

## Drosophila during early gastrulation is not only a living being

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We propose a mechanical approach of the beginning of the first morphogenetic event of the development of *Drosophila*, namely the gastrulation. This event is known to happen concomitantly with the recruitment of apical myosin in a ventral region (the mesoderm). Against the grain, that usually invokes local changes in an hypothetical spontaneous curvature of the mesoderm, we suggest that the pulling of myosin in this area (ventral + apical) is sufficient to induce the formation of the longitudinal ventral furrow that initiates the gastrulation. To test this assumption, we performed finite-elements simulations of a purely mechanical model, where the initial shape of the embryo was reproduced. These numerical experiments showed sequences of shapes observed in-vivo, and due to dedicated experimental measurements on developing *Drosophila*, a quantitative correspondence between successive simulations and the developmental time was set up. This allowed to quantitatively retrieve experimental features such as the displacement of cells around the ventral midline (along which the ventral furrow develops), area changes according to the distance to the ventral furrow, the evolution of the furrow depth and the signature of a buckling. These results show the importance of myosin location in the mesoderm, and the crucial role of the three-dimensional geometry, in the folding of the epithelium during the early gastrulation in *Drosophila*.