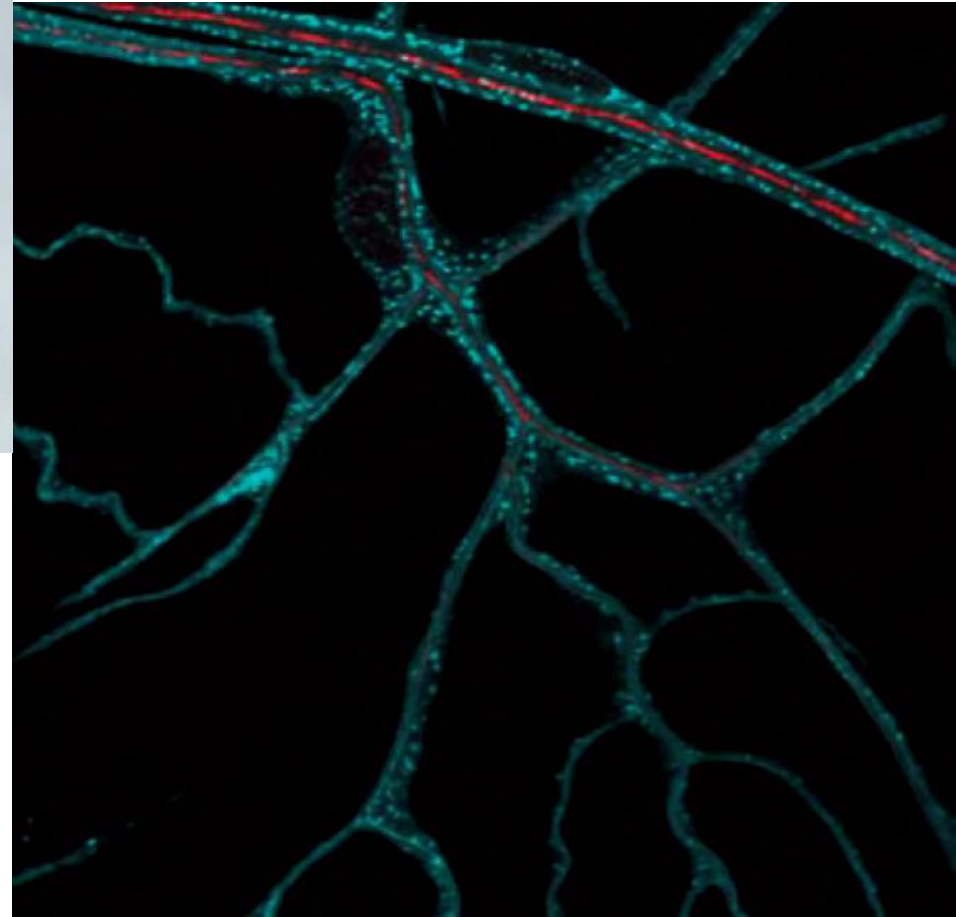
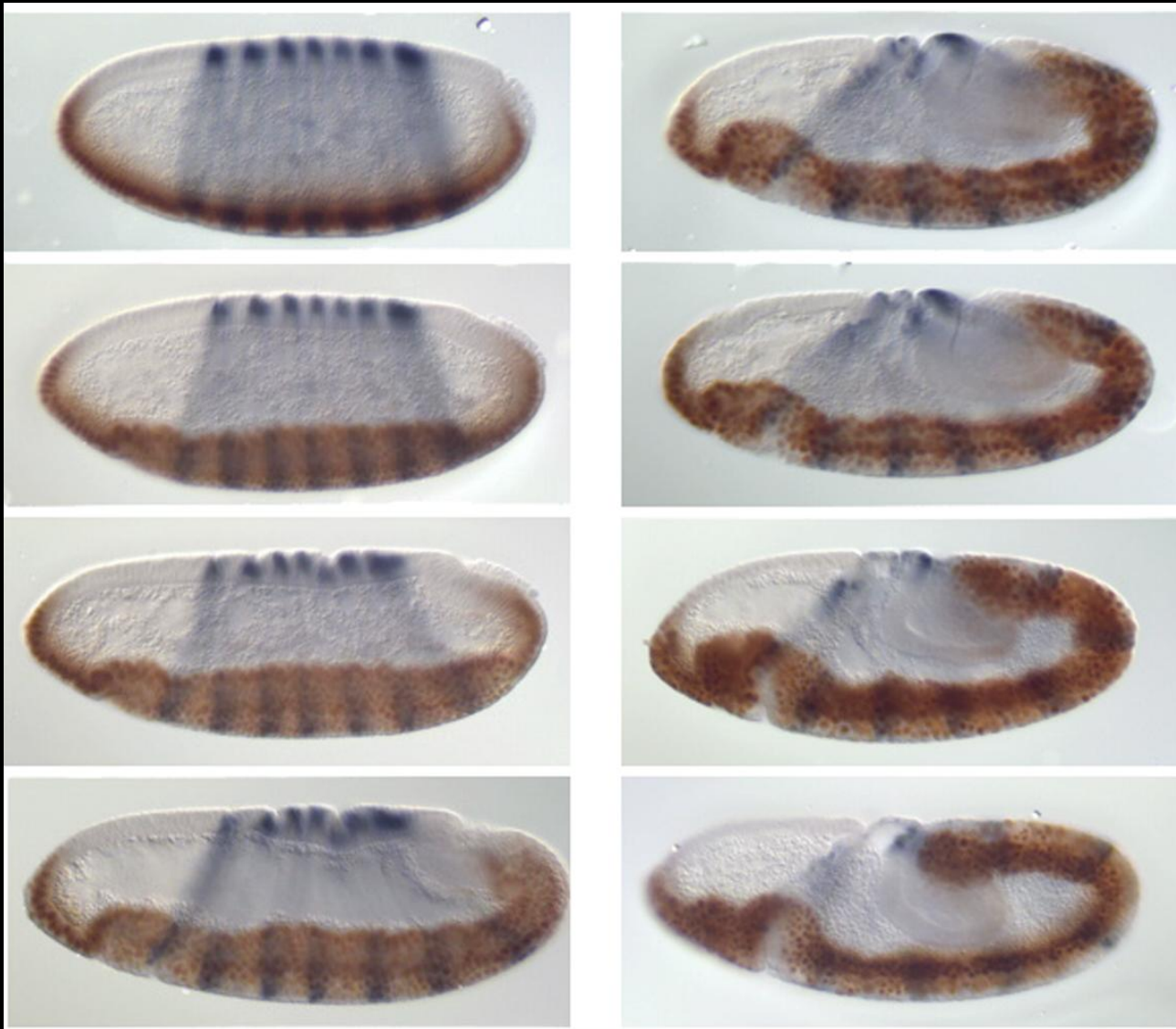


