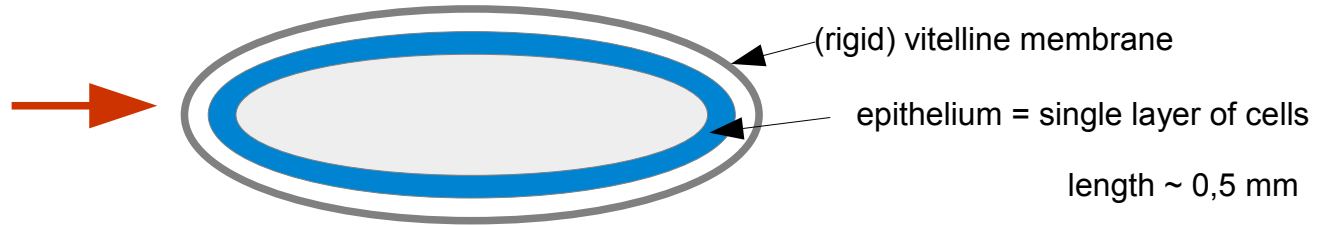


## Mechanics in *Drosophila* during early gastrulation

J. Fierling, A. Torzinsky, C. Quilliet, P. Marmottant, J. Etienne (LIPhy, Grenoble)  
G. Blanchard, C. Lye, B. Sanson (Physiology, Development and Neuroscience, Cambridge)

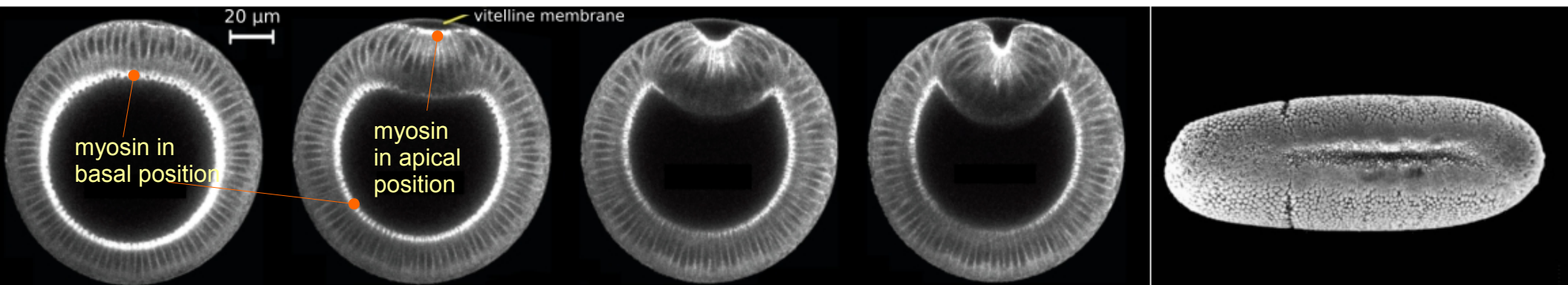


Mr and Ms Fruitfly



Drosophila embryo

### Ventral furrow formation (VFF):

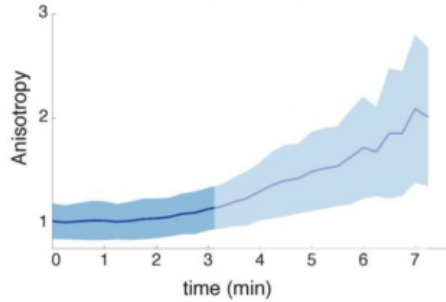
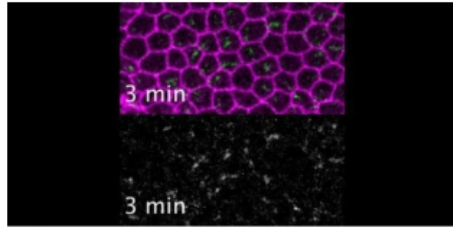


How ?!

# Rq: force (anisotropic) and (isotropic) curvature are sufficient to induce a furrow...

...but...

[Chanet et al, Nat Comm 2017]

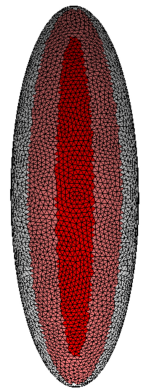
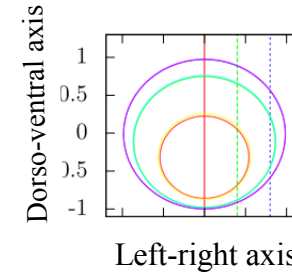
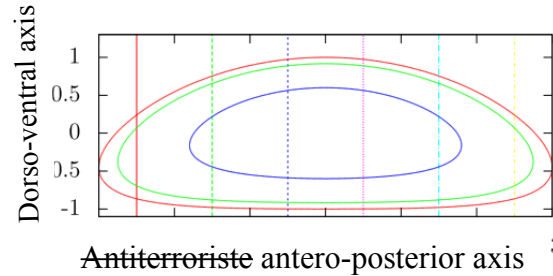


Myosin is initially organized in an isotropic way.

→ why not an **(isotropic) tension** on an **anisotropic** embryo?

Model: epithelium ↔ elastic (stretch, shear, bend) isotropic surface

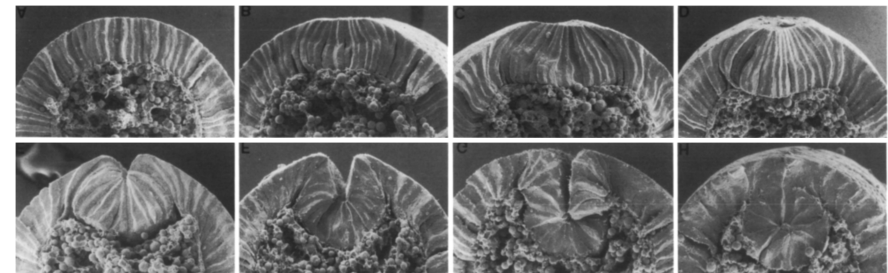
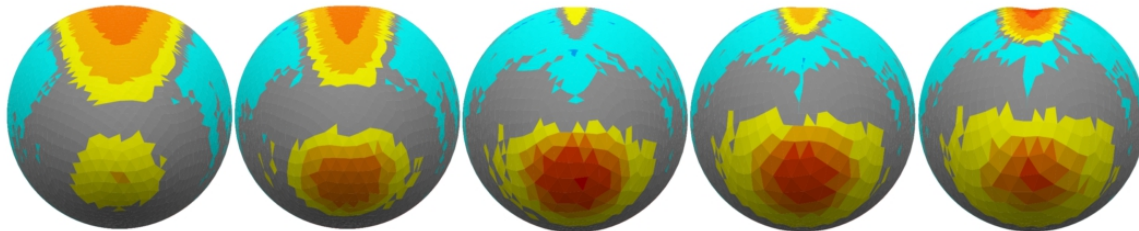
- anisotropically curved:  $[x^2/9 + y^2 + (z + x^2/20)^2 = 1]$



In red: contracting myosin

- heavily constrained (volume, vitelline membrane)

Comparison with real life:



+ other quantitative features → predictions (stress)