

Where are Early-Middle Paleozoic pelagic remains preserved?: approaches from the Caledonian and Central Asian orogenic belts

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Pelagic deep-water sedimentary rocks in Lower-Middle Paleozoic orogenic belts provide essential information about the early evolutionary process of the pelagic marine ecosystem during that period. Recently, Lower-Middle Paleozoic biogenic abyssal deposits have been addressed several ancient orogenic belts such as Central Asia (Iwata et al., 1997; Tolmacheva et al., 2001), and similar studies should be applied to other regions. I here present true pelagic radiolarian cherts from two major Lower-Middle Paleozoic orogenic belts: the Caledonian and Central Asian orogenic belts.

Caledonian orogenic belt: the Southern Uplands terrane is the Upper Ordovician to Lower Silurian accretionary complex formed in the northern marginal trench of the Iapetus Ocean (Leggett et al., 1979). The ocean floor succession consisting of radiolarian chert with basalt, hemipelagic siliceous mudstone, terrigenous clastic rocks including graptolite shale and alternating sandstone and shale of turbidite affinity has been recognized. Based on conodont constraints, chert ranges in age from Arenigian (470 Ma) to Caradocian (460 Ma). Llanvirnian to Caradocian radiolarians have been reported (e.g., Danelian and Floyd, 2001), but faunal details are poorly known.

Central Asian orogenic belt: our recent research clearly shows that Silurian to Devonian radiolarian cherts of the Khangai-Khentei belt in central Mongolia constitute the Devonian to Lower Carboniferous accretionary complex (Kurihara et al., in prep.). Chert frequently associates with conformably underlying basaltic rocks or overlying siliceous shale and turbidite. The stacking of tectonic alternating basalt-chert or chert-turbidite successions is the most remarkable feature of this accretionary complex. From chert, radiolarians and conodonts totally ranging in age from latest Silurian (Pridolian) to Late Devonian (Famennian) were recognized. This biostratigraphic result provides corroborating evidence for the presence of a gigantic ocean which allows over 50 m.y. of continuous pelagic chert sedimentation. The Silurian radiolarian assemblage differs slightly in faunal composition from previously reported ones that accumulated in relatively neritic environments. Thus, there is a possibility that distinctive faunas were flourished in the pelagic environment during the Silurian Period.

Most previous reports on Lower-Middle Paleozoic radiolarians were from shallow marine strata, but two examples mentioned above show that true pelagic radiolarites commonly exist in the Lower-Middle Paleozoic orogenic belt. Radiolarians have spread their distribution from the neritic to pelagic environments through Cambrian to Silurian, so pelagic sedimentary rocks have the potential to record their spreading process. In the near future, more study results on the pelagic sedimentary rocks and their microfauna should be accumulated from major Lower-Middle Paleozoic orogenic belts in order to better know the early pelagic marine ecosystem.