

What is the reason for the difference in diversity between Radiolaria and planktonic foraminifera?

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There is large difference in diversity and response to major climatic changes between Radiolaria and planktonic foraminifera, although they have much similarity in size and planktonic adaptation and both are Sarcodina. Radiolaria, which is a diverse microplankton group in the modern ocean with ca. 500 species, have long history since the Cambrian Period with high diversity overcoming environmental difficulties, whereas planktonic foraminifera have repeatedly undergone diversity crises to reach today's ca. 40 species. I will discuss the reason of these differences taking recent progress in ecological study into account and supposing their 'dream' and 'wishes' that Radiolaria have wanted to sink to the depths and planktonic foraminifera have wished to come up to the sea surface.

Recent ecological study suggests that radiolarian assemblages exhibit little seasonal variation in the subtropical to subarctic seas, while planktonic foraminiferal assemblage have apparent seasonal changes with replacement of major species components. This implies that most of radiolarians can reproduce throughout a year but planktonic foraminifera cannot, and, thus, planktonic foraminifera could be more severely damaged when the oceanic seasonality was disturbed by catastrophic events. Why those radiolarians can reproduce throughout a year? A possible reason is that most radiolarians live in the deep layer below the seasonal thermocline. On the other hand, most of planktonic foraminiferal species dwell in the surface layer above the seasonal thermocline. The above-mentioned supposition seems to be compatible with this difference in depth habitat. Emergence from the bottom to the surface might be a wish of planktonic foraminifera that evolved from benthic foraminifera, resulting in exposure of themselves to large environmental variations and danger. In contrast, Radiolaria got siliceous shells, i.e., weights, in earliest Paleozoic to be able to easily sink to the depths where there is little seasonality and they could have escaped serious disturbance of the surface layer.

For more solid discussion, however, reproductive nature and vertical migration in their life cycles of the two planktonic groups should be more vigorously studied and considered.