SFB 680

Molecular Basis of Evolutionary Innovations

Molekulare Grundlagen evolutionärer Innovationen

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The role of predation and distant chemoreception in phytoplankton evolution

Chain formation is common among phytoplankton organisms but the underlying reasons and consequences are poorly understood. Our recent results show that chain formation in the motile dinoflagellate Alexandrium tamarense, as well as in non motile diatoms of the genus Skeletonema is strongly impaired by waterborne cues from copepod grazers. Chains of both species responded to copepod cues by splitting up into single cells or shorter chains. Single cells swim significantly slower compared to chains in A. tamarense, which in combination with the smaller size of single cells result in several times lower simulated encounter rates with predators. Similarly, experimentally determined copepod clearance on single cells of Skeletonema sp was several times lower compared to the clearance on 4 cell chains, consistent with simple encounter rate models for chemosensory grazers. Grazer induced chain length plasticity constitutes a novel mechanism to reduce encounters with grazers. We argue that grazer induced chain length plasticity reflects a tradeoff between motility and risk of predation in chain forming motile cells. For non-motile cells like the diatoms, the benefit of chain formation is not well understood, but it is clear that chains, even though more susceptible to mesozooplankton grazers, are protected towards some microzooplankton grazers, which suggest that Skeletonema cells are able to minimize losses to grazers by adjusting chain length in response to chemical cues from the dominant grazers. The high encounter a rate of phytoplankton chains has probably been an important factor favoring the evolution of grazer induced chain length plasticity.

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Biocenter, Zülpicher Str. 47b, Room 0.024

Host: Eric von Elert

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