Abstract

The silica is one of the most common elements in the Earth´s crust. During erosion it is released in soluble form to the environment, where some organisms can accumulate the silica and incorporate it to their bodies by biosilicification process. The organsims possessing this ability are widespread either when considering their position in eukaryotic tree of life, or their abundance in natural ecosystems. As a result, the whole global biogeochemical cycle of silica is controlled by biosilicificated organisms. In Chromista microorganisms, the silica is loaded to so-called „silica deposition vesicles“ – membrane surrounded compartments, in which the silica is polymerated and formed into the final shape of silica structures during an ingeniously controlled *in vivo* process. Apparent differences in the process of silica deposition among Chromista microorganisms imply that this ability has developed independenty and repeatedly within the group. The most common silica structures are scales, bristles, cases, skeletons and cysts. The analogical structures often originated independently in unrelated lines of Chromista by means of convergent evolution. On the contrary, in some lineages of Chromista, the ability of biosilicification was suppressed. It is therefore very likely that the silica structures should have some functional significance, and the particular phylogenetic lineages have to confront a trade-off between the energy cost of their maintainance and selective pressures of the environment they inhabit. A series of hypotheses have been formulated to explain the evolutionary significance of silica structures, some of them were even tested experimentally. The most often mentioned role of silica structures is the protection against predators and pathogens. The another alternatives involve the use of silica structures in a cell metabolism, during a redistribution of incident light, in a nutrition uptake or in regulating a sinking rate of an organism.