Genetics and mechanics of cell shape determination

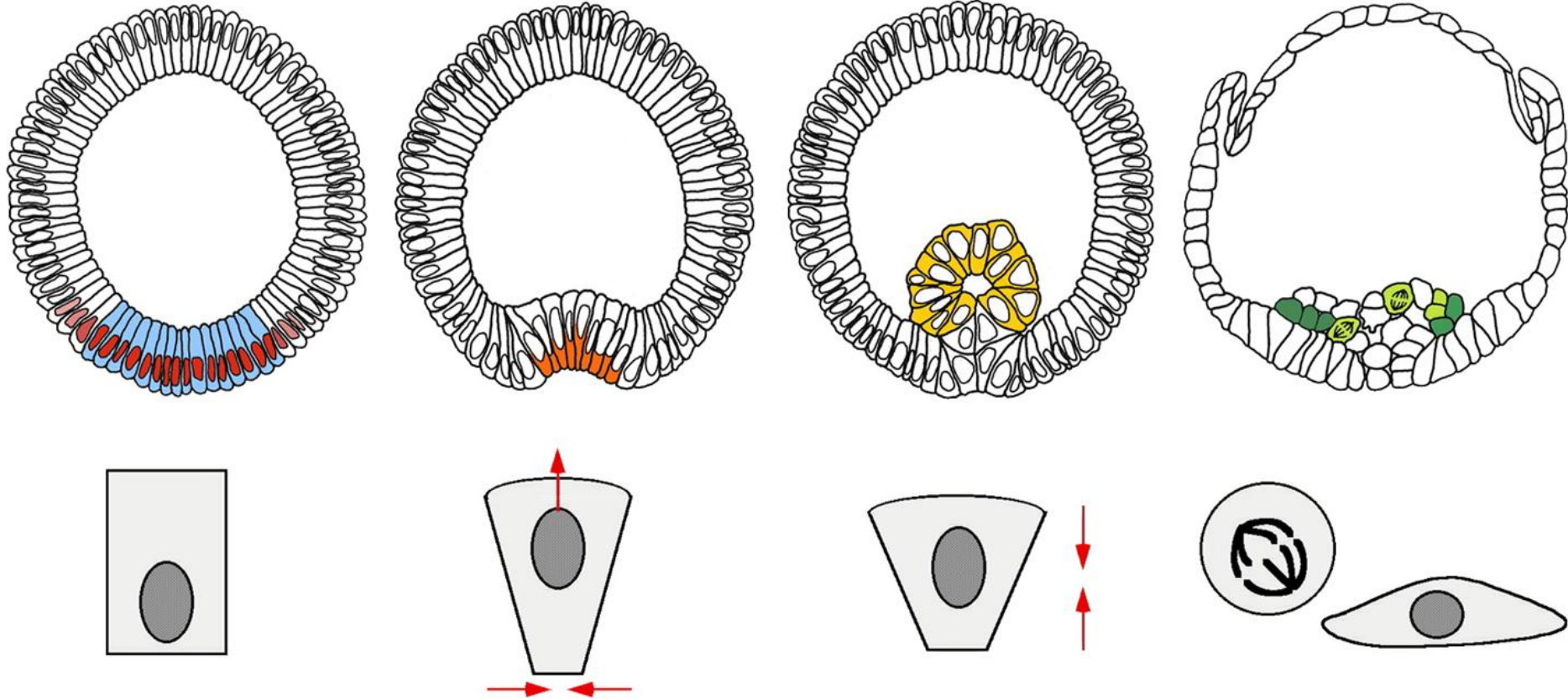


20 minutes of embryonic development

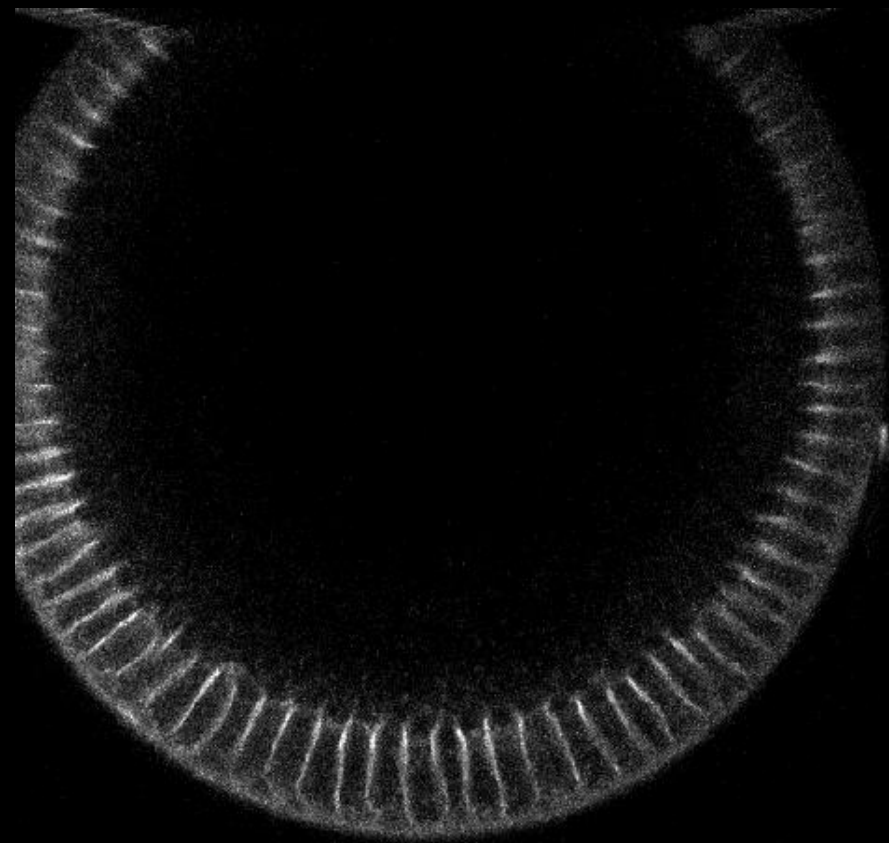


blue = even-skipped; brown = twist

