

# Deep time

Over time the age of planet Earth has been gaining years. And the beginning of this story begins with the first religious speculation about the subject. Later science, through the scientific method and the new discoveries, proves that the planet was much older than it was supposed to be.

In 1650, the Archbishop of Ussher published a 1600-page document on the age of the earth, in "The Annals of the World" subtitled "The Origin of Time, and the Total Destruction and Abolition of the Temple and the Community of Jews." In this document he stated that the creation took place on a Sunday, October 23, 4004 BC. Counting the years from Adam's genealogy to the present year of research, Ussher came to the conclusion that the earth was exactly 5610 years old. This statement sparked heated debate at that time.

Later in 1785, James Hutton Scottish geologist and naturalist conceived the idea of "Uniformitarianism," a philosophical school that claims that the present is the key to the past. This powerful idea allows us to say that geological processes that occur in the present also occurred in the distant past. This helped to explain the shape of the Earth's crust and also gave an idea that geological processes are slow and work over a large scale of time. This time is much longer than previously stated. This new conception about the age of the earth is called "deep time."

Already in the nineteenth century, physicist Lord Kelvin creates and refines a model based on the Laws of Thermodynamics and heat transfer by thermal conduction, set values for certain parameters such as temperature of the Earth's core and thermal conductivity gradients. Kelvin estimated the age of the earth between 25 and 400 million years. However, Kelvin's model was incomplete as it did not take into account heat generation through nuclear radiation and also disregarded heat transfer through thermal convection.

With the discovery in the late nineteenth century of the phenomenon of radioactivity by Becquerel and later work by the Currie couple, it was found that certain rocks and minerals spontaneously emitted large amounts of energy and in turn were transmuted. With the discovery of scientific methods to measure the natural decay of uranium, the Englishman Arthur Holmes estimated by dating the rocks the age for the planet of 3 billion years. However, the measurement methods of the time were still subject to external lead contamination.

It was only Claire Cameron Patterson, an American geochemist, who in the mid-twentieth century was able to isolate lead contaminants. By doing this one can estimate by analyzing zircons (small minerals present in rocks able to withstand high temperatures and pressures) in meteorites the precise age of the earth. This study published in "Age of Meteorites and the Earth" in "Geochimica et Cosmochimica Acta" established the age of 4.5 billion years for Earth.

It can be said that planet Earth has gained years over time. Early religious speculation prompted scientists to explain the world through the logical deductions of the scientific method. In an attempt to date deep

time, some misconceptions were made. However, these misconceptions do not invalidate the attempt itself. Only with the discovery and explanation of new natural phenomena and the improvement of measurement techniques did we reach a conclusive age for our Planet.

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