

A new growth pattern of non-marine stromatolites in the Lower Cretaceous Wakino Subgroup, northern Kyushu, Japan

Atsushi Yamamoto[1]

[1] Earth and Planetary Sci., Tokyo Univ.

The Lower Cretaceous non-marine Wakino Subgroup in Kyushu yields stromatolites, but little was known about their mode of occurrence and detailed petrographic and mineralogical features. In this study, by finding seven new stromatolite horizons in the Wakino region (northern Fukuoka, the type locality of the Wakino Subgroup), I examined their mode of occurrence and microstructures in detail and investigated their sedimentary environment.

All of the stromatolite horizons are in the upper part of the Wakino Subgroup (the Lower Wakamiya Formation, 113 +/- 10 Ma by the fission track dating in this study). Based on morphology, the stromatolites are classified into three types; 1) stratiform, 2) columnar, and 3) nodular types.

All types of stromatolites occur in the shale dominant sequence intercalating thin sandstone beds. These strata bear mud cracks and tepee structures, strongly suggesting an arid environment. As previous sedimentological studies revealed lacustrine setting, all stromatolites have presumably formed in a very shallow environment probably along the lake margin rather than a deeper offshore-lacustrine environment suggested by previous works. Nodular stromatolites associated with thicker sandstone beds than stratiform and columnar stromatolites associate with. The sandstone beds sometimes have ripple marks. These facts suggest nodular stromatolites have grown under a higher-energy environment than the other two types. Therefore, the current strength may have been a major factor that differentiated columnar and nodular stromatolites.

Stratiform and lower parts of columnar stromatolites are characterized by alternation of silici clastic layers and calcareous ones (clastics-carbonate type), whereas upper parts of columnar stromatolites and nodular stromatolites by alternation of carbonaceous layers and calcareous ones (carbon-carbonate type). Particularly, in middle parts of columnar stromatolites, the alternation type of individual columns changes gradually upward from the clastic-carbonate type to the carbon-carbonate type. As stratiform stromatolites sometimes intercalate columnar ones and clastics layers of stratiform stromatolites are thicker than lower parts of columnar ones, a flux of clastics is regarded as another factor to determine the morphology of stromatolites.

Previous works indicated many morphogenetic factors which controlled the forms of recent stromatolites, such as desiccation frequency, sedimentation rate and so on. The above-mentioned two factors, which are also included in the morphogenetic factors of recent stromatolites, might chiefly affect the construction of Cretaceous Wakino stromatolites and caused their morphological diversity.