Abstract Submitted
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Mechanics of Morphogenesis: The Drosophila Eye SASCHA HILGENFELDT, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, IAN GEMP, Mechanical Engineering, Northwestern University, RICHARD CARTHEW, Department of Biochemistry, Molecular Biology, and Cell Biology, Northwestern University — Epithelial tissues are highly organized layers of individual cells with non-trivial geometry both in equilibrium and during tissue development. In the latter case, individual cell rearrangements and deformations can result in larger-scale, flow-like restructuring. The complex, highly reproducible shapes of epithelial cells in the retina of the Drosophila eye are crucially dependent on the expression of adhesion molecules (cadherins). We show that not only the overall tissue organization, but the shape of each individual cell can be understood through quantitative modeling using minimization of an interfacial energy functional. The model contains only two free parameters, encoding for the adhesion strengths of E- and N-cadherin, and reproduces interfacial angles and lengths to within a few percent accuracy [1]. Characteristic morphological changes in mutant ommatidia can be modeled within this approach, changes that are also present during natural morphogenesis of epithelia. We investigate the role of changing cadherin expression and cytoskeletal tension in these dynamical processes. [1] S. Hilgenfeldt, S. Erisken & R. W. Carthew, Proc. Natl. Acad. Sci. USA **105**, 907 (2008)

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