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Modeling stochastic cell dynamics with adhesion anisotropy quantitatively reproduces convergent extension TAYLOR FIRMAN, KINGSHUK GHOSH, Department of Physics and Astronomy, University of Denver, Denver, CO, J. TODD BLANKENSHIP, Department of Biological Sciences, University of Denver, Denver, CO, DINAH LOERKE, Department of Physics and Astronomy, University of Denver, Denver, CO — Epithelial cells in *Drosophila* embryos intercalate together during germ-band extension in order to elongate the entire embryo along the anterior-posterior axis, a process more broadly known as convergent extension. *In silico* simulation of hexagonal cell matrices provides an inexpensive way to test the validity of possible mechanisms governing convergent extension of epithelial tissues. Our proposed system is node-based as opposed to pixel-based, storing data only for the node points defining the idealized polygons representing individual cells. This brings simulation times down from days to hours. Using Monte Carlo simulation techniques, the energy function used takes into account cell volume and membrane conservation as well as adhesion between surrounding cells. Our model takes a passive adhesion approach by assuming planar polarized distributions of adhesiveness within the cell. This leads to convergent extension using only Brownian motion. This adhesion-based model also allows us to add in a level of heterogeneity, where cell polarizations don't align perfectly along the dorsal-ventral axis due to a mistake in cellular machinery. This results in longer monopolar adhesions along interfaces, leading to slower interface contraction and complex cell behaviors.

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