



Foraminiferal cellular pH control under high-CO₂ condition in the laboratory

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Foraminifera have been considered one of the major carbonate producers in marine environments. Their calcareous tests are broadly utilized as paleo-environmental indicators in various studies of earth science because their tests act as geochemical archives. Although foraminifers are unicellular organisms, they precipitate a highly complex and fine-decorated test. Their calcification mechanisms must thereby be strongly controlled by biological activity and knowledge about the cytological control on carbonate precipitation is rapidly accumulating. In particular, mechanisms of calcium and carbonate ion uptake into foraminiferal cells from ambient seawater are of great interest. Our previous studies showed the potential to understanding the biomineralization of foraminifera by the application of fluorescent indicators. Development of fluorescent indicators allow us to visualize the spacial distributions of cytological chemical environment (e.g. pH and calcium concentrations) and organelles in living cell. Observed results show that foraminifera operate their biomineralization by controlling their intracellular environments. Acidified oceanic condition by antigenic high pCO₂ becomes global environmental problem in the near future. Therefore, we have extended our approach in order to observe foraminiferal cellular environment under a range of environmental pH's through laboratory culture experiments.