Exploring the Floating Mechanism of Algal Cells Responsible for Cyanobacterial Blooms

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The floatation and rapid propagation of algal cells in eutrophic water are the key factors of cyanobacterial blooms. The buoyancy regulation of cyanobacteria is particularly important, because it helps algal cells to obtain optimum light and carbon dioxide levels for strong photosynthesis and rapid growth. What is the mechanism of floatation and aggregation of algal cells? Can they swim or fly onto the surface of the water? Do they have an air bladder and fins like fish or air sacs and wings like birds? The goal of this study was to explore the floating mechanism of algal cells, which is a key internal cause of cyanobacterial blooms . The results showed that the ability of algal cells to float was related to the commonly accepted gas vesicles structure as well as a fibrous network structure formed on the cell surface. This network structure has been demonstrated to be formed from a suspended protein secreted by algal cells. This network can suspend cyanobacteria as well as other microorganism and particles. This finding indicates that the suspension function of this protein has a broad spectrum. In this study, a novel protein with a suspension function was discovered, which supplements the traditional gas vesicles thesis for floating algal cells. A new floating mechanism of algal cells is proposed. My results provide a novel idea and method for the rapid, efficient, and harmless treatment of cyanobacterial blooms. The protein with a broad-spectrum suspension function can be used as a detection marker to indicate cyanobacterial blooms.

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