**DISCRIPTION FOR GENERAL PUBLIC (IN ENGLISH)**

Diatoms are unicellular photoautotrophic microorganisms, with size varies from 1 to 600 μm (rarely larger) that are found nearly everywhere where liquid water occurs. The most distinctive feature of diatoms is the intricately ornamented siliceous cell wall, slightly different for each species and thus a basis for classical species classification. Cell wall, called the frustule, is composed of two valves, bigger and smaller, joined together by girdle band. The diatoms life cycle consists of a long (months to years) phase of vegetative multiplication (asexual divisions) where the cell splits, and each valve is producing a new, always smaller valve. Because the siliceous frustule is not able to expand, this form of reproduction leads to size diminution in the population over time hence, for long-term survival diatoms enter a second phase of reproduction – sexual breeding. During sexual reproduction two compatible cells produce gametes, which after fusion form a zygote that grows into auxospore and eventually initial cell (the cell of largest size, unique for each species). Sexual reproduction varies depending on species, but usually closely related species (e.g. in one genus) have similar sexual reproduction pattern.

Diatoms, due to small size and rapid reproduction, have dominated most of the aquatic environments, and at the same time play an important role in primary production, global oxygen, carbon and silica cycle. The number of species is estimated to exceed 100 000, which is considered to be underestimated because many localities have not yet been investigated for diatoms. Diatoms have adapted to various environmental conditions, and hence are used as indicators for water quality assessment and as a tool for paleoclimate reconstructions, with wide range of application in industry and of potential uses in cosmetics, medicine, and as a source of biofuel that does not compete with food.

The purpose of this project is to investigate the monoraphid diatom genus *Schizostauron* Grunow, with an uncertain taxonomic and phylogenetic position, in order to answer the following questions: (1) Is the amount of lipids accumulated in *Schizostauron* cells dependent on diatom size and life cycle? (2) Under which conditions is the lipids accumulation highest? (3) Is the ability to produce oil a heritable trait? (4) Is there any phylogenetic signal for oil-producing *Shizostauron* taxa? To answer those questions, this project will analyze the cell wall morphology, perform molecular analysis of the available strains and observe the life cycle pattern and sexual reproduction, which was already successfully initiated in certain strains. All of the above are crucial to determine the taxonomic position of the genus and identify species, which will enable us to answer further questions concerning lipid accumulation.

This project will expand existing knowledge on the factors driving lipid accumulation in diatoms, as well as the phylogeny of *Schizostauron*, and in broader context monoraphid diatoms in general. The precise morphological, molecular and life cycle studies on this genus will contribute significantly to a current knowledge on diatoms as a simple, biological model that can be used in various fields of science. The advantage of this project will be detailed documentation of diatom frustule structure, three gene based concatenated phylogeny of *Schizostauron*, and documentation of sexual reproduction process, which is still not well investigated. The knowledge on factors controlling lipid production in diatoms will have an important impact on studies on biofuel production. The fundamental science of unicellular organisms is undoubtedly important in context of developing a sustainable society and for future technologies.