Editorial

The objectives of biopetrology

—As a preface of the journal

Biolith, a very old collective term widely used in the first half of the 18th century in some geologic papers in Germany, refers to the rocks formed from the remains or skeletons of organisms, or by the activities of organisms. Bioliths includes both the macrobioliths formed by macroorganisms and the microbioliths formed by microbes.

Biopetrology, an old term sparsely used in a few Indian scholars' papers to refer to the petrological features of coal, is here formally redefined to refer to the study of all kinds of bioliths, such as reefs, microbialites and other rocks formed by macroorganisms and microbes. It is a new interdisciplinary science to encompass the study of the biolith's features, formation, environments, and its roles in the formation of ore deposits and hydrocarbons. It embraces the researches of both biomineralization and biogenic rocks.

Compared to the abiogenic sedimentary rocks, bioliths are much less studied. And the research of bioliths, i.e., biopetrology, is much less socially known and influential than sedimentology.

However, the amount of bioliths is very enormous, considering the 3.1-billion-year-long time from the 3.1-billion-year-old earliest stromatolite in Greenland to the radiation of metazoans in the Middle Ordovician, a time when the Earth was dominated by the microbes that were producing microbioliths!

The enormous amount of bioliths is incredibly valuable to us, since there may be a huge amount of ore deposits and petroleum in them, as implied by the numerous large gas fields that have been discovered in reefs and microbialite strata throughout the world, and by the large iron ore deposits such as the worldwide distributed banded iron formations and the Datangpo-type manganese ore deposits in south China, and there is a great quantity of information about the life and environments of the early Earth in them.

We need to recognize the enormous amount of bioliths! We need to discover the huge amount of treasure in the enormous amount of bioliths! We need to extract and decipher the great amount of information about the early life and environments of the Earth from the amount of bioliths! These are the objectives of biopetrology, and are our noble mission!

Previous researchers have studied most Phanerozoic reefs, but the research that has been done on ancient microbioliths is only a drop in the ocean! And this is why our study on bioliths did not make great contribution to human society!

To achieve the objectives of biopetrology, two things are obligatory, one is to change the way of our research and the other is to use more advanced research methods.

Previous research often focused on the typical and easy-studying bioliths, but ignored those that

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are not typical and hard to study. Our future research should cover all bioliths. Previous research mainly dealt with the features of bioliths, but did little research on the formation and environments of ancient bioliths. Our future research should go farther. We should reveal the organisms responsible for the formation of the bioliths, especially the microbes for the ancient microbioliths, and to reveal the paleoenvironments in which the bioliths formed, to reveal how the ore deposits and petroleum formed or preserved in the bioliths.

In previous researches, microbioliths were recognized based on their macro- or meso- fabrics. This method, however, greatly limited the amount of the microbioliths that have been recognized, since for the microbioliths formed by microbes, microscopic features are more important. We need to keep in mind that it was the environments that had determined the microbes, and it was the microbes that had determined the features of the ancient microbioliths.

Thus, our future research should focus on the microscopic features of microbioliths, especially the microfabrics, one of the most important features determined by microbes. Only in the case that our future research focuses on the microfabrics, can we recognize all microbioliths, reveal the types of the microbes that formed them, reveal the environments where the ancient microbioliths formed, and reveal how the ore deposits and petroleum formed or preserved in microbioliths.

We need to know more about microbes (virus, archaea, bacteria, cyanobacteria, algae, fungi and so on), since they were ubiquitous on the Earth since 3,700 million year age, and are the producers of the huge amount of microbioliths during the 3,700 million year long history of the Earth.

Let's move on and make our own effort! I believe that the objectives of biopetrology will be achieved one day!

—by Ya-Sheng Wu, Dr., wys@mail.igcas.ac.cn

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Comment anonymously by Giorgio Bianciardi:

A nice writing on the need to investigate the constructs made by life on Earth in more than 3 billion years and which can be recognized in biopetrology studies, practically the only one possible. A vast ocean of life forms of which we know only a few drops. It deserves to be published.

Anonymous innovation scored by: Adrita choudhuri, Fritz Neuweiler, Giorgio Bianciardi, Hua-Xiao Yan, Santanu Banerjee, Subir Sarkar, Wei Wang, and Yue-Feng Shen.

Innovation score: (3+3+5+5+5+0+5+5)/8=3.9

Anonymously detailed reviewed by: Fei Li, Hua-Xiao Yan, Subir Sarkar, Wei Wang, Fritz Neuweiler.

Revised by: H.B. Sun, Yue-Feng Shen.

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