ENRICHMENT AND ISOLATION OF CHEMOSYNTHETIC MICROBES FOR ASBESTOS BIOREMEDIATION

SABRINA ELKASSAS[1], JESSICA K. CHOI[1], ILEANA PÉREZ-RODRÍGUEZ[1]

[1]Department of Earth and Environmental Science, University of Pennsylvania, Philadelphia, USA (elks@sas.upenn.edu, jesschoi@sas.upenn.edu, ileperez@sas.upenn.edu)

Asbestos, a widely used material in manufacturing, is now classified as hazardous to humans. For instance, asbestos' physical structure can puncture lung cells if inhaled. Its Fe content can also generate free-radicals in cells, causing cancer via mutating biochemical reactions. Here, we explore the iconic microbe-mineral interactions by chemolithoautotrophs from deep-sea hydrothermal vents for the tranformation of chrysotile asbestos. Enrichments of vent chimney samples for H_2-oxidizing, NO_3^- or Fe(III)-reducing microbes in the presence of chrysotile asbestos were established in order to obtain representative strains for studying 1) biological Si mobilization from the mineral surface and into biofilm material as a means to decrease asbestos physical hazards and 2) Fe removal through Fe(III) respiration reactions as a way to decrease asbestos chemical hazards. Initial enrichments for chemosynthetic Fe(III)-reducers were successful at 75°C, and those for chemosynthetic NO_3^--reducers were successful at 55, 65, and 75°C (Fig. 1). 16S rRNA gene sequencing of one chemosynthetic NO_3^--reducing isolate obtained at 75°C showed 99% similarity to the 16S rRNA gene sequence of *Thermovibrio ammonificans*, a chemolithoautotrophic NO_3^--reducer of the *Aquificae* class. These cultivation-based efforts represent an initial step for identifying potential microbes and/or chemolithoautotrophic reactions relevant to microbe-mineral interactions targeting the physico-chemical characteristics involved in chrysotile toxicity.

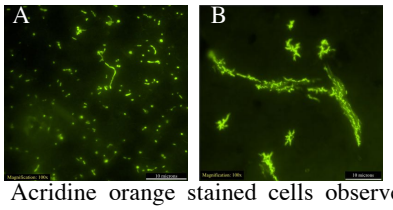

Figure 1. Acridine orange stained cells observed through epifluorescent microscopy (appearing green in color), indicating growth in the presence of chrysotile asbestos by A) H_2-oxidizing, NO_3^--reducers at 75°C or by B) H_2-oxidizing, Fe(III)-reducers at 75°C.