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Collective mechanics of undifferentiated cells drives ventral furrow formation in *Drosophila* embryo[1] ANA HOCEVAR, PRIMOZ ZIHERL, Jozef Stefan Institute, Ljubljana, Slovenia, MATTEO RAUZI, European Molecular Biology Laboratory, Heidelberg, Germany, MARIA LEPTIN, Universitaet zu Koeln, Koeln, Germany
— We propose a 2D mechanical model of ventral furrow formation in *Drosophila* embryo that is based on undifferentiated epithelial cells of identical mechanical properties whose energy resides at their cortex. Depending on the relative tensions of the apical, basal, and lateral sides, the minimal-energy states of the embryo cross-section include circular and buckled furrow shapes. We discuss the possible shape transformation from a circular to an invaginated shape consistent with experimental observations, arguing that generic collective mechanics may contribute to the robustness of tissue shape changes in embryonic development. A small increase of the area of the mesoderm cells is sufficient to pin down the invagination. This agrees with experimental data which show that just before the outset of gastrulation, the apical, basal, and lateral sides of the mesoderm cells indeed are larger than in the rest of the embryo.

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