

**Editorial**DOI : <http://doi.org/10.22438/jeb/44/1/Editorial>

## An assumption of the past climate and environment in millennial and centennial scale

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The approximate age of Planet Earth is around 4.54 billion years. This age of the earth has been determined from isotopic dating of the rock samples from the earth's crust as well as from the soils and rocks of the moon and meteorites. Dating methods e.g., Rubidium (<sup>87</sup>R) – Strontium (<sup>87</sup>Sr) and Uranium (<sup>238</sup>U, <sup>235</sup>U, <sup>232</sup>U) – Lead (<sup>206</sup>Pb, <sup>207</sup>Pb, <sup>208</sup>Pb) are widely used for dating of the rocks pertaining to deep time.

Succeeding the birth of planet earth, the origin of first life on the earth is one of the greatest enigmas. There have been a number of questions that have been asked on this issue but many of the answers are not satisfactory and absolutely verified as well as full proof. For a better understanding of this enigma, we need to focus on the several features and geochemical conditions that were congenial for the first life on Planet Earth. We need to know which were the main driving forces viz., water, chemistry, temperature cycles, etc., that facilitated the emergence of life on the earth. There are various opinions regarding the origin of first life on the earth. A group of scientists believe that RNA or RNA-like molecule first appeared on the earth that was capable to self replicate. As far as the existing knowledge is concerned, the earliest life forms were microscopic organisms (microbes) and their evidence is archived in the rocks of about 3.7 billion years ago. Evidence of microbes is also preserved in Stromatolites (lamination of lime-secreting Cyanobacteria that make calcareous mound). After the evolution of Cyanobacteria, there was a dramatic transformation by the rise in Oxygen level in the atmosphere. Gradually from the prokaryotes, the eukaryotes evolved. In the history of life on the earth there have been numerous mass extinction events when high proportions of the plants and animals became extinct both in the terrestrial and marine realms. However, the classical mass extinction events are popularly known as 'Big Five'. In accordance with the geological time scale, the 'Big Five' major mass extinction events are: Ordovician-Silurian (440-450 million years ago), Devonian-Carboniferous (360-375 million years ago), Permian-Triassic (252 million years ago), Triassic-Jurassic (205 million years ago) and Cretaceous-Tertiary (65 million years ago). Extreme climatic and catastrophic events were responsible for all these mass extinction events that took place in the history of earth. However, with every mass extinction event, radiation of flora and fauna took place and evolution as well as diversification in the plant and animal kingdom was witnessed both on the land and in the ocean. All these are linked to the change in climate and environment and there have been change in climate since the first life emerged on the earth i.e., during the past several million years. During the past few decades, the global trend of climate change has created tremendous encouragement and increased concern amongst the scientific community of the world and that have motivated the scientists to focus on different aspects of climate research. In this backdrop, the study of the past climate can provide some important clues and by virtue of that possible changes in the future climate can be predicted. Based on different instruments recorded at the meteorological stations, climate and environmental records of the past few centuries can be traced but not on a millennial and centennial scale. For this reason, we need proxies viz., biotic proxies preserved as fossils and geochemical proxies archived in the ancient rocks of the earth. These proxies are able to interpret the past changes in the climate and environment that occurred in different time slices on the Planet Earth.

During the last thirty five years of my palaeobiological research hovered on the past climate and evolution of organisms both on the land and oceanic realms myself along with colleagues and research students associated with me have contributed on various extreme climatic events of the past. We have been able to decipher when and how the change in floral composition and radiation took

place after the Permian-Triassic mass extinction (~252 million years ago) event (Pal *et al.*, 1991; Pal and Ghosh, 1997; Chatterjee *et al.*, 2014; Ghosh *et al.*, 2014; Ghosh *et al.*, 2016; Kar and Ghosh, 2018; Ghosh *et al.*, 2021). My working group also attempted to identify the changes in the benthic marine flora before and after the Cretaceous-Tertiary mass extinction (~65 million years ago) event (Ghosh *et al.*, 1997; Ghosh and Sarkar, 2013). During the last couple of decades, research of my working group mainly focused on the phytoplankton from the sedimentary rocks exposed in different islands of Andaman and Nicobar along with adjacent offshore sedimentary cores. Our investigations revealed the optimum climatic events, intensification of the Indian Summer Monsoon (ISM), fluctuations in sea level, and various other climatic events since ~16 million years ago (Chakraborty and Ghosh, 2016; Chakraborty *et al.*, 2019; Ghosh *et al.*, 2017; Chakraborty *et al.*, 2021; Saxena *et al.*, 2021; Chakraborty and Ghosh, 2021; Chakraborty *et al.*, 2021a and b; Roy *et al.*, 2022; Saxena *et al.*, 2022). However, according to my perspective, the contributions of mine along with my working group are meager and in further intensive research is needed that can be used as an analogue to predict the future climatic scenario.

Last but not the least, I would like to express that I am associated with the *Journal of Environmental Biology* for the last 10 years in different capacities. I really appreciate the quality of publication in the journal, the process of peer review and the accuracy that attracts the international audience. Specifically, I must acknowledge the contribution of Dr. R.C. Dalela who solely handled the journal and to date, the standard is maintained in an era of competition when various predatory journals are mushrooming all over the world. It is still unbelievable for me that the founder, Dr. R.C. Dalela is no more with us. On December 12, 2022 he took his last breath. I pay my deepest regards and homage to Dr. Dalela. In fact, he invited me to write this editorial note and I am really thankful to this great human being; a very honest, humble, meticulous and pleasing personality. Whenever I met him, I told him that during my graduation I took the help of the book written by Dalela and Verma on Cell Biology. He is no more in this living world as it is the law of our life, but I believe that his untiring effort, hard work, blessings and best wishes will certainly improve the quality of the journal.

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