The molecular basis for silica morphogenesis in diatoms

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The silica cell walls of diatoms are paradigms for the remarkable ability of organisms to generate inorganic materials with complex nano- and micropatterns that exceed by far the capabilities of current materials synthesis. During the past two decades, numerous candidate genes have been implicated in bio-morphogenesis of diatom silica, yet hardly any of them have been functionally characterized. Furthermore, general mechanistic models are lacking that would be able to explain how the encoded proteins can control silica morphogenesis from the nanometer scale up to scale of hundreds of micrometers. Recently, we have performed the first proteomics analysis of silica deposition vesicles (SDVs) which has enhanced the ability to identify genes involved in silica biogenesis with high confidence [1]. Furthermore, we developed a method to visualize silica morphogenesis in diatoms with unprecedented detail [2]. Combining these advances with targeted gene knockout allowed us to establish an experimental pipeline for the functional characterization of SDV proteins, and has started to provide invaluable information to develop models for silica morphogenesis mechanisms [1,3].

References :

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