

Early Paleozoic radiolarian diversity dynamics in the context of the Great Ordovician Biodiversification Event

Taniel Danelian ^{*1}, Claude Monnet ¹

¹ Univ. Lille, CNRS, UMR 8198 Evolution, Ecologie et Paléontologie (Evo-Eco-Paléo) – Cité Scientifique, Bât. SN5, 59655 Villeneuve d'Ascq - France

Based on a new and exhaustive sample-based dataset of middle Cambrian to Silurian radiolarian occurrences we investigate the diversity patterns of all radiolarian species to find out trends in their taxonomic evolution and to evaluate possible biases influencing these patterns. We also review the long term radiolarian biotic changes in the context of the Great Ordovician Biodiversification Event (GOBE) and associated global changes that affected the Earth system at the time. The Cambrian–Ordovician interval is characterized by a protracted diversification trend peaking in the Darriwilian. The rising trend is initially produced during the Tremadocian by Archaeospicularian radiolarians and it may be partly correlated with the basal Ordovician “plankton revolution”. Subsequently, the radiolarian diversity increase is mainly due to Spumellarian and Entactinarian radiolarians; the Darriwilian peak is the highest for the entire studied interval; it reflects a profound turnover in Ordovician radiolarian plankton assemblages. The Darriwilian appears to be a “game changing” interval for radiolarians and it is likely due to the profound oceanographic changes that followed the early Darriwilian cooling trend of Earth’s climate. The transition with the Silurian is separated and highlighted by a late Ordovician large drop in diversity, which records the lowest taxonomic richness of the studied interval. Next, the Silurian is first characterized by a rapid protracted recovery culminating in the Aeronian, and, secondly, by another peak in richness recorded in the Gorstian. Our results suggest that radiolarian microzooplankton have responded during all the major diversity events of the marine biosphere recognized for the early Paleozoic. However, although the long-term trends in radiolarian biodiversity are robust, the documented patterns remain partly and locally biased by uneven sampling through space and time.

Mots-Clés : Radiolaria, Paleobiodiversity dynamics, Early Paleozoic, Great Ordovician Biodiversification Event