

Controlling factors on depositional fabrics of stromatolite and thrombolite

Yuhsaku HANZAWA^{1*}, OKUMURA, Tomoyo², SHIRAISHI, Fumito¹

¹Hiroshima University, Graduate School of Science, ²Kyushu University, Graduate School of Social and Cultural Studies

Tufa is carbonate deposit in freshwater environment, and usually has laminations similar to fossil stromatolites. However, tufa depositing at Ueno, Takahashi City, Okayama Prefecture has thrombolite-like texture, exhibiting unusual appearance. The present study aims to find out the cause of thrombolite-like texture by comparing stromatolite-like tufa in Shimokuraida, Nimi City, and thrombolite-like tufa in Ueno. Based on this comparison, it is expected to get new insight about thrombolite divergence and stromatolite decline events in early Paleozoic era. First, in the composition of water chemistry at Ueno and Shimokuraida, there was no significant difference between two sites. Chemical profiles at the vicinity of deposit surface, also did not show significant difference between two sites: they both were formed by photosynthesis-induced CaCO₃ precipitation. On the other hand, there were obvious differences in the appearance of deposit surfaces observed by Confocal Laser Scanning Microscopy. At the surface of Ueno deposit, numerous small mounds were formed by coccoid cyanobacteria, and their periphery was surrounded by exopolymeric substances (EPS). At the surface of Shimokuraida deposit, in contrast, erect filament of cyanobacteria is at flat surface, and EPS distributed only near the bacteria. In addition, some of differences were also recognized by observing at vertical section of deposits. At Ueno deposit, filamentous cyanobacteria located around the surface mounds, concentrated at 2-3 mm depth, and scatteredly distributed at 0-2 mm depth. At Shimokuraida deposit, in contrast, had only two layers composed of filamentous cyanobacteria growing vertically. Therefore, the differences between these two deposits might be due to the differences of EPS distribution and/or growth pattern of cyanobacteria. In addition, iron-reducing bacteria were found at Ueno deposit by genetic analysis, which closely related to class Deltaproteobacteria, families Desulfuromonadales, genera Geobacter. The result of CARD-FISH indicated that they distributed where photosynthetic bacteria were scarce, which indicating the possibility that Geobacter-induced dissolution and recrystallization minerals form thrombolite-like texture. In future, it is necessary to reveal the relationships between minerals and microbes.