Litho- and Bio-facies of the uppermost Cretaceous Sada Limestone in the Shimanto City, Kochi Prefecture, Japan.

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The Sada Limestone is intercalated in the upper Cretaceous Nakamura Formation, southernmost part of the Northern Shimanto Belt, Kochi Prefecture, Japan. The surroundings of the Sada Limestone consist of mudstone and alternating beds of sandstone and siltstone, which were deposited on shelf to slope (Tashiro, 1991) and are assigned to be Campanian to Maastrichtian on the basis of a fossil radiolarian assemblage (Taira et al., 1980). The fossils from the Sada Limestone were suggested to be different from those of the Torinosu limestone by Kobayashi (1950). Tashiro (1991) noted that *Thyasira* sp. and *Serpula* sp. are densely concentrated in the Sada Limestone. The family Tyasiridae is one of the representative chemosynthetic bivalves, not only living in reducing muddy bottoms, but also colonizing methane-seepage environments. This study makes clear the body-size and distribution of the Sada Limestone and preliminarily reports the litho- and bio-facies to discuss its origin.

The limestone crops out over 10 localities where are distributed in the elliptical area, its semimajor axis about 250 m, and range about 80 m in vertical distance. The Sada Limestone consists of the following facies, which show a series of a succession in ascending order at Loc. S03.

1) Recrystallized limestone: grey massive limestone composed of recrystallized sparite, containing little detritus. The original carbonate was fractured before the recrystallization. Megafossils are rare. The thickness is over 2 m at Loc. S03.

2) Stromatactis-like facies: parallel calcite-veinlets in grey detrital micrite. The veinlet , filled by sparite, is about millimeters to decimeters in thickness, with curved or irregular tops and flat bases. The stromatactis-like structure was frequently fractured, but the veinlets are laterally traceable over several meters. The grey limestone with stromatactis-like structure range its thickness from several to dozens centimeters.

3) *Thyasira*-*Serpula* limestone: massive grey limestone composed of detrital micrite, which contains abundant *Thyasira* and *Serpula* fossils in matrix-supported condition. *Thyasira* valves are commonly conjoined. Non-compacted pelletes indicate that the siltstone was concreted in shallow depth below the bottom surface. This bio-facies dominated by *Thyasira* or *Serpula* were recognized in many localities. At Loc. S03, the *Thyasira*-*Serpula* limestone, about 1.3 m in thickness, consists of the lower *Thyasira*-dominant part and the upper *Serupla*-dominant part.

4) Transitional bed: mixed facies of the detrital micrite with slit blocks fractured under a semi-consolidated condition. *Thyasira* and *Serpula* rarely occur.

5) Grey massive siltstone. Small to medium-sized bivalve fossils such as *Acila* sp. rarely occur. The siltstone frequently yields granulated nodules containing abundant fine-sand grains.

The succession observed at Loc. S03 indicates that the Sada Limestone is not one pure carbonate block, but consists of alternating beds of the above mentioned facies. Moreover, the transmitted bed suggests that the Sada Limestone is not allochthonous, and the sedimentary envirionment was not pelagic on the basis of the megafossils and sandy facies of the siltstone. The *Thyasira* fossil colony with *Solemya* and *Myrtea* suggests that the Sada Limestone was in chemosynthetic origin. Stromatactis-like structure was also commonly reported in the Devonian to Carboniferous cold-water carbonate mounds (Krause et al., 2004), and was pointed out to be formed in relation with hydrate generation (Krause, 2001).

Kiel and Little (2006) reviewed the temporal ranges of cold-seep mollusks, and pointed out the paucity of Maastrichtian and Paleocene seep sites. The Sada Limestone is one of the candidates to compensate it to evaluate of the K/T event effect on seep faunas.