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LS-2-P-3192 Actin dependent gliding motion of a diatom, Bacillaria paradoxa.

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Diatom is a major group of algae, and the most popular type of phytoplanktons. Some of pennate diatoms can adhere to the substratum and glide over it. This motion is called “gliding”. *Bacillaria paradoxa* belongs to pennate diatoms and forms a colony consisting of 2-30 cells. Neighboring cells show active gliding each other, but its mechanism and physiological meanings are not understood. We established a culture system of *B. paradoxa* with artificial sea water (ASW) in our laboratory. From the observation of transmission and scanning electron microscope, the neighboring cells are connected with mucilage secreted from the raphe, the elongated slit in the frustules. Alexa 488-phalloidin staining revealed that two actin filament bundles are present along with the raphe.
Both latrunculin B (LB), an actin polymerization inhibitor, and 2, 3-butanedione monoxime, a myosin inhibitor, completely inhibited gliding motion. After removal of the LB, gliding motion restored. These results suggest an important role of actomyosin system in gliding motion.
Electron microscopy revealed the detailed structures of frustules. Arch-shaped structures called fibula are present across the raphe in the interior of the frustules. Each fibula passes through the cytoplasm. We could observe some filamentous structures between the fibula and the outer wall. These filamentous structures are located a similar place to that observed in fluorescence microscope. We suppose that these fibers are actin bundles. We found a high-electron dense structure on the plasma membrane between actin bundles and the raphe. In addition, we could observe a low-electron dense material filling the space on the raphe and excrete to the extracellular space, probably mucilage. Actin bundles are associated with high electron dense structures on the plasma membrane and it is associated with the low electron dense materials on the extracellular surface. The high-electron dense structures were only observed in particular places, and the mucilage was always observed with this high density structures. This high-electron dense structure might be a complex of trans-membrane proteins and myosin that drives movement of the mucilage. These structures should play a key role in the gliding motion.
We found that a single cell separated from a colony shows a motion in back and forth at a point attaching to the substratum, and succeeded in revealing a motion of the mucilage extending from rapha using micro beads. We presented a curtain model for the gliding motion of *B. paradoxa*.

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