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Epithelial Mechanics during Germband Retraction in Fruit Fly Embryogenesis XIAOYAN MA, HOLLEY E. LYNCH, M. SHANE HUTSON, Dept of Physics & Astronomy, Vanderbilt University — During germband retraction in the early embryonic development of fruit fly embryos, the epithelial cells of the amnioserosa (AS) undergo a dramatic change in cell shape. The average cell aspect ratio reduces from $\alpha \sim 10$ to ~ 1 within three hours. We performed laser hole-drilling and confocal microscopy to investigate the mechanics of this process in live fly embryos. We find that the laser-induced recoil dynamics of AS cells during germband retraction (when $\alpha \sim 10$) is dramatically different from that during the later dorsal closure stage (when $\alpha \sim 1$). First, in the earliest stage of germband retraction, some AS cells actually shrink instead of expand in the first one second after ablation. After this point, the cells do slowly expand. Second, in either phase, the cell speeds were much slower, in the range of $\pm 1 \mu\text{m/s}$ (compared with speeds in excess of $10 \mu\text{m/s}$ during dorsal closure). These results suggest a much smaller tensile (and in some cases, compressive) stress in the whole cell sheet in early germband retraction. As retraction proceeds towards dorsal closure, the stresses increase.

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