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The Enlightenment of the Earliest Footprint Fossil Discovery in China

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Short Communication

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Introduction

On June 6 this year, Science Advances published in the journal Science of the United States online reported the footprints of metazoans with appendages found by Chinese and American scientists in the Ediacaran strata of the Three Gorges area in Hubei Province, China [1]. This is the oldest known footprint fossil on earth. The study found two rows of walking imprints and three burrow imprints produced by bilaterian animals with paired appendages. Studies have shown that the characteristics of these imprints reflect that the migratory organisms can support the body from the surface of the sediment through the appendages, while the track ways of the contemporaneous animals found in the past are all creeping on the surface of the sediment. Such ancient animals are likely to be arthropods, annelids or their ancestors in ancient times. Therefore, the earliest imprint fossils discovered in China are clearly a major advance in the end of the Precambrian trace fossils.

We know that in the Chengjiang fauna of China, the earliest lobopodia, the Luolishania, which is almost walking on the ground, is the most typical squat-type walker [2]. It is called the first animal to open the walking age. But this new discovery undoubtedly push the era of animal walking to the end of the Precambrian era, and also provided indirect evidence for the emergence of bilaterally symmetrical animals with appendages at the end of the late Precambrian period. What is even more profound is that it also provides another testimony to the view that the Cambrian life explosion actually started at the end of the Precambrian.

Whether the Cambrian life explosion started at the end of the Precambrian period, whether the Precambrian biota and the Cambrian biota have a gradual transitional evolutionary relationship is still controversial. One year ago, an international research team led by Chinese scientists published the latest advances in the Cambrian explosion published in the journal of Geology [3]. Based on the stratigraphic and paleontological fossil data obtained in the Far East Siberia region of Russia, they proved that the typical fossils of the Cambrian period have appeared in the late Precambrian period and are mixed with the skeleton weak fossils of the late Precambrian. For example, the late Precambrian typical weakly mineralized “Cloudina Tube” fossils are symbiotic with the tubular and other skeleton fossils of the Cambrian, indicating that there is a gradual transition of evolutionary relationships between the Cambrian biota and the late Precambrian Ediacaran biota.

In fact, sponges and prickles were discovered in the Weng 'an biota found in the Guizhou 600 million years ago, but it was only at the time of the Cambrian life explosion that a new radiation burst emerged. The Stromatoveris, octopus corals, sea anemones, and Thaumaptilon, a marine pen in the burgess shale of the middle Cambrian, are all the representatives of the late Precambrian to the Cambrian.

From this point of view, the Cambrian life explosion did not happen immediately. However, there is almost a huge “unconformity” between the Precambrian and Cambrian strata in all continents of the world, that is, the geological record between the Precambrian and the Cambrian has a

significant lack, thus creating a huge contrast between the Cambrian biota and the Precambrian biota. Moreover, a global extinction event at the end of the Precambrian period coincided with a highly significant carbon isotope negative anomaly event (BACE event) in the global ocean [4], which seemed to strengthen the sudden occurrence of the Cambrian life explosion. However, the Precambrian and Cambrian mixed fossils appeared earlier than the carbon isotope negative anomaly (BACE events) in the Cambrian. Therefore, it is indicated that the so-called pre-Cambrian extinction event was an illusion caused by incomplete geological records.

Obviously, the indirect evidence obtained by the footprint fossils discovered in the Three Gorges of China has undoubtedly provided further support for understanding a deep root for the Cambrian life explosion.

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