Complete Genome Sequence of Desulfofococcus fermentans, a Hyperthermophilic Cellulolytic Crenarchaeon Isolated from a Freshwater Hot Spring in Kamchatka, Russia

D. fermentans, a hyperthermophilic crenarchaeon belonging to the Desulfofococcusaceae family, is the first reported cellulytic archaean (6). It was isolated from a freshwater hot spring of the Uzon caldera on the Kamchatka peninsula, Russia. This obligate anaerobe grows optimally at temperatures of 80 to 82°C. It ferments cellulose and various other carbohydrates (fructose, lactose, maltose, ribose, and starch) and peptides in peptone and casein hydrolysate for growth and produces hydrogen in the process (6); hydrogen production is not impeded by hydrogen accumulation (6). In contrast, other Desulfofococcus species do not utilize cellulose, are inhibited by hydrogen, and require elemental sulfur for growth (1, 4, 6, 7, 9); reduction of sulfur to H2S removes inhibition by hydrogen. The complete genome sequence reported here suggested that D. fermentans employs membrane-bound hydrogenases and novel glycohydrolases for hydrogen production from cellulose.

Desulfofococcus fermentans is the first known cellulytic archaean. This hyperthermophilic and strictly anaerobic crenarchaeon produces hydrogen from fermentation of various carbohydrates and peptides without inhibition by accumulating hydrogen. The genome sequence reported here suggested that D. fermentans employs membrane-bound hydrogenases and novel glycohydrolases for hydrogen production from cellulose.
ACKNOWLEDGMENTS
This project has been supported by the Community Sequencing Program (CSP) of the U.S. Department of Energy’s Joint Genome Institute (DOE-JGI). The sequencing, assembly, and analysis work at the DOE-JGI was supported by the Office of Science of the U.S. Department of Energy under contract no. DE-AC02-05CH11231. D.S. and J.R.R. were supported by NASA Astrobiology: Exobiology and Evolutionary Biology grants NNG05GP24G and NNX09AV28G and National Science Foundation grant MCB 1020458 to B.M. D.S. also received a graduate fellowship from the Virginia Tech Genetics, Bioinformatics and Computational Biology Ph.D. program. E.A.B.-O. and A.A.P. were supported by the program of the Russian Academy of Sciences “Molecular and Cell Biology.” A.A.P.’s collaborative research visits to B.M.’s laboratory at the Virginia Bioinformatics Institute were supported by a 2010 International Fellowship for Asia from the American Society for Microbiology and a Fulbright Scholar award in 2012.

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