Functional and taxonomic dynamics of a methanogenic biofilm community using a solid-phase electron donor

ORIANNA BRETSCHGER[1], KAYLA CARPENTER[1], TONY PHAN[1], SHUNICHI ISHII[2], SHINO SUZUKI[2], ELYSSE GROSSI-SOYSTER[3], MICHAEL FLYNN[4] AND JOHN HOGAN[4]

[1]J. Craig Venter Institute, obretschger@jcvi.org, kcarpenter@jcvi.org, tphan@jcvi.org
[2]JAMSTEC, sishii@jamstec.go.jp, sisuzuki@jamstec.go.jp
[3]Stanford University, elysse.grossi@gmail.com
[4]NASA AMES, michael.flynn@nasa.gov, john.a.hogan@nasa.gov

Methanogenesis is an essential part of the global carbon cycle and a key bioprocess for sustainable energy [1]. However, the relationship between biogeochemical cycling and methanogenesis has yet to be fully described. Research to-date suggests that solid-phase minerals acting as electron donors may significantly promote inter-species electron transfer between syntrophic bacteria and methanogenic archaea [2]. These interactions may be very important to sediment microbial ecology, where an abudance of solid-phase minerals exist.

Here we present new data relative to the taxonomic and functional relationships that were observed for methanogenic biofilm over a 3-month period. Duplicate bioelectrochemical systems were inoculated with rice paddy soil and subpassaged every 10-14 days. Poised-potential electrodes (-500 mV vs SHE) were used as a proxy for solid-phase minerals and bioelectrochemical reactors were operated under anoxic conditions with a 20%:80% CO_2:N_2 headspace.

Physiological data and community taxonomic analyses indicated a correlation between current consumption and methanogenesis. 16S rRNA sequence data showed a high relative abundance of *Desulfovibrio, Methanobacterium, Colstridium* and *Rhizobium* spp. in each subpassage sample. These data may hold new insights for understanding inter-species electron transfer between syntrophic bacteria and methanogenic archaea.

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