

**Calcium Requirement for Phototactic Gliding Movement in
Cyanobacterium *Synechocystis* sp. PCC6803**

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The unicellular cyanobacterium *Synechocystis* sp. PCC 6803 (Syn6803) shows photomovement through gliding motility, but until recently almost nothing is known about its ability to respond to light stimuli. For better understanding of phototactic gliding movement in Syn6803, we studied the effects of Ca^{2+} on phototaxis using computer-assisted videomicroscopic motion analysis system. When calcium ion was chelated from the medium by adding 0.5 mM EGTA, the photoorientation was totally inhibited, but the gliding speed was not much affected compared with that in the control medium. EGTA-induced inhibition was recovered within 30 min in calcium-deprived cells upon addition of 1 mM CaCl_2 . Lanthanum ion at 10 μM also inhibited the phototactic activity of Syn6803 cells by occupying calcium binding site. Furthermore, calcium channel inhibitors such as verapamil, diltiazem, pimozide, and specific calcium ionophore A23187 impaired positive phototaxis. These results show that calcium is required for phototactic gliding movement in Syn6803. Interestingly, phototactic response was prevented by the trifluoroperazine and the chlorpromazine, suggesting the involvement of calcium binding protein in Ca^{2+} -dependent photomovement of Syn6803. It strongly indicates that Ca^{2+} might play a significant role in regulating phototactic activity and act as a signaling molecule for the light signal transduction in Syn6803.