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Physiological and metabolic potentials of subseafloor microbial communities up to 31 and 136 meters below the seafloor

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Subseafloor sediments are inhabited by microbial groups of the 3 domains of life, representing a subsurface biosphere still poorly understood, notably in term of questions related to microbial evolution, metabolisms and selective advantages that may be deployed by buried microorganisms (sporulation, response to stress, dormancy). In order to better understand physiological potentials and possible lifestyles of subseafloor microbial communities, we analyzed 2 metagenomes from subseafloor sediments collected at 31 mbsf (meters below the sea floor) and 136 mbsf in the Canterbury Basin, either with a "global approach" using MG-RAST or microbial physiology databases (two component systems, CRISPR, transcription factors databases etc) or with a "targeted approach" by manually annotating the largest genomic fragments encompassing phylogenetic markers, to link physiology and phylogeny. Here we present the predicted physiological potentials of these microbial communities, represented by groups of Chloroflexi, Firmicutes and Proteobacteria for bacteria and by groups of Thaumarchaeota and Euryarchaeota for Archaea. Anaerobic metabolisms encompassed fermentation, methanogenesis and utilization of fatty acids, aromatic and halogenated substrates. Potential processes that may confer selective advantages for subsurface microorganisms included sporulation, detoxication equipment or osmolyte accumulation. The annotation of genomic fragments described the metabolic versatility of Chloroflexi, Miscellaneous Crenarchaeotic Group (MCG) and Euryarchaeota and showed recombination events within subsurface taxa. This study confirmed that the subseafloor habitat is unique compared to other habitats at the meta-genomic level and described physiological potential of still uncultured groups.

Biography

Gaboyer Frederic has completed his PhD from Brest University in France, in the Laboratory of Microbiology of Extreme Environments, France in the field subseafloor microbial ecology and Postdoctoral studies from the Centre de Biophysique Moléculaire, France, in the "Exobiologie" team, led by Frances Westall, on the field of microbial fossilization. He has also published 7 papers; 3 as first author, all dealing with microbial physiology and diversity in an ecological context.

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