Cell shape changes during gastrulation



Cell shape changes during the invagination of the mesoderm



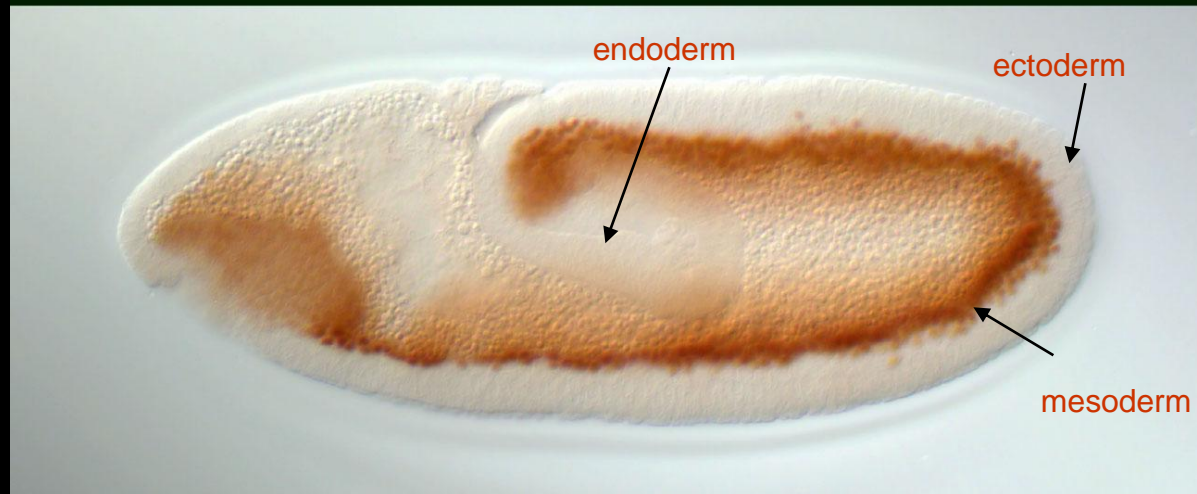
0.0 min

Gastrulation: conversion of single epithelial cell layer into a multilayered embryo

