

Ecological Mechanism of Dinosaur Extinction

Huai Tang Gu

The Middle School of Dong-Xin Farm
Lianyungang City, Jiangsu Province, China
E-mail: ght19651213@163.com

Abstract

To analyze the reasons for the extinction of dinosaurs by applying the elimination methods, to exclude the factors that could not cause the worldwide extinction of the dinosaurs. At last obtain a conclusion that because the Ice Age had come on the Earth and caused the changing of climate that it had been becoming cold and arid from warmth and moist, and caused the phyto-group had been changing, which the Pteridophyte and gymnosperm groups fell off or died out, but the angiosperm groups had been developing and expanding. The characters of photosynthesis of producers of the biosphere had been becoming to the seasonal and regional from the perennial and global, the total of oxygen had reduced sharply in the atmosphere, the density of oxygen had declined, and finally affected the breath of dinosaurs, and led to the extinction of dinosaurs. And as the main producers of biosphere, the pteridophyte and gymnosperm groups had fallen off or died out were the mainly reasons for the creature's extinction at the later of the Cretaceous period.

Keywords: Unbalances of Carbon-Oxygen, Ice Age, Character of photosynthesis, The diffusion of Gas, Density of oxygen.

1. Introduction

The reasons for the extinction of the dinosaurs, a number of scholars proposed many opinions, such as the volcanic eruption, food poisoning, the striking of asteroids, and so on. The argues had exceeded the scopes of biology and paleontology and extended the astrophysics, geology, marine science, etc. However, almost nobody to analyze it on the angle of ecological basic knowledge, almost no one to consider the living state of the producers of biosphere. This article jumps off the thinking set of the forefathers, and thinks and speculates deeply the reasons for extinction of dinosaurs from another perspective, and leads the people's view to a different realm.

2. Methods

Under most circumstances, the forefathers to analyze the causes for extinction of dinosaurs from inner of the Earth, or outside, but neglect the various kinds of environmental factors of dinosaurs living. This paper to analyze and infer the possible living conditions of dinosaurs then and some environmental factors, which can cause the death of living things, by applying the methods of exclusion, to do away with the factors that could not cause global extinction of dinosaurs at the same time and obtain the finally conclusion.

2.1 *Natural disasters can't result in the global extinction of the dinosaur*

In the nature, the causes of death of animals are to fall illness, hunger, stifling (drowning), pestilence, kill, hill fire, and so on. These factors although can cause mass mortality of some organisms, but they are not enough to cause the worldwide extinction of a species of biology. And that excluding the illness and pestilence, the natural hazards giving rise to massive mortality of biology usually can cause all biology's death, but not a chance to aim at a specific species. So we can absolutely eliminate these conventional factors were the reasons for the extinction of the dinosaurs.

2.2 *The impact of asteroid's striking*

In these theories explaining the causes for extinction of dinosaurs. The asteroid's impact theory is the most influential (William Glen, 1997). The theory thinks that at 65 million years ago, a diameter of about 10 km of asteroids collided with the Earth and caused a violent explosion, it resulted in a large amount of dust thrown into the

atmosphere, and these dust blocked the sunlight for several months, the earth was in a dark and cold, the plant died and the food chain was disrupted, it caused many animals, including dinosaurs, extinction. The theory has deeply probed into the causes of the extinction of dinosaurs from astronomical angle, and provided a useful inspiration for the future study of the extinction of dinosaurs. Nevertheless, it still can't answer why other biology still is living? For example, the crocodiles and amphibians. Under the Earth's atmosphere was filled with oxygen, the striking must cause an exploding and burning which would cause the extinction of all species, but not one or two special species, and if the asteroid was roomy enough, it would devastate the entire biosphere.

2.3 The biotic factors and abiotic factors affect the living of dinosaurs.

Then what was it causes the dinosaurs to die out? We might as well analyze it on the composition of the biosphere, one of the largest ecosystems in the world, one by one.

2.3.1 The biotic factor's effect

We firstly analyze the biotic factor's effect. We know that the dinosaurs should be the dominator of Earth then (Hazel Richardson, 2003), merely microorganisms, the dinosaurs, and the plants were able to affect the life of dinosaurs, the former was disease, the latter two were foods chain, but they were not enough to cause the global extinction of dinosaurs. Therefore, we may eliminate the biotic factor's effect.

