

SYMBIOSIS IN THE COLD: IDENTIFICATION AND CHARACTERIZATION OF A NEW FRANCISELLA ENDOSYMBIONT FROM THE POLAR CILIATE, EUPLOTES PETZI

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Ciliates of the genus *Euplotes* are commonly found in polar environments, and different species isolated from Arctic and Antarctic coastal seawaters are currently studied for their genome evolution and adaptation. In analyzing whole genome sequences of a wild-type *E. petzi* strain collected from Terra Nova Bay (Antarctica), it appeared that more than 3% of the assembled contigs had a bacterial origin and overlapped (one contig containing rDNA operon included) with DNA sequences of the gamma-proteobacterium *Francisella* (represented by extremely infectious species to a wide array of different organisms man included).

Given that an *Euplotes* species of temperate seawaters, *E. raikovi*, has already been found to host a *Francisella* species (namely *F. endociliophora*), we searched for and succeeded in isolating *Francisella*-like endosymbionts from *E. petzi* cells. Colonies of these endosymbionts (grown optimally at a temperature range from 4 to maximum 30 °C) have been analyzed for their genome and found to represent a new clade with a basal position in the *Francisella* phylogenetic tree. This clade is unequivocally distinct from *F. endociliophora* (living in *E. raikovi*) as well as from all the other well-recognised *Francisella* clades.

The finding that *Francisella* is adapted to live in the extreme environmental conditions of the polar regions implies that this bacterium is much more common and geographically widespread than previously known, and that free-living *Euplotes* species may represent a natural reservoir of *Francisella* in every aquatic environments.