ABSTRACT

The dating of radiolarian biostratigraphic zones from the Silurian to the Devonian has only partially been established even on a world-wide scale. Dating zircons in radiolarian-bearing tuffaceous rocks has enabled us to ascribe practical ages to the radiolarian zones. To precisely date the previously disputed ages of the local formations and to establish an age-constraint for the radiolarians, radiometric dating of magmatic zircons within the radiolarian-bearing Hitoegane, Yoshiki and Shibasudani formations in the Hida Gaien belt, central Japan was undertaken. The formation is mainly composed of alternating beds of tuffaceous sandstones, tuffaceous mudstones, and felsic tuff. The felsic tuff and tuffaceous mudstone yield well-preserved radiolarian fossils.

Radiolarians and zircons were collected from 21 tuffaceous mudstone and 30 felsic tuff horizons of the Yoshiki Formation. The radiolarian species are assigned to the Futobari solidus - Zadrappolus tenuis assemblage, and U-Pb SHRIMP (Sensitive high-resolution ion microprobe) ages of ca. 420 Ma were obtained from the zircon grains. Thus the F. solidus – Z. tenuis assemblage survived up to the Pridoli age in the Yoshiki Formation.

Zircon grains from four horizons of the Hitoegane Formation show an U-Pb LA-ICP-MS ages of ca. 426 Ma. These horizons correspond to around the boundary of the Ps. tauversi to the F. solidus – Z. tenuis radiolarian assemblage zones. This fact shows that the boundary of the two assemblage zones is around the Ludlow.

Zircons showing U-Pb SHRIMP age of ca. 408 Ma were reported from a horizon of 20 m above of the last occurrence of a species F. solidus at Kurosegawa belt, southwest Japan. Thus the range of the F. solidus – Z. tenuis radiolarian assemblage zone can be assigned to be from Ludlow to Pragian or Emsian.

Zircon grains showing the U-Pb LA-ICP-MS ages from ca. 387 to 503 Ma were collected from the Shibasudani Formation, and the youngest zircons of ca. 387 Ma were obtained from nearly lowermost...
horizon of the *Pactarentinia intermedia*-*Pactarentinia igoi* assemblage zone. Therefore it is reasonable to conclude that the boundary between this assemblage zone and the *Palaeoscenidium ishigai* - *Deflantrica furutanii* assemblage zone lay down at around Givetian. Therefore, *P. ishigai* – *D. furutanii* assemblage zone likely assign to be from Pragian or Emsian to Givetian.

The results shown here has the potential to revise and refine previous dating is of many biozones worldwide, and in particular can be a promising method for the entire study of radiolarian biostratigraphy.

**Keywords:** U-Pb SHRIMP and LA-ICP-MS age, Silurian to Devonian, Radiolarian, Biostratigraphy

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**Photos**

I'm working in a SEM Laboratory at Nagoya University Museum

All members of the dissertation committee physically present at the final oral defense