before



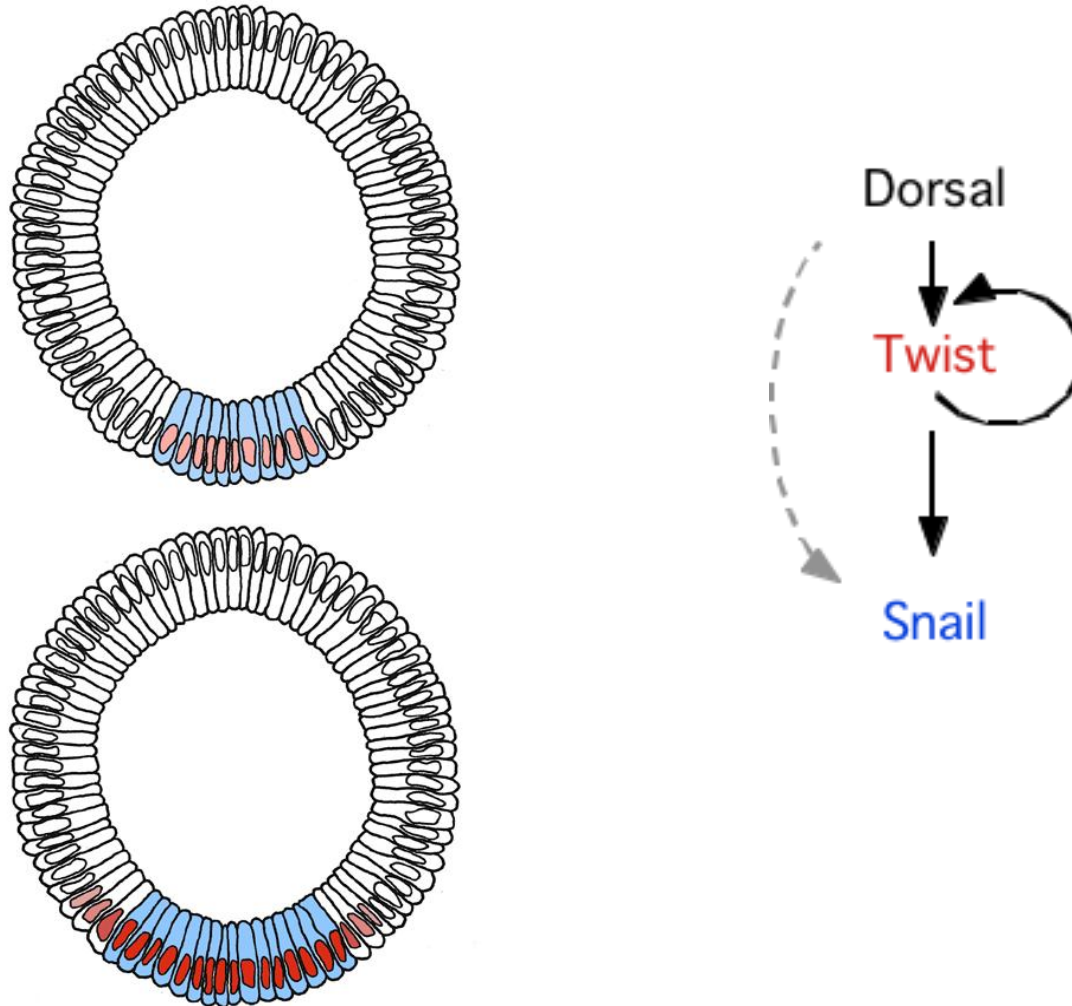
after



Mesoderm invagination: controlled by **Twist**

The genetic cascade that regulates mesoderm morphogenesis

Dorsal activates transcription of Twist and Snail on the ventral side



Twist is required for all aspects of the development of the mesoderm

wt



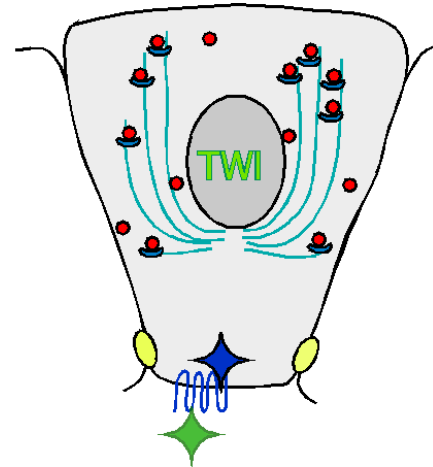
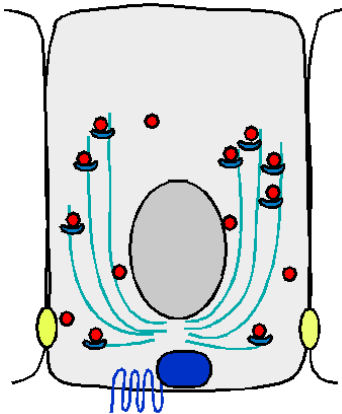
twist



