ISSN 0031-0301, Paleontological Journal, 2014, Vol. 48, No. 14, p. 1449. © Pleiades Publishing, Ltd., 2014.

# Preface

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**DOI:** 10.1134/S0031030114140111

This issue comprises materials from the conference on "Early Evolution of the Skeleton in Various Groups of Organisms and Biomineralization in the Earth's History" held at the Borissiak Paleontological Institute of the Russian Academy of Sciences on April 24–25, 2014 as part of the "Problems of the Origin of Life and Early Evolution of the Biosphere" program. The reports given at the conference included problems of development of the mineral skeleton and biomineralization in various groups of organisms. The skeleton is apparently an innate part of any living organism, since it allows compartmentalization, a necessary condition for separating the living organisms from environments. The skeleton may be organic or mineralized, a product of biomineralization. Biomineralization is understood here as a process by which living beings cause mineral formation. This process can be actively biologically controlled as in most eukaryotes and some prokaryotes, or passive, inducing deposition of minerals, as in most prokaryotes. The organic skeleton, like the mineralized skeleton, performs several functions, but primarily a supporting function allowing the animal to maintain a particular shape and retain the arrangement of its soft organs. The defensive function of the skeleton is also very important, as it reduces the negative influence of some environmental factors, predators, and parasites. The poorly studied third function of the mineralized skeleton is to serve as a depository for various elements, primarily calcium, which plays a very significant role in many organisms. This function could in many cases be a physiological basis for the appearance of the carbonate skeleton. Calcium carbonate, in the form of calcite or aragonite, silica, and calcium phosphate (hydroxyapatite) are the main materials for building mineral skeletons. Thanks to such mineral, primarily carbonate, skeletons, we can relatively completely reconstruct the paleontological record of the evolution of organisms in the Phanerozoic. All these three major types of mineral skeleton appeared almost simultaneously in many higher metazoan taxa in the Early Cambrian. Therefore, the Cambrian evolutionary explosion is often referred to as the "Cambrian skeletal revolution." The siliceous skeleton appeared at the same time in radiolarians, but the carbonate skeleton in foraminifers only appeared in the Devonian. What were the reasons for the skeletal revolution and what prevented its progress in foraminifers and many other protozoans remain subjects of heated debate. The proposed reasons include geochemical changes in the ocean, defense against predators and stabilization of the internal medium of organisms. In my opinion, the main reason for the skeletal revolution was the explosive development during the Cambrian of the body plans of major animal groups, which included a strengthened mineralized skeleton as an inherent characteristic. Other factors were only a background to this primary reason, which alone affected the degree of mineralization and the main features of the skeleton. Anyway, we hope that the attention given to various aspects of skeletization in animals during this conference will lead to a renewal of interest in Russia in the study of this dynamically developing field of research.

*Translated by S. Nikolaeva*