# Conical Stromatolites formation by filamentous cyanobacteria from YNP hot spring: Perspective from carbon, nitrogen uptake and dynamics

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Stromatolite , especially conical stromatolites, - plays an important role for the study of early Earth, are layered bio-chemical accretionary structures by the trapping, binding and cementation of sedimentary grains by microorganisms, especially cyanobacteria. Modern cyanobacterial mat from the hot springs of Yellowstone National Park (YNP) grow into macroscopic structure similar to an ancient analogs. Using high resolution imaging (TEM) and isotopic mapping (Nano-scale SIMS), we probed the carbon and nitrogen uptake patterns and dynamics in conical-stromatolite forming microbial community from the YNP hot spring, and focused on the characterization of carbon and nitrogen enrichment in autotrophs, especially cyanobacteria. We detected distinct patterns of carbon uptake and storage for cyanobacteria which belong to different subsection (I, II and III), and identified filamentous non-heterocystous cyanobacteria (subsection III) to be the main constitute of cone structure. These cyanobacteria bear unique sub-organelle structure 'cyanophycin', which can accumulate and storage large amount of carbon and nitrogen. This ability of carbon and nitrogen accumulation and storage may provide great advantages for competition of carbon and nitrogen during the formation of conical stromatolites.