



Evolution and Extinction of Dinosaurs

Sen S*

Retired Scientist, Council of Scientific and Industrial Research, India

*Corresponding author: Subhasis Sen, Retired Scientist, Council of Scientific and Industrial Research, Hemantika, O- 26, Patuli, 700094 India, Email: ssennagpur82@yahoo.com

Mini Review

Volume 5 Special Issue 1

Received Date: April 29, 2022

Published Date: May 10, 2022

DOI: 10.23880/ijpbp-16000S1-001

Abstract

In contrast to the view that mass extinction of dinosaurs was caused due to impact of a huge meteorite, the author contemplates that to understand such crucial problem at first it is prerequisite to review the cause for the growth of small animals to larger size. Geological records reveal that Permian and Carboniferous era were marked by extensive formation of coal deposits in various parts of the globe which obviously implies that during that period widespread photosynthesis causing enrichment of oxygen of the global atmosphere occurred. Growth of animals thus can be linked with favourable oxygen enriched environment of the Triassic when plenty of food was readily available. Geological evidence further confirms that during the next K-T boundary stage extensive volcanism took place in various parts of the globe. In consequence of such volcanic activity, oxygen content of the global atmosphere must have been substantially reduced associated with rise in temperature that affected the entire global environment. Therefore, selective extinction of large-sized animals that required higher amount of oxygen for sustenance can be directly linked with depletion of oxygen during K-T boundary stage. On the other hand, the evidence shows that the small animals that required comparatively lesser amount of life-sustaining oxygen could easily survive such ordeal.

Keywords: Extinction; Dinosaurs; Paleogene period

Introduction

In the field of geology, especially dealing with palaeontology, the varied group of gigantic extinct animals commonly termed as dinosaurs, have probably stimulated extensive interest to all, including the scientists, principally because of their enormous dimension. Dinosaurs consist of diverse group of vertebrate animals having more than 900 distinct genera and are mostly bipedal and egg-laying. The group also includes birds, which have been confirmed from fossils. A most intriguing subject to all scientists is the cause of sudden disappearance of these species which once ruled the earth.

Discussion

For understanding the situation responsible for extinction of the giant animals [1] it is necessary to go to the bottom of

the problem, namely, the reason why a large group of animals grew up to gigantic dimension and after ruling the planet for considerable period suddenly disappeared. In a previous work the author [2] has discussed the views on extinction of dinosaurs put forward by several scientists, amongst which the work put forward by Nobel Laureate physicist Alvarez and co-workers attracted much attention, even though many scientists disagreed with the thesis. In 1980 Luis Alvarez [1] along with his geologist son Walter Alvarez suggested that mass extinction of dinosaurs and certain other fauna was caused due to impact of an enormous meteorite over the surface of the earth during the Cretaceous–Paleogene period. The theory has been supported by many including a team of scientists who consider that a giant meteorite of about 15 km thickness fell at Chicxulub in Mexico causing this unusual event. Alvarez and co-workers consider that such impact would inject about 60 times the object's mass into the atmosphere as pulverized rock, a fraction of which would

stay in the stratosphere for several years and distributed worldwide. The resulting darkness would hinder the process of photosynthesis, and the expected biological consequences which, according to them, match with the extinction observed in the paleontological record. The present author considers that this view is evidently not based on actual geological evidence but appears to be a fantasy-driven opinion and should have been forthwith rejected. The view of an outstanding chemist or physicist in the field of geology may not be correct and, on the other hand, the opinion of a geologist or a chemist may not solve crucial problem of physics. In the event of fall of a large meteorite, if large and robust animals like dinosaurs would face extinction, before that almost all the flora and fauna would be wiped out. Some of the objections which could be raised against the meteorite pelting thesis are: -

1. Some large and robust animals would have escaped extinction while small and relatively weaker animals would have perished. Perhaps some dinosaurs would have been severely injured but would have survived.
2. The view cannot explain the reason of selective extinction of all dinosaurs during the K-T period.
3. It is not clear how the pulverized rocks are distributed worldwide and remained in the stratosphere defying the force of gravity.
4. The theoretical concept that pulverized rocks would have stayed in atmosphere for several years cannot be considered as sacrosanct and beyond any doubt. In all probability owing to gravitational attraction such debris would soon fall over the surface of the earth and due to that many [3] animals, especially, the smaller ones would have died while larger ones too would have either died or severely injured.
5. Extra-iridium content in rocks on earth's surface could have also been caused owing to igneous intrusion, especially like the event of Deccan volcanism.
6. Charles Officer and Jake Page [3] contemplate that Chicxulub structure of Cretaceous-Tertiary age may

represent remnant of a volcano of late Cretaceous age and that iridium might have been ejected from the volcano.