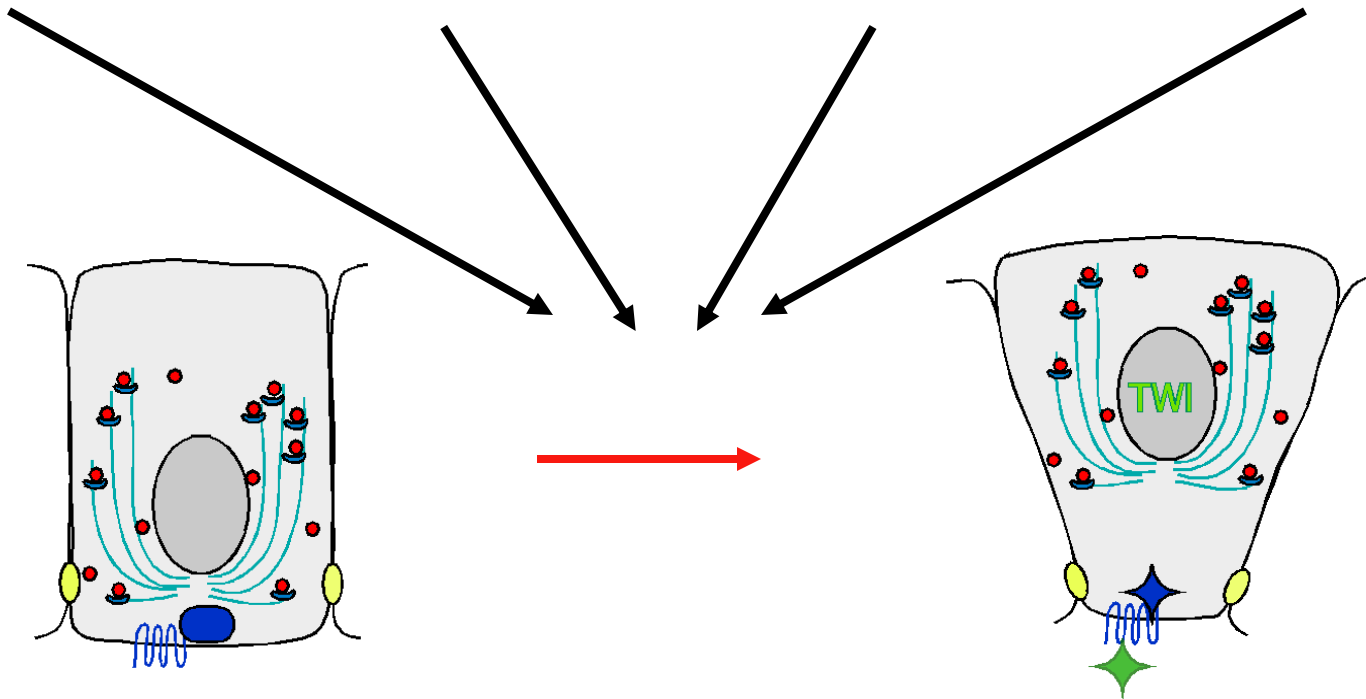
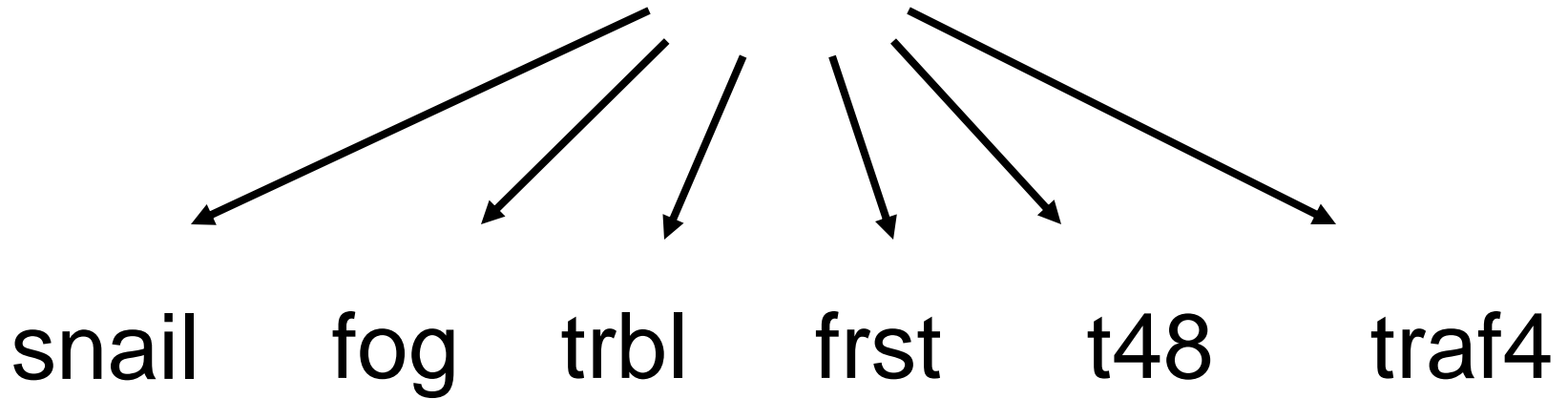
Twist

