

Abstract Submitted
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Fluid flow enhances the effectiveness of toxin export by aquatic microorganisms: a first-passage perspective¹ NICHOLAS LICATA, Univ of Michigan - Dearborn, AARON CLARK, University of Michigan - Dearborn — Aquatic microorganisms face a variety of challenges in the course of development. One central challenge is efficiently regulating the export of toxic molecules inside the developing embryo. The strategies employed should be robust with respect to the variable ocean environment and limit the chances that exported toxins are reabsorbed. In this talk we consider the first-passage problem for the uptake of exported toxins by a spherical embryo. A perturbative solution of the advection-diffusion equation reveals that a concentration boundary layer forms in the vicinity of the embryo, and that fluid flow enhances the effectiveness of toxin export. We highlight connections between the model results and recent experiments on the development of sea urchin embryos.

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Nicholas Licata
Univ of Michigan - Dearborn

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