Another, some scholars put forward food poisoning hypothesis (Alvis Xie, 2019), they think there were a lot of highly toxic alkaloids in the angiosperm, when phytophagous dinosaurs ate them would be in poisoning and death. However, it is worth for people to suspect that the plants were all angiosperms on the Earth then? The pteridophytes and gymnosperms had died out? Or the phytophagous dinosaurs only ate the angiosperms, but didn't eat pteridophytes and gymnosperms? In fact, "fern's peak" occurred on the later period of the Cretaceous rightly, when there were pteridophyte's current families for the first time appeared. Dinosaurs eating angiosperms might perish, but the dinosaurs eating pteridophytes and gymnosperms still could be survival! So it was impossible to cause the global extinction of the dinosaurs.

2.3.2 The abiotic factor's effect

Thus, we can only analyze the reasons for the extinction of the dinosaurs on the angle of Abiotic factors! Abiotic factors are temperatures, sunshine, water, soil and air, let us to analyze them one by one.

Firstly, it was not feasible for the sunshine and soil to lead dinosaurs to demise, we may not discuss them.

Secondly, the temperature.

On the basis of present research results, we can know that the dinosaurs suitably existed on a warmth and moisture wetland environment (Hazel Richardson, 2003), if the temperature declined suddenly, it would influence, of course, the subsisting of the dinosaurs. Nevertheless the low temperature usually occurs on the two polar's high latitude areas of Earth, the equator and low latitude areas still keep a high temperature. In other words, at the same time, it has no possible for a global low temperature to occur on the Earth, Even if the dinosaurs of low temperature areas died, but the high temperature areas could still be survival, in addition, the dinosaurs of low temperature areas might migrate to the high temperature areas, so the temperature factor is very difficult to cause the global extinction of dinosaurs.

Thirdly, water.

The water is a source of life, if no water, it is not possible for the Earth to have any life. On the Earth, although there are some phenomenons of drought, waterlogging, but they have a regional restricting, it is not possible for the Earth to occur on a global drought or waterlogging at the same time. So the water was not also a factor that caused the global extinction of the Dinosaurs.

Thus, there is only one factor for us to analyze, namely, air. Biology must absorb oxygen and consume the organic substances to emit energy and maintain own vital movement in the course of its life. If the carbon-oxygen is an unbalance state, the density of oxygen is declining in atmosphere, in that way all biology of the biosphere will be not able to breathe and go to death, the dinosaurs are no exception, of course. And that, on account of the diffusion of gas, the density of oxygen in the atmosphere is the same or similar at the same elevation, it is not possible for the Earth to occur one territory high, and another low. Dinosaurs in one area could not breathe for lacking oxygen, all dinosaurs on Earth would face the same destiny! In a manner of speaking, the unbalances of carbon-oxygen and atmospheric hypoxia was a sole reason to result in worldwide annihilation of biology at the same time.

2.4 The causes of carbon-oxygen imbalance

What was it caused the unbalance of carbon-oxygen in the biosphere and the lack of oxygen in the atmosphere? It is necessary for us to infer from the sources of oxygen in the biosphere. We know that the Photosynthesis of green plants is the only source of oxygen in the nature, in the Cretaceous Period, the ferns (for example, *Alsophila spinulosa*) and the thermophilic gymnosperms (for example, *Cycas revoluta*) were primary phytogroup, the floriferous angiosperm's evolution was also in a peak time. The growing of the pteridophytes (*Alsophila spinulosa*) and thermophilic gymnosperms (*Cycas revoluta*) want a warmth, humid environment, if the weather turned to the cold and arid, the pteridophytes and thermophilic gymnosperms would be affected seriously, thus it must cause the declining or extinction of ferns and thermophilic gymnosperms. As a major producers of the ecosystems, the decline of the ferns and thermophilic gymnosperms must affect the carbon-oxygen's balance in the biosphere, the total amount of oxygen produced by photosynthesis of the green plants would be less than the respiration consumption of various living organisms in the biosphere, the atmospheric oxygen density had dropped, and the carbon dioxide density had increased, it must affect the respiration of various living creatures and their survival in the biosphere (WANG Rui-ping, 2010).

