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Forces driving three-dimensional tissue patterning during morphogenesis HENG LU, ADAM SOKOLOW, U. SERDAR TULU, DANIEL KIEHART, GLENN EDWARDS, Duke University —
Dorsal closure is an essential stage of *Drosophila* embryogenesis and is a model system for *in-vivo* investigations of cell sheet morphogenesis. During closure a system of four biological processes work collectively to close a gap in the epithelium, which initially is filled with a transient tissue. The geometry of the dorsal opening is similar to that of two intersecting circular arcs being pulled apart at a nearly constant rate. Substantial progress in understanding the dynamics has been made in the past by largely viewing closure as a two-dimensional process. However, tissue and cell dynamics are not confined to the embryo surface. We have been investigating the three-dimensional kinematics of dorsal closure by imaging the actomyosin purse strings at the periphery of the dorsal opening and by imaging the apical belts of DE-cadherin in each cell within the opening. We have analyzed the results with the methods of analytic geometry. In addition, in the past we have determined the relative magnitudes of the forces that drive dorsal closure. We have been using magnetic tweezers, time-resolved *in-vivo* microscopy, and biophysical modeling to measure the net force and to determine the magnitude of each force.

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