

Diverse Adaptations to a Life in Redox Gradients within the Family *Beggiatoaceae*

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Large Sulfur Bacteria of the family *Beggiatoaceae* are wide spread and abundant in sulfidic sediments today and have been in the geological past. Their principal energy source is the oxidation of sulfide with oxygen or nitrate, which by itself implies a life in redox gradients. In spite of this unifying metabolism, members of this family have developed diverse strategies to cope with the special challenges of steep redox gradients. Physiologically, these adaptations to a life in redox gradients include the storage of electron acceptors or donors, chemotaxis, additional use of alternative electron acceptors or donors, storage and degradation of polyphosphate etc.

Consequently, members of this family occupy an abundance of slightly different ecological niches, which is also reflected by an impressive phylogenetic and morphologic diversity within this family. Morphologically, most *Beggiatoaceae* are either gliding filaments or round cells, but variations of this basic morphologies such as bundles of filaments or chains of spherical cells occur. In general a tendency for gigantism in this family further suggests that the evolutionary pressure experienced by steep redox gradients selects for adaptations that are extremely uncommon among prokaryotes. In conclusion, *Beggiatoaceae* have found many different answers to the same question: How can you bring together toxic sulfide from a very reduced environment with a suitable electron acceptor found only under much more oxidized conditions. For some cases we think that we understand the strategy quite well, whereas other cases still remain elusive.