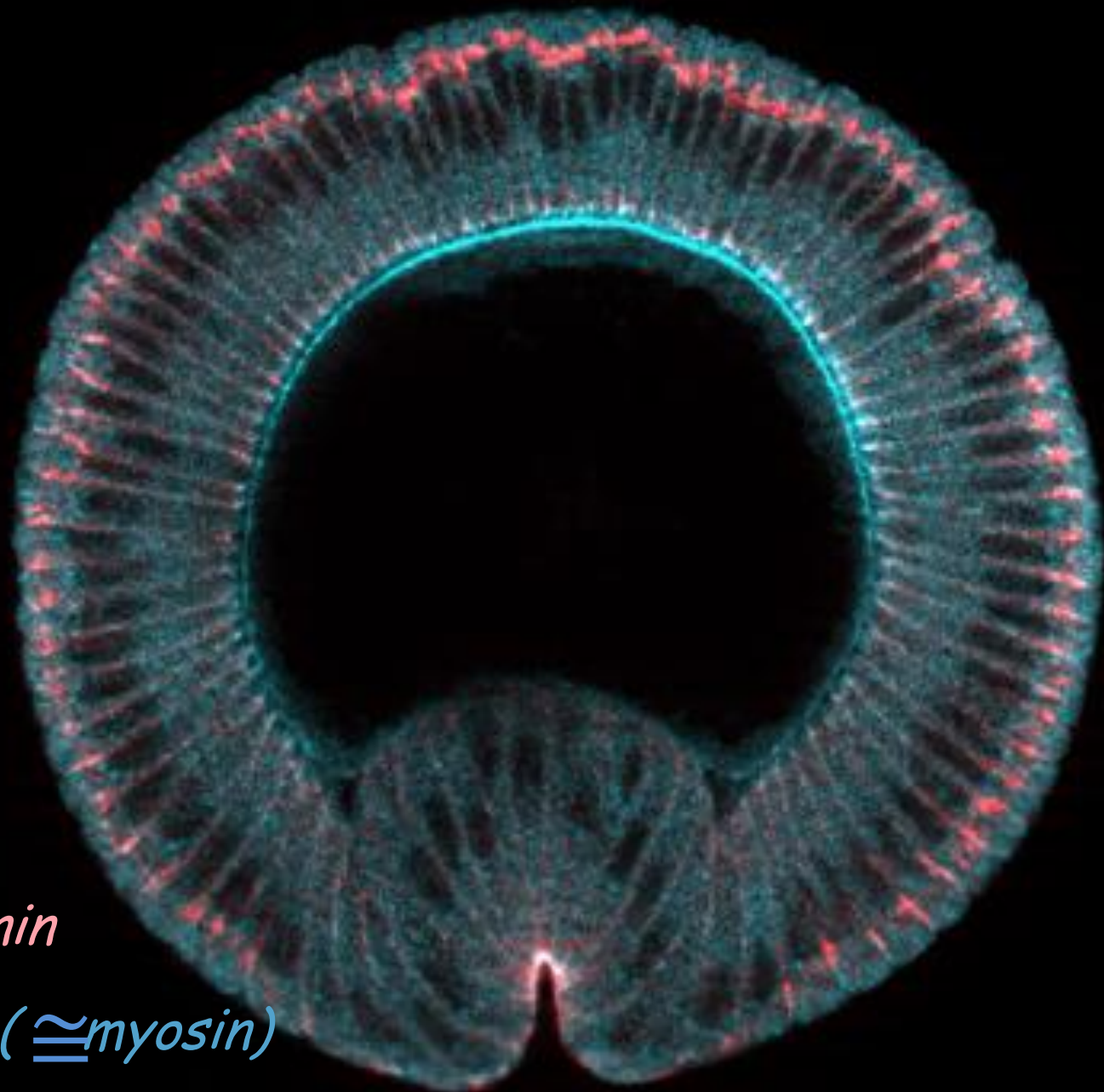


?



