

SYNCHRONIZATION OF EUKARYOTIC FLAGELLA

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One of the most fundamental issues in biology is the nature of evolutionary transitions from single cell organisms to multicellular ones. Not surprisingly, for microscopic life in a fluid environment, many of the processes involved are related to transport and locomotion, for efficient exchange of chemical species with the environment is one of the most basic features of life. This is particularly so in the case of flagellated eukaryotes such as green algae, whose members serve as model organisms for the study of transitions to multicellularity. In this talk I will focus on studies of the stochastic nonlinear dynamics of these flagella, whose coordinated beating leads to graceful locomotion but also to fluid flows that can out-compete diffusion. A synthesis of high-speed imaging, micromanipulation, and three-dimensional tracking has quantified the stochastic dynamics of flagellar beating and allowed for tests of the hydrodynamic origins of flagellar synchronization.

Keywords: flagella; synchronization;