

Short Commentary

Dinosaurs - Mystery of Growth and Extinction of Giant Animals

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Received: February 09, 2022; Accepted: February 17, 2022; Published: February 28, 2022

Abstract

It has been considered that mass extinction of dinosaurs – a complex problem of geology – has happened due to impact of a huge stone on earth as suggested by the father and son team of Alvarez who in 1980 proposed the view. Despite some criticisms, the view of Alvarez and Alvarez has been overwhelmingly supported by a large section of geologists, including paleontologists and other branches of sciences. Here the author presents a substantially dissimilar view on extinction of dinosaurs for which it has been considered prerequisite to comprehend the cause of growth of the huge animals. From the extensive coal deposits of the Permian and Carboniferous era, it can be assumed that due to widespread photosynthesis of glossopteris-rich forests, oxygen content of the atmosphere of the Triassic period - that immediately followed - became significantly high. From this view possible reason for rapid growth of some animals can be assumed to be due to favorable oxygen-enriched environment with plenty of food material that prevailed during the Triassic period. In consequence, the animals that roamed in oxygen-enriched environment of that time where plenty of food was also available, naturally grew up to large size. Nevertheless, a completely contrasting situation prevailed during the K-T boundary stage when extensive volcanism took place in various parts of the globe for which oxygen content of the atmosphere was substantially reduced. This selectively caused extinction of the large animals which required higher amount of oxygen for sustenance, whereas the smaller animals remained unaffected.

Introduction

In “The Problems of Philosophy” Bertrand Russell [1] in his inimitable style expressed:

“Is there any knowledge in the world which is so certain that no reasonable man could doubt it? When we have realized the obstacles in the way for a straightforward and confident answer, we shall be well launched on the study of philosophy - for philosophy is merely the attempt to answer such ultimate questions, not carelessly and dogmatically as we do in ordinary life and even in the sciences, but critically after exploring all that makes such questions puzzling, and after realizing all the vagueness and confusion that underlies our ordinary ideas. ...”. Regarding apparently unquestionable notions, Sir Bertrand further pointed out that *“Yet, all these may be reasonably doubted and all of it requires much careful discussions before we can be sure that we have stated it in a form that is wholly true.”*

The present author [2] has pointed out that many of our concepts and axioms which are extensively been applied in earth sciences for a long time have been considered to be authentic and of paramount importance, require sensible evaluation, modification, and revision and in certain cases total rejection in the interest of science. Meaningful and judicious upgrading and circumspective analysis of our previous thinking may compel us to unlearn many well-known concepts of earth sciences [1]. The author would be satisfied if he can utilize the rich scientific heritage developed through protracted studies by the scientists from all over the globe in an honest and meaningful manner avoiding fairy tale-like imagination and dogma.

Discussion

The subject matter of the article is dinosaurs – a creature of huge dimension and because of their sheer dimension they aroused much interest and enthusiasm to all, especially to the avid museum visitors. Dinosaurs are a varied group of vertebrate animals which also include birds and are usually bipedal and egg-laying. From fossil evidence more than 900 distinct genera of these extinct animals have been identified. A most intriguing subject to all scientists is the cause of sudden disappearance of these species which once ruled the earth. A large number of scientists have attempted to understand the cause of extinction of dinosaurs amongst them the work of Alvarez and co-workers suggesting impact of meteorite has attracted wide attention, appreciation, as well, as criticism. Although the credit of developing the concept of mass extinction of dinosaurs due to impact of a huge stone on earth goes to the father and son team of Alvarez [3] who in 1980 suggested the view. In 1953 almost a similar view was suggested by Allan O. Kelly and Frank Dacheille [4] who consider that due to impact of asteroids angular shift in axis of the planet occurred associated with features like global floods, atmospheric occlusion and termination of the dinosaurs. According to the theory put forward by Nobel Laurate physicist Luis Alvarez [3] along with his geologist son Walter Alvarez 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 in to atmosphere as pulverized rock, a fraction of which would stay in the stratosphere for several years and distributed worldwide. The resulting darkness would suppress photosynthesis, and the expected biological consequences match quite closely with the extinctions observed in the paleontological record. The present author considers that in case of such event the following possibilities would have taken place:

1. Almost all the flora and fauna would have faced extinction, possibly including large and robust animals.
2. Some large and robust animals would have escaped extinction while small and relatively weaker animals would have perished.
3. The view cannot explain the reason of selective extinction all dinosaurs during the K-T period.
4. It is not clear how the pulverized rocks are distributed worldwide in the stratosphere defying the force of gravity.

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 animals, especially, the smaller ones would have died while larger ones too would have either died or severely injured. 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. Earlier, Charles B. Officer and Jake Page [5] pointed out that instead of an impact crater of Cretaceous-Tertiary age Chicxulub structure is possibly the remnant of a volcano of late Cretaceous age. Officer and Page consider that iridium might have been ejected from volcanoes. They also opined that even if a meteoric impact occurred at K-T time causing interruption of sunlight, many species remained unaffected. One of the critics of the Alvarez hypothesis Gerta Keller [6] thinks that Deccan volcanism to be a possible cause of extinction of dinosaurs in a gradual manner.

Author's View

The author presents here a substantially different view for the cause of extinction of dinosaurs for which, to start with, the cause of growth of the huge animals is vital to understand. The concept suggests that the Permian and Carboniferous era marked is by rich Gondwana coal deposits formed from glossopteris-rich forests of that era. These thick forests would cause extensive process of photosynthesis, thereby producing considerable amount of oxygen that would enrich the atmosphere. Hence it can be visualized that oxygen content of the atmosphere of Triassic period must be high compared to the earlier periods. In consequence it is seems that the animals of the Triassic period roamed in an oxygen-rich environment where plenty of food was also available. The fossil records point out that animals of that period became huge in size, which can, therefore, reasonably be related to the oxygen-rich environment associated with availability of food of 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

Table 1: Pertinent geological ages.

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

substantially reduced. This led large animals which required larger quantum of oxygen for sustenance to face selective extinction whereas smaller animals were not affected. Hence, it seems in the pertinent geological ages the following events took place (Table 1).

Conclusion

The author considers that cause of extinction of large sized animals of various types which also consist of birds, bipedal and quadrupedal animals of both herbivorous and carnivorous types, commonly termed as dinosaurs, was not due to impact of meteorites, but depletion of oxygen of the atmosphere. During the Triassic period oxygen content of the atmosphere was greatly enhanced owing widespread photosynthesis of the glossopteris forests. In such a congenial oxygen-enriched environment with plenty of foods, the animals grew up to large size. However, due to the incidences of igneous activities that occurred during the Cretaceous period oxygen content of the atmosphere was significantly depleted when the large-sized animals that required more oxygen selectively faced extinction while the smaller animals remained unaffected.

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Citation:

Sen S (2022) Dinosaurs - Mystery of Growth and Extinction of Giant Animals. *Geol Earth Mar Sci* Volume 4(2): 1-2.