

Inorganic polyphosphates in extremophiles and their possible functions

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Many extremophilic microorganisms are polyextremophiles, being confronted with more than one stress condition. For instance, some thermoacidophilic microorganisms are in addition capable to resist very high metal concentrations. Most likely, they have developed special adaptations to thrive in their living environments. Inorganic polyphosphate (polyP) is a molecule considered to be primitive in its origin and ubiquitous in nature. It has many roles besides being a reservoir for inorganic phosphate and energy. Of special interest are those functions related to survival under stressing conditions in all kinds of cells. PolyP may therefore have a fundamental part in extremophilic microorganism's endurance. Evidence for a role of polyP in the continued existence under acidic conditions, high concentrations of toxic heavy metals and elevated salt concentrations are reviewed in the present work. Actual evidence suggests that polyP may provide mechanistic alternatives in tuning microbial fitn