The accumulation of polyP under nutrient stress conditions in vtc mutants of *C. reinhardtii*.

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Phosphorus (P) and nitrogen (N) are key elements for the metabolism of all living cells. Phosphorus, in the form of inorganic or orthophosphate, is integral to metabolic processes as a functional component of many biomolecules (nucleic acids, phospholipids, phosphoproteins). Polyphosphates (polyP), together with purine microcrystals, a large-capacity N deposit, occur in microalgae simultaneously during the cell cycle and co-localize with future cell nuclei. We hypothesize that polyP can serve as a short-term P source during the cell cycle as well as a long-term depot in adverse conditions.

As previously examined in the synchronized culture of *Desmodesmus quadricauda*, polyphosphate production and consumption seem to be related to the progression of the cell cycle and massive phosphate consumption to nucleic acid synthesis (Moudříková, 2017). Moreover, both Raman microscopy and conventional fluorescence microscopy detected groups of polyP granules on each side of the single nucleus, or later, on the outer side of newly formed nuclei until the bi-nuclear stage in *D. quadricauda* (Moudříková, 2021). The localization of polyP granules could suggest their function as energy and phosphates storage for nucleic acid synthesis.

It was proved, that the synthesis of polyP granules is crucial for the cell to cope with the energetic dynamics under stress conditions (Sanz-Luque, 2020). In most unicellular eukaryotes, the synthesis is performed by the vacuolar transporter chaperone (VTC) complex. In *Chlamydomonas reinhardtii*, the VTC1 protein, which seems to have a structural function in the VTC complex, is essential for polyP accumulation. To elucidate the link between polyP and cell cycle progression, we focused on nutrient (S or P) deprivation of *C. reinhardtii* vtc1 mutant strain, deficient in polyphosphate synthesis, and vtc1-1 rescued with VTC1 (vtc1R).