Twist

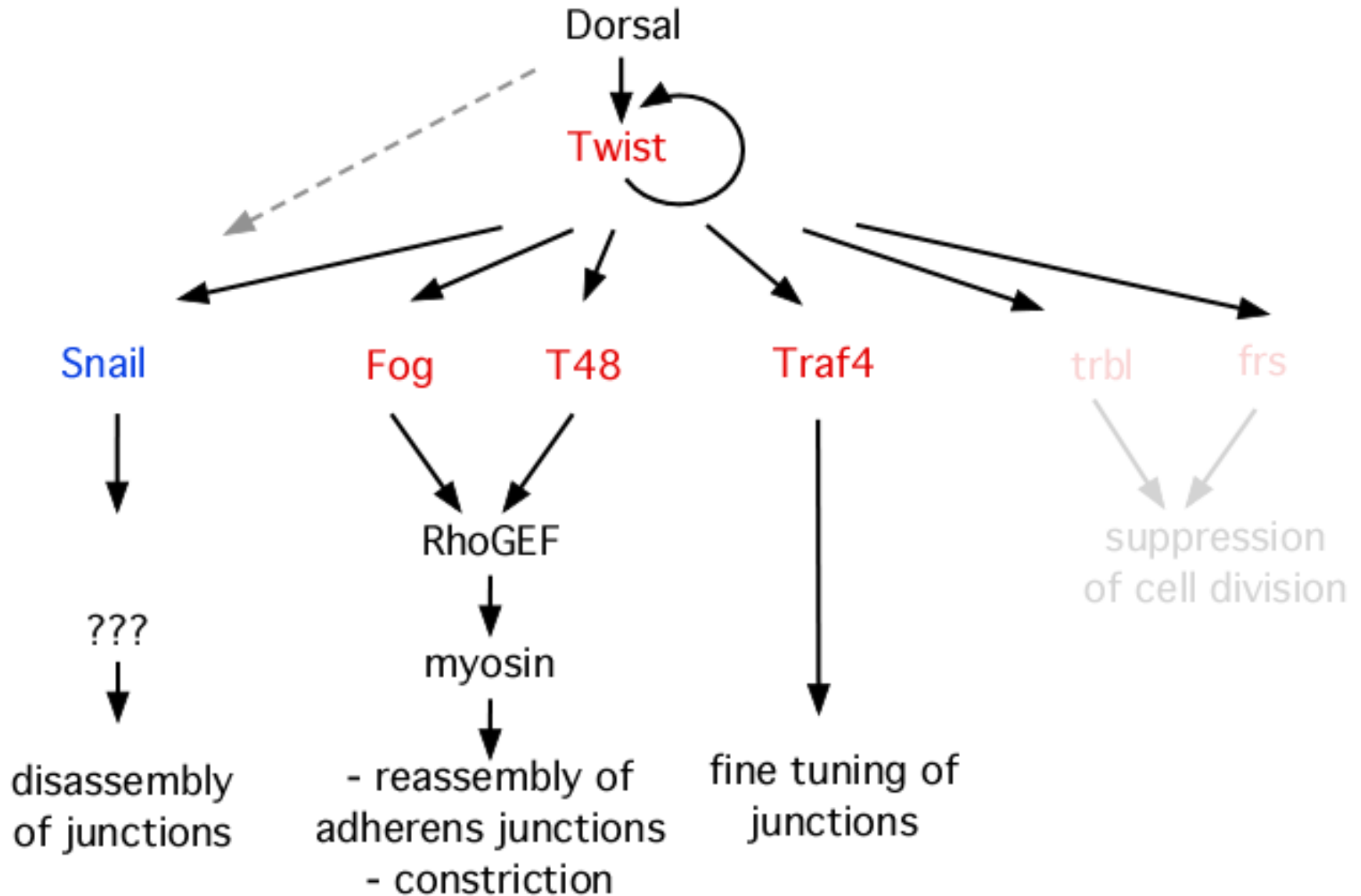




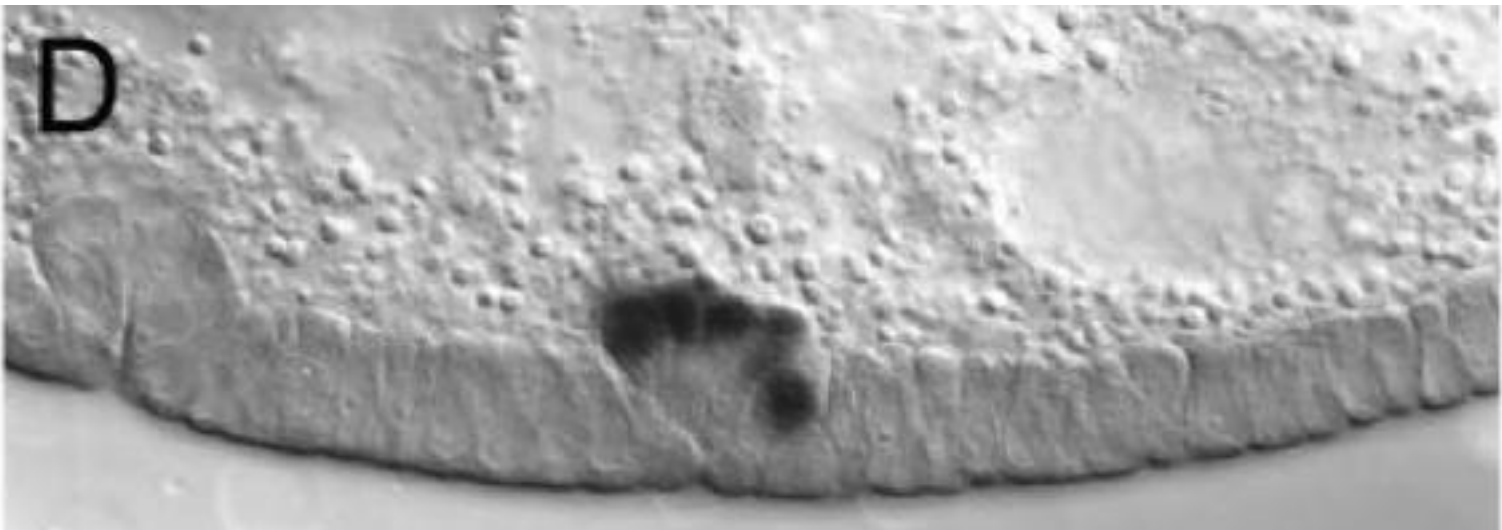
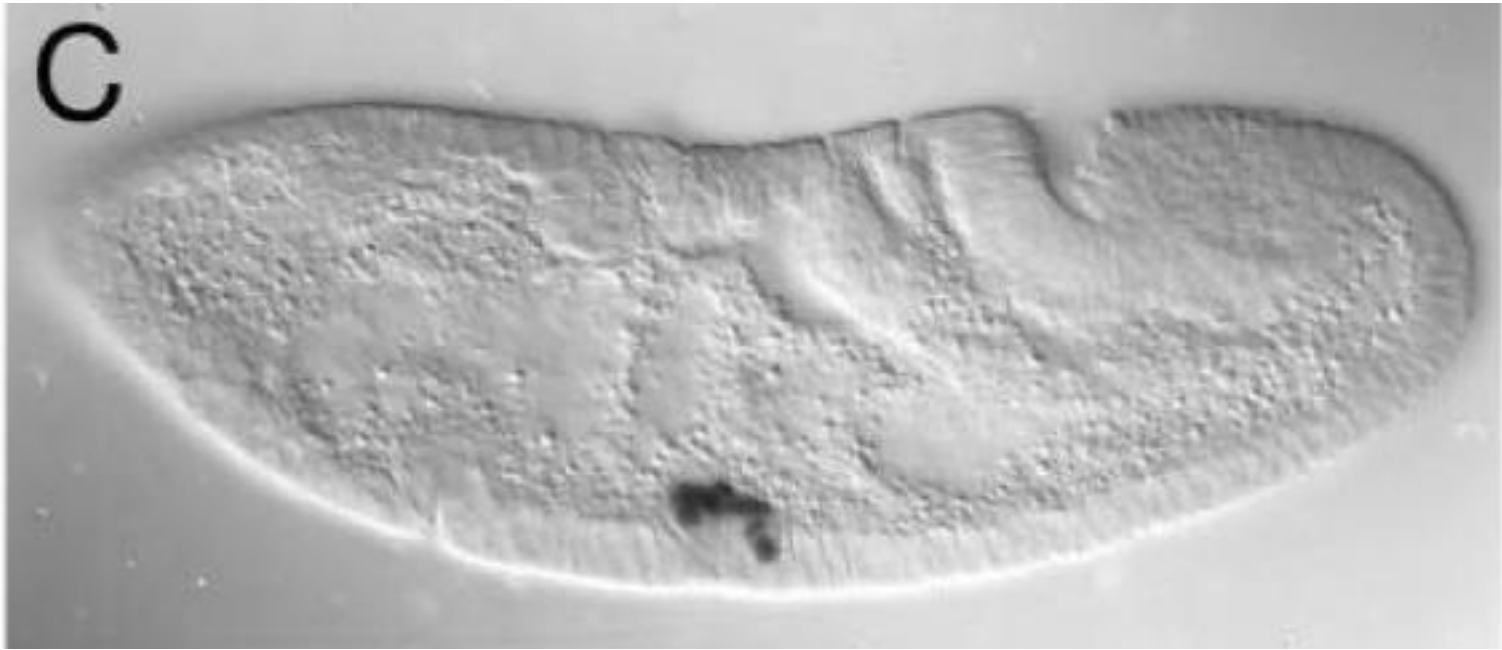
beta-catenin