2.5 The Ice Age's coming on was a curse.

Many scholars believe that the forming cause of the Ice Age is related to the rotation of the solar system. It is right for the Earth to occur a warm-humid age and an Ice Age (including glacial and interglacial periods) in the each revolution period of the solar system. It is about 2.2~2.5 hundred million years for the solar system's revolutionary period, the dinosaurs had been ruling the Earth was about 165 million years (Hazel Richardson, 2003), and it should be about fifty-five million to eighty-five million years for the Earth should be in the Ice Age. The period of dinosaurs belongs to the warm-humid period, and the remaining time belongs to the Ice Age (in the late Cretaceous, the Earth entered the Ice Age, which coincided with the extinction of dinosaurs). During the Ice Age, the Earth's surface temperature was in dropping, and the surface of Earth was in freezing in the middle and high latitudes, the total amount of water vapor in the atmosphere decreased, it was becoming cold and dry, it must affect seriously the growth and reproduction of thermophilic gymnosperms and ferns, and caused the decline or extinction of them, but the angiosperms could rely on the protective structure of the pericarp to adapt to environmental changing, to survive and thrive, gradually occupy an advantageous position. It can be said that the growth of the angiosperms and the declining or extinction of ferns and gymnosperms was a result of natural selection in the process of climate changing caused by the Ice Age! But in the warm and humid period of the dinosaur era, the atmosphere of the whole earth was in a global high temperature, high humidity environment, and it was suitable for the growth and reproduction of ferns and thermophilic gymnosperms and the survival of the dinosaurs.

There was for two distinct differences for the photosynthetic characters of green plants between the dominating periods by the angiosperms and the dominating periods by the ferns, gymnosperms. During the period when ferns and gymnosperms were major producers, the photosynthesis was in a warm and wet periods in front of Ice Age, it was like summer in all year round, and the ferns and gymnosperms (*cycas*) were found all over the world that the discovery of coal, oil and natural gas in the Antarctic and Arctic regions can prove the validity of this prediction (beichengjiu), it was possible for the green plant to proceed the photosynthesis all year round, hence, it had the perennial and global two characters. However, in the dominant periods of angiosperm, the photosynthesis was in the Ice Age, due to the constraints of low temperature factors, it had obvious seasonality and regionality characters, the photosynthesis could only take place during the growing season. The southern hemisphere was different from the northern hemisphere, and the differences were also great between the high latitudes areas and the low latitudes areas. Therefore, there was a vast difference between the two for the efficiency of photosynthesis and the yield of oxygen.

Angiosperms appeared in the early Cretaceous, and had a substantial increase in the medium term, and it obtains a Dominant position in the terrestrial plants at the late period (Zhang Mingzhen, etc., 2018,). It shows that the Cretaceous period was a transition period from the warm-moist climate to the glacial period (The "quilt" of angiosperms is a protective tissue evolved by plants to adapt to the unfavorable environment), it was also the transition period from dominant period of the pteridophytes and gymnosperms to the angiosperm. In the course of this transition, the ferns and gymnosperms were becoming from dominant to declining or even extinction, but the angiosperm was from "minority nationality" to prosperity (ScienceDaily) , and ultimately occupied a dominant position. The photosynthetic characters of the biosphere's green plants had also been changing from the perennial and global to the seasonal and regional, the total amount of oxygen produced by the producers decreased sharply, and caused the atmospheric oxygen density to decrease gradually, Finally, it affected the breath of dinosaurs, and endangered the dinosaurs' life, and led them to global extinction.

2.6 The relationship between the body shape and viability (for oxygen).

As for why dinosaurs died out, but the crocodiles and amphibians survived? It should be related to the dinosaur's shape. We know the dinosaurs were huge, it needs more energy to sustain various activities of life, the consumption of oxygen is also much larger than that of smaller creatures. When the carbon-oxygen was slightly out of balance, the dinosaurs would be in difficulty breathing because of low oxygen density, and then it would affect their movement, foraging and other life activities, as the oxygen density progressed debasing, they eventually stopped breathing! However, for the smaller biology because of their breathing's oxygen requirements were not as high as dinosaurs, thus they could survive. As for the sharks in the sea, although their body was larger, but for dinosaurs, it is still smaller, in addition, they can adapt to the deep-sea environment of life, has a strong adaptability, so they could survive.

3. Results and discussion

3.1 Results

In summary, because of the Ice Age had come on the Earth, and it had changed from warm and moist to cold and dry, which had affected the growth and reproduction of ferns and some thermophilic gymnosperms, and then caused them to decline or extinction. However, angiosperms could survive and develop because they could adapt to the bad environment, and gradually growing, and obtained an ultimate advantage position. During the decay or extinction of ferns and thermophilic gymnosperms, and the development and expanding of angiosperms, the characters of the photosynthesis of Producers in the biosphere had been becoming to the seasonal and regional from the perennial and global, the total of oxygen produced by producers had reduced sharply, the density of oxygen had declined, and affected the breath of dinosaur, and caused the global extinction of dinosaur. The carbon–oxygen was in imbalance in the biosphere and the oxygen density of declining were the direct reasons for the extinction of dinosaurs, and the decline or extinction of the ferns and thermophilic gymnosperms, the main producers of ecosystems, caused by temperature reducing, were the indirect reasons for the extinction of dinosaurs. It can be said that the extinction event at the late Cretaceous was rightly caused by the biosphere's disturbance, which was caused by the decline or extinction of the producers, ferns and gymnosperms in the ecosystem. We also may say that it was an evolutionary process of the animal that it was from the reptile to the mammal, or say from dinosaur occupy a dominant position to the mammal go on the stage of history, which it is along with the green plant's evolution that was from the fern and gymnosperm groups to the angiosperm groups, and it was induced by the changing of environment because of Ice Age had come on the Earth.

