

OTHER

Interactions and Coevolution of Life and Earth Environment

Edited by: Xie Shucheng, Yin Hongfu, Shi Xiaoying. 2011. Science Press, c/o Flat 21, 20/F, Acacia Building, 150 Kennedy Road, Wan Chai, Hong Kong. 345 pages. 78.00 RMB.

In the vast universe, the Earth is the only planet so far known for the existence of life. It's exclusive position in the solar system, results in the best environmental conditions for life, such as the appropriate planetary gravitation, moderate sunshine, limited temperature difference between day and night, and so on. The Earth provides life with all the basic elements and unique environment required for the survival, development and reproduction of life. The rise of life triggered the emergence of the biosphere in the earth surface system, which as the most active sphere in the Earth, not only promotes the earth surface system to circulate much faster, but also buffers the earth environment and facilitates the environmental evolution. The interactions or coevolution of life with its environment, or biosphere with other spheres, through Earth history, has become an essential for the earth system science, which is also the main focus of the newly emerging geobiology.

Earth history has been heavily fluctuated due to a series of unusual environmental events, which was well reflected in the earth surface system. Life has experienced major geological events through the life-environment coevolution, and the evolutionary life provided natural cues to divide the Earth history during the Phanerozoic and the pre-Phanerozoic time. During the Proterozoic, life and Earth environment evolved smoothly and symmetrically until the Neoproterozoic when the Earth became extremely active. Since Phanerozoic, the environmental cues and fossil records have become abundant and the life-environment coevolution has become obvious. The life-environment interactions and coevolution during the great turning periods of Earth history, which is prominently marked by the phenomenon of mass extinction, are the most remarkable. The environmental change facilitates life to evolve into new adaptation, and the surviving and new-emerging organisms are always trying to alter the environment and reconstruct new ecosystems to better adapt to the changed environment. The actions of environmental events are usually short, while the followed reconstruction led by organisms is relatively long.

Coevolution between organisms and their environment is an inherent feature of living systems on the Earth. Life on Earth is based on networks of biochemical reactions that interact with the environment to maintain a biosphere that has been remarkably resilient to environmental challenges. However, understanding of the whole relationships between life and the environment is not easy, requiring a synthesis that draws from many different fields of science. Coevolution of life and the environment is dynamic, and proceeds at all organism levels. For example, prokaryotic microor-

ganisms have played a critical role in shaping our planet. The diversity of life on Earth today is actually a result of the dynamic interplay between genetic opportunity, metabolic capability and environmental challenges.

It should be mentioned that in the 1970s, the chemist James Lovelock formulated the Gaia hypothesis (it later was called Gaia theory), which proposed that all organisms and their inorganic surroundings on Earth are closely integrated to form a single and self-regulating complex system, maintaining the conditions for life on the planet. The Gaia theory's unique approach discovered and addressed the interaction between life and environment on the Earth. The later scientific investigation of the Gaia hypothesis focussed on observing how the biosphere and the evolution of life forms contributed to the stability of global temperature, ocean salinity, oxygen in the atmosphere and other factors of habitability in a preferred homeostasis. Some of the principles summarized by the Gaia theory nowadays have been adopted in fields like biogeochemistry, systems ecology, geophysiology and earth system science.

Actually, besides the Gaia theory, there has been much progress related to the issue of interactions and coevolution of life and earth environment scattered across various scientific fields worldwide. The newly published book *Interactions and Coevolution of Life and Earth Environment* introduced some important concepts for research progress in some key areas of geobiology, a new cross discipline between Earth science and life science, focussing on the interactions and the co-evolution of life and environment. The book through in-depth theoretical elucidation and abundant result demonstration convinces readers that the history of the evolution of life and the Earth can only be appreciated by deciphering their interdependencies. It is divided into three parts. The first part mainly introduced the subject system and the basic task of geobiology; the second part involved a number of important branches of geobiology, including the molecular geobiology, geomicrobiology and geoecology (such as reef ecosystems, bacteria and algae ecosystems, and tropical rain forest ecosystems); the third part dealt with the geobiological research on major geological change periods (pre-Cambrian, the extinction period of Phanerozoic and contemporary era). Each part introduced authors's findings based on the review of the international research progress in the relevant fields. The book was currently most extensive monograph on geobiology including various branches in China. The main contents included Chapter 1 Overview of geobiology, Chapter 2 molecular records of interaction

between life and environmental systems on Earth, Chapter 3 some important geomicrobiological processes of the Earth, Chapter 4 the biological processes of the Earth and the formation and collapse of some typical ecosystems on Earth, Chapter 5 the geological roles of the microbes in Precambrian and the evolution of Earth's surface system, Chapter 6 globally episodic biological crisis when turning from Paleozoic to Mesozoic, and the global environmental system abnormalities, Chapter 7 modern living systems and environmental systems under the anthropogenic disturbance.

Humans are increasingly perturbing Earth's biogeochemical cycles and the living environment. Currently the so called Gaian homeostatic balance is being stirred, and today's Earth is entering a new great turning period due to the rapid increase of human population and the serious impact of their activities to the environment, based on which Paul Crutzen applied a new term "Anthropocene" to name the present era of Earth. Obviously, research on how these changes caused by

humans will affect the Earth environment as well as the interactions and coevolution of life and the environment will become a new and urgent task of scientists. Harmonious Gaia and sustainable interactions and coevolution of life and environment must be our common expectation.

The book would be a good reference for the persons who are engaged in paleontology, sedimentology, stratigraphy, geomicrobiology, molecular organic geochemistry, biogeochemistry, ecology, geology and other relevant fields.

LI DEZHI¹ and QIN AILI²

(¹Lab of Urbanization and Ecological Restoration of Shanghai; National Field Observation and Research Station in Tiantong Forest Ecosystem of Zhejiang; Department of Environmental Science, East China Normal University, 3663, Zhongshan Rd (N). Shanghai, China. 200062; ²Shanghai Vocational and Technical College of Agriculture and Forestry, 658 Zhongshan 2 Rd. Songjiang, Shanghai, China. 201600)

Erratum The Canadian Field-Naturalist 126(4)

In response to the review of *Contributions to the History of Herpetology*. CFN 126(3): 344-345, the book's editor Kraig Adler pointed out (personal communication to FRC 12 May 2013): "Only one small correction. Mrs. Martof used a kitchen knife, not a gun. She told the police she slipped while cutting some pizza. But Bernie was stabbed up under his rib cage several times!"

Erratum The Canadian Field-Naturalist

It has come to our attention that sections of many of the book reviews by Li Dezhi and Qin Aili were copied from sources without attribution. The journal and the authors apologize for this oversight.