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Cell Shape Dynamics: From Waves to Migration MEGHAN DRISCOLL, University of Maryland, COLIN MCCANN, University of Maryland and National Cancer Institute, National Institutes of Health, RAEL KOPACE, TESS HOMAN, JOHN FOURKAS, University of Maryland, CAROLE PARENT, National Cancer Institute, National Institutes of Health, WOLFGANG LOSERT, University of Maryland — We analyzed the dynamic shape of migrating Dictyostelium discoideum cells. We found that regions of high boundary curvature propagate from the front to the back of cells in an organized fashion. These waves of high curvature are stabilized by surface contact, and so, at the sides of cells, are stationary relative to the surface. The initiation of curvature waves, though, which usually occurs at the front of cells, is associated with protrusive motion. The protrusion location shifts rapidly in a ballistic manner at speeds nearly double that of cellular migration. To examine curvature waves in the absence of surface contact, we guided cells to extend over the edge of micro-cliffs. The curvature wave speed of cells extended over a cliff was triple the wave speed of cells migrating on a surface, which is consistent with the higher wave speeds observed near the non-adherent leading edge of cells.

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