3.2 Discussion

3.2.1 The impact of the next Ice Age

Then, as the solar system turns and the next Ice Age will arrive on Earth, will the human being face the same fate as dinosaurs? The answer is no. For today's Earth is no longer the age of ferns era., but the seed. Seed plants have a stronger adaptability and vitality to adapt environment's changing, coupled with the development of human's science and technology; it will enable humans to cope with future changing environment. It can be said that the dinosaurs were born in a wrong age (fern age), and were in a wrong direction of evolution (on the one hand, large body, on the other hand, did not evolve into intelligent creature), and ultimately led them to the road of extinction.

3.2.2 The impact of coming warm-moist ages

For the humans, the crisis of survival will be not the Ice Age, but the warm-moist age following the Ice Age. It is not difficult to imagine for us that after the Ice Age, the climate will become gradually warmer and wettish, the melting glaciers, the rising sea levels, disappearing deserts, and increasing wetlands..... How do humans adapt to the environment of high temperature and humidity? It will be an urgent problem for us to face! If the revolution period of solar system is for 2.2~2.5 hundred million years is correct, the dinosaurs ruled the Earth is for 165 million years, and the extinction time is sixty-five million years, it has still for zero to twenty million years or so for us, the Earth will return to the dinosaurs' age warm and humid climate again.

3.2.3 The extinction events of the Earth's history

There have been several times the large-scale extinction events in the Earth's history, the mechanisms of these extinction events should be the same, the difference was at a different era., the existence form of life, the level of evolution, vitality and adaptability, the way of reproduction and so on., was unlike. Therefore, the interval period length of extinction was unlike, some are long and some short, and it was not coincident with the revolution period of the solar system and has no a certain periodicity. We can discuss and study this question accord to the biological

characteristics of the producers and the consumers, the climate, environment, etc. at that time. For example, for the producers of the biosphere, in different periods, there are great differences in the level of life evolution, vitality and adaptability, breeding methods and so on.

4. Conclusion

When the earth's climate changes periodically with the revolution of the solar system, and the living environment of living things changes also correspondingly, the fittest survives, the unsuitable are eliminated. During the transition of the earth's climate from the warm and moist period to the glacial period, phytogroup had been evolving from ferns and thermophilic gymnosperms (cycas) adapting for the warm and humid climate to angiosperms adapting for the cold and dry environment, and the biosphere's disorder caused by this evolutionary process of the plant had produced a biological species extinction event in the late Cretaceous period, in the evolutionary process, the reptile, dinosaurs, withdrawn from the historical stage, the substitutional was the mammals having a stronger ability to adapt to the environment change. The extinction of the dinosaurs is a result of natural selection in the process of biological evolution. The survival of the fittest in natural selection is always an eternal truth!

References

- Alvis Xie, 2019, The death of dinosaurs from food poisoning, Dinosaur Wikipedia. <https://www.dinomake.com/the-death-of-dinosaurs-from-food-poisoning/>
- Hazel Richardson, 2003. Dinosaur and Prehistoric Life, first edition. Friendship Publishing Company of China, Beijing.
- Wang Rui-ping, 2010, A New Hypothesis of the Extinction of Dinosaurs because of the Changes of Atmospheric Environment, Journal of Shangrao Normal University, http://en.cnki.com.cn/Article_en/CJFDTotal-SRSX201002015.htm
- William Glen, 1997, The Great Dinosaur Extinction Controversy, JSTOR.DOI: 10.1029/97EO00233
- Zhang Mingzhen, etc., 2018, Mid-Cretaceous Hothouse Climate and the Expansion of Early Angiosperms, Acta Geologica Sinica-English Edition. DOI.10.1111/1755-6724.13692
<https://www.beichengjiu.com/biology/168257.html>
<https://www.sciencedaily.com/releases/2009/07/090713211621.htm>

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