

Gram-positive, endospore-forming piezophilic bacteria, “unseen majority” in the deep biosphere?

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Facultatively anaerobic piezophilic bacteria were isolated from deep marine subsurface sediment collected from 1498, 1999, and 2406 meters below seafloor during Integrated Ocean Drilling Program Expedition 337. Bacterial cellular fatty acids were dominated by iso- and anteiso-branched fatty acids (average 85.3%), including iso-15:0 (10.3%), anteiso-15:0 (47.8%) and anteiso-17:0 (17.3%). Phylogenetic analysis of the 16S rRNA gene indicated that these isolates are members of the *Firmicutes* group, genera *Bacillus* and *Clostridium*, closely related to *Virgibacillus pantothenicus*, *Robinsoniella peoriensis*, and *Bacillus subtilis*. These isolates are gram-positive, spore-forming, facultative anaerobic piezophilic bacteria, and represent the first new piezophilic species isolated from the deepest depth of the deep biosphere. Isolation of entirely gram-positive, spore-forming piezophilic bacteria suggests that microbial community composition and diversity in the deep subsurface biosphere may be significantly different from that in the surface biosphere. Gram-positive, endospore-forming piezophilic bacteria may be the “unseen majority” in the deep biosphere.