7. Officer and Page [3] also opined that even if a meteoric impact occurred at K-T time causing interruption of sunlight, many species remained unaffected.
8. According to Gerta Keller [4] extinction of dinosaurs has been caused by Deccan volcanism.

Author's View

As has been considered that to decipher the cause of extinction of dinosaurs, to start with, the cause of growth of the huge animals is vital to understand. The Permian and Carboniferous era marked by rich Gondwana coal deposits formed from glossopteris-rich forests of that era which are found in Australia, Africa, South America and India. Leaves of these thick forests would cause massive process of photosynthesis, thereby producing extensive amount of oxygen that would enrich the entire global atmosphere. Hence, it can be visualized that oxygen content of the atmosphere during the Triassic period must have been very high compared to that of the earlier periods. In consequence it seems that the animals of the Triassic period roamed in an extremely favourable oxygen-rich environment where plenty of food was also available. The fossil records point out that animal of that period became huge in size, which can, therefore, be reasonably related to the oxygen-rich environment associated with availability of plenty of food during that period. However, during K-T boundary stage a contrasting situation prevailed when widespread volcanism occurred in various parts of the globe for which oxygen content of the atmosphere substantially reduced. This led the huge animals which required greater amount of oxygen for sustenance to face selective extinction whereas smaller animals were not affected. The condition of dinosaurs vis-à-vis following events appears to have taken place in the relevant geological ages (Table 1).

Period	Age (m. years)	Main Event	Main Result
Cretaceous	65-130	Igneous Activity	Dinosaur Extinction
Jurassic	130-165	Reign of Dinosaurs	Dinosaur Supremacy
Triassic	165-230	Oxygen-rich-Globe	Growth-of-Dinosaurs
Permian	230-265	Photosynthesis	Oxygen Production
Carboniferous	265-355	Photosynthesis	Oxygen Production

Table 1: Oxygen Content Vis-à-vis Condition of Dinosaurs in Different Geological Periods.

Conclusion

The author considers that the cause of extinction of large sized animals of various types, grouped as dinosaurs

which include birds, bipedal and quadrupedal animals of both herbivorous and carnivorous types, was not caused by impact of meteorites, but owing to depletion of oxygen of the global atmosphere. Impact of meteorite, even if had

occurred in the past in a particular geological time affecting several parts of the globe, it is most unlikely to be a general world-wide phenomenon that would kill selectively only the large size animals in every nook and corner of the planet. In contrast, oxygen content of the global atmosphere would virtually be the same everywhere near the surface of the earth where all land animals dwell upon. Even if oxygen content in several corners is diminished due to prolong burning caused by igneous intrusion, its effect unlike stone pelting, would be rapidly spread throughout the globe, thereby causing it to be a global effect. Geological records reveal that during the Triassic period oxygen content of the atmosphere was greatly enhanced owing widespread photosynthesis of the glossopteris forests. In such an affable oxygen-enriched environment, where abundant food was also available, some animals grew up to enormous size. In contrast, in the next Cretaceous age due to incidences of igneous activities oxygen content of the global atmosphere was significantly depleted and in consequence of that dinosaurs that required more oxygen selectively faced extinction while the smaller animals

remained unaffected.

References

1. Alvarez LW, Alvarez W, Asaro F, Michel HV (1980) Extra-terrestrial cause for the Cretaceous-Tertiary extinction. *Science* 208(4448): 1095-1108.
2. Sen S (2022) Dinosaurs - Mystery of Growth and Extinction of Giant Animals. *Geol Earth Mar Sci* 4(2): 1-2.
3. Officer CB, Page J (1996) *The Great Dinosaur Extinction Controversy*. Addison-Wesley.
4. Gerta K, Paula M, Jahnavi P, Hassan K, Brian G, et al. (2018) Environmental changes during the Cretaceous-Paleogene mass extinction and Palaeocene-Eocene Thermal Maximum: Implications for the Anthropocene. *Gondwana Research* 56: 69-89.