RhoGEF2 (\cong myosin)

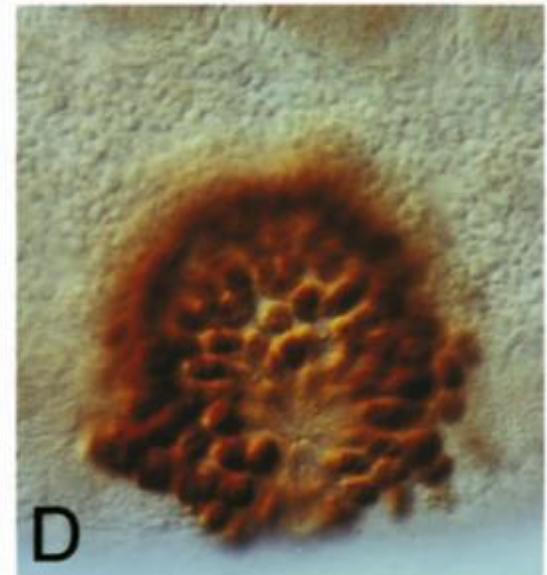
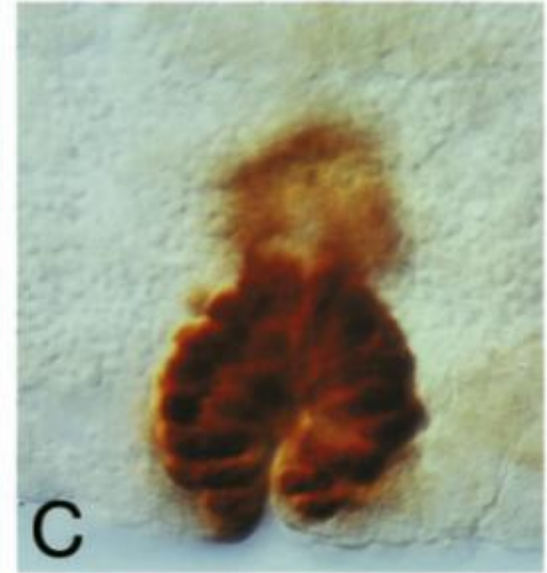
The genetic hierarchy downstream of Twist



