

Ultrastructural analysis of mucocysts in the euglenoid flagellate *Peranema trichophorum*

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SUMMARY

Peranema trichophorum shows unique unidirectional gliding cell locomotion on the substratum at speeds up to 30 $\mu\text{m/s}$, which is the highest among all gliding microorganisms. We showed that treatment with 0.1–0.2 mM nicotinamide induced discharge of mucocysts from *P. trichophorum*, and that cell gliding was inhibited concomitantly with the treatment, suggesting a possible involvement of mucocyst discharge in gliding cell locomotion. Using negative-staining electron microscopy, the ejected content of the mucocyst was observed as an elongated shaft-like structure, 1,400 nm long and 230 nm wide, with characteristic helical striations. Ultrathin sectioning of intact *P. trichophorum* after fixation by freeze substitution revealed that the shaft-like structures in the intact mucocysts are shorter and wider in appearance (1,000 nm in length and 350 nm in width), with electron opaque materials inside the shaft. One tip of the mucocyst was found to be docked to the interlocking zone of the pellicular structure, where edges of the adjacent pellicular strips are mutually associated at the cell surface.