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The Crawling Cell as a Brownian Inchworm MOUMITA DAS, Rochester Institute of Technology, J.M. SCHWARZ, Syracuse University — Cell migration is integral to several physiological processes such as immune response, wound healing, tissue formation, fertilization etc. Previous studies, both theoretical and experimental, have attempted to model different aspects of cell migration, including adhesion, protrusion and retraction at the level of single cells, and collective motion at the multicellular level. The entire motility process of a single cell and its ability to navigate a landscape containing obstacles is, however, not well understood. We attempt to address this issue by modeling a single moving cell as a Brownian inchworm composed of two beads attached by a spring that can sense and respond to the mechanical properties and architecture of its environment. The elastic interaction between inchworm and the substrate is modeled by molecular clutches. We study the dynamics of this inchworm in a corrugated potential. In particular we focus on the interplay between confinement and adhesion in the motility of this inchworm. This model may provide important insights on cell movement through a biological maze of other cellular and extracellular structures.

Moumita Das
Rochester Institute of Technology

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