



Theme Issue “Renaissance for Paleozoic Evolution Studies: Radiation and Extinction”: Preface for Part 2

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Theme Issue “Renaissance for Paleozoic evolution studies: radiation and extinction”: Preface for Part 2

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This is the Part 2 of the thematic issue; Part 1 was published in *Paleontological Research* (PR) vol. 25 in 2021. Part 2 adds two more articles that introduce new views and concepts for Paleozoic paleontology, i.e., one for Early-Middle Paleozoic microfossil studies from the long-term *terra incognita*, central Asia, and the other for essential reconsideration of the causes for the Phanerozoic major extinctions from a non-conventional cosmo-climatology viewpoint.

Obut (2023) introduces the latest knowledge on Early Paleozoic micropaleontology from Siberia where precious pieces of information are potentially archived for the lost ocean called the Paleo-Asian Ocean. In addition to classic fossils, such as graptolites and trilobites, a long list of conodonts and radiolarians recently became available from cherts, mudstones, and some limestones. These new fossil data provide prime clues for reconstructing the biogeographic provinciality and geotectonic setting of the Paleo-Asian Ocean. It is noteworthy that the essential research scheme for those ancient mid-oceanic sediments was imported from Japan (e.g. Buslov and Watanabe, 1996; Iwata *et al.*, 1997; Uchio *et al.*, 2004; Ota *et al.*, 2007), and thus is highly suitable for publication in PR.

Isozaki (2023) reviews studies on the causes of the Phanerozoic mass extinctions, emphasizing the categorization of previously proposed causes into four distinct groups (see Isozaki, 2019). Besides the currently widely discussed possible causes, such as bolide impact and a large igneous province, a new possibility—non-bolide extraterrestrial effects—is explored on the basis of the astrophysical observations of galaxies (e.g. Rocha-Pinto *et al.*, 2000; Ruiz-Lara *et al.*, 2020) and a new line of material evidence from deep-sea cherts in Japan. The latest finding of an unusually high helium isotope ratio ($^3\text{He}/^4\text{He}$) from the Permo-Triassic boundary extinction interval (Onoue *et al.*, 2019; Takahata *et al.*, 2019) suggests that our Solar System had encountered a dark cloud and that abundant interplanetary dust particles have

blocked the solar irradiance to darken and chill the biosphere.

Taking Part 1 and Part 2 together, the five contributions in this thematic issue are all review articles that provide new viewpoints on the important issues, i.e., “Cambrian explosion,” “Great Ordovician Biodiversification event,” and “Big-5 mass extinctions,” particularly from non-conventional aspects. The contributors hope that this thematic issue will ignite the curiosity of the world’s paleontologists and lead to new joint research projects in the near future. In 2021, I prepared the preface for Part 1 in the midst of the COVID-19 pandemic with deep anxiety for the future, which totally changed our lifestyle in all aspects. Now in early 2022, writing another preface for Part 2 gave me feelings of *déjà vu*, due to the war in Europe again with keen anxiety. We hope that international co-operation in research can be peacefully continued against all odds.

Once again, I thank the editorial board of PR, particularly the former Editor-in-Chief Dr. Tamaki Sato, for inviting us to present the thematic issue, and also Ms. Shiori Matsumoto for her work in editing Parts 1 and 2.

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