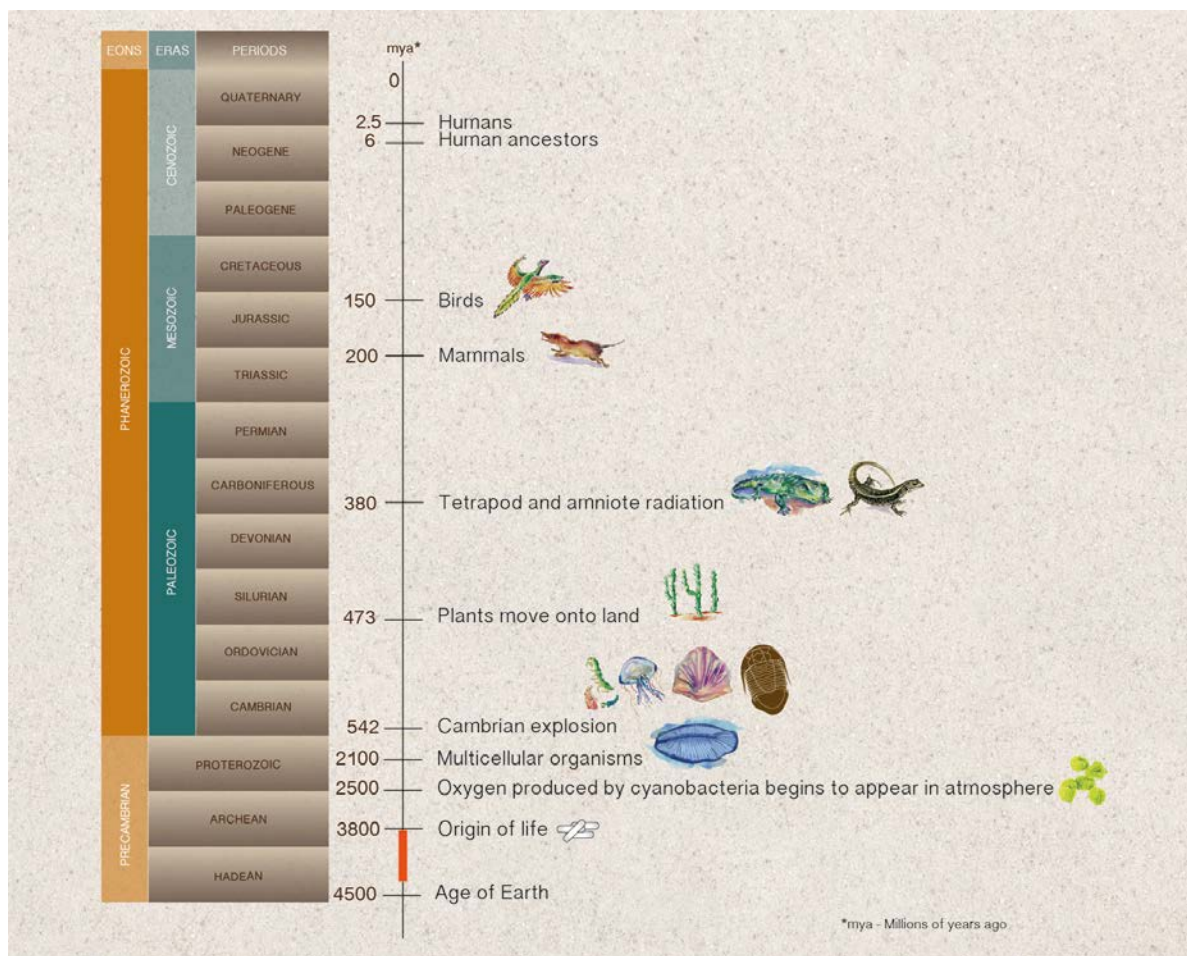
Earliest life was almost certainly microbial. In fact, we think that the earliest microbes on the planet were more like the extremophiles that we know of today, the Archaea. The Archaea, as you all probably know, are capable of living in incredibly harsh environments. They live in the deep vents in the ocean, they live deep underground on Earth. They are able to live in extreme environments that's why they are called extremophiles and we think that because early Earth environment was incredibly unpleasant, these microbes have to be these extremophiles and in fact recent DNA analysis seems to suggest that this may have been the case.

The oldest rocks in South Africa date to about 3.5 billion. The ones in Australia date to 3.4 billion years old and these early rocks, both of them, show evidence of early microbial life. In September 2016 an article in Nature reported on newly exposed rock outcrops in Southwestern Greenland which have been dated to 3.7 billion years. What's special about these rocks is that, within them, there are microbial aggregates called stromatolites that are preserved. These findings of stromatolites at this age suggest that life may have evolved even earlier. Unfortunately, the fossil record does not extend deeper into time. Later on in the fossil record, stromatolites are fairly common. So these aggregates of cyanobacteria are very important because they changed the atmosphere of Earth.

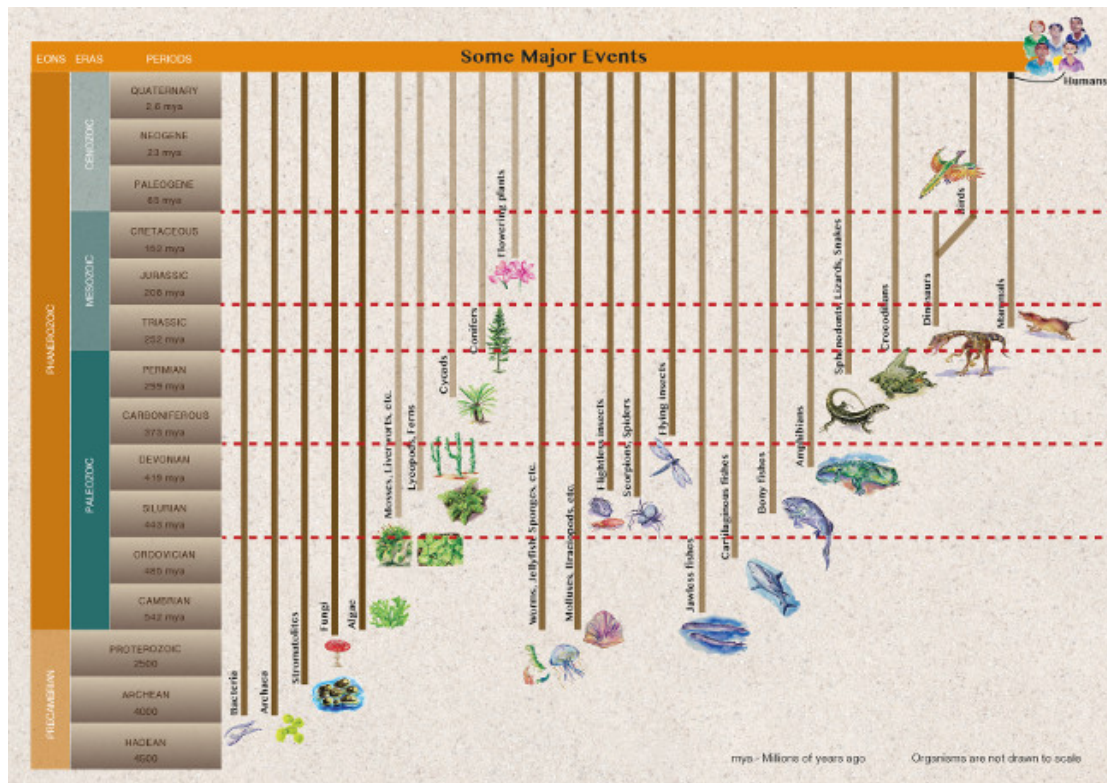
Later this week we will talk with microbiologist Ed Rybicki about why it is that microbes are considered the most successful organisms on our planet. We will also talk about how these cyanobacteria changed the atmospheric content of the atmosphere.

Complex multicellular forms are initially known from around 575 million years ago. But, in 2001, a discovery in Gabon, which is in west-central Africa, showed really complex multicellular cellular forms that date to about 2.1 billion years. By 542 million years we get this huge Cambrian explosion and here the explosion refers to

the diversity of multicellular forms that evolved. Within a period of between five and ten million years we get all relatives of modern phyla. Why this occurred is uncertain. It may have been the higher oxygen levels that spurred this diversification, or it is possible that there are particular genes called homeotic genes, these genes are the ones that control development and they may have played a very important role in this rapid diversification that occurred in the Cambrian. What we do know is that from the Cambrian onwards the pace of innovation is rapid and we soon see the movement of both plants and animals onto land.



When we look at the history of life chart we see that most of the animals and plants alive today have representatives that actually extend deep into time, but we must remember that this is just a very simple depiction. In this chart we are not seeing how these forms are related to one another. We are not even seeing the side branches that eventually go extinct. We have just seen the endpoints of that evolutionary history so there's a fascinating story that still can be told about their relationships.



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