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Microorganisms on iron mineral particles in the Fe(II) rich hot spring

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Iron rich environments have been studied as model systems analogous to the ancient sea, and are valuable for understanding the involvement of microbial activities on ferrous iron oxidation. Most previous studies did not focus on iron oxidizing bacteria in high temperature, and in general iron mineral deposition seems to be a restricted physiology. In this study, the characteristics of microorganisms in mineral deposition were examined in an iron rich hot spring for the model. The sampling site was Jinata hot spring in Shikine-jima. There were 4 pools, which are connected by channels. We focused on the two different environments, pool 1 and 2. The spring source containing Fe(II) was 62℃ in pool 1. The pH was 5.4. The pool 2 was 45-56℃ , pH 6.3. In both pools, muddy orangish sediment due to iron oxide was observed. Pool 1 had red streamers, which were flapping in the flow. In pool 2, there are layers, a green mat, an iron mineral layer, and a black layer in this order from the surface.There were more cells in the streamer than in the sediment, and cyanobacteria could also be observed by fluorescence microscopy. In the green mat, filamentous cyanobacteria were found. In the black layer, unicellular cyanobacteria were observed. The psaA gene analyses showed that the filamentous cyanobacteria are related to *Leptolyngbya* sp. and the unicellular cells are related to *Pleurocapsa* sp. Minerals in the streamers and particles were examined by SEM-EDS, and typical composition was C 10%, O 62%, Mg 1.1%, Si 4%, Fe 16%. The mats contained less Mg and Si and the black layer contained Mn. Thus, significant amounts of microorganisms were observed on iron particles and streamers, possibly involving in the formation of the sediments. The streamer may have microorganisms related to oxidize ferrous iron directly. The presence of cyanobacteria suggests that evolved oxygen may also involve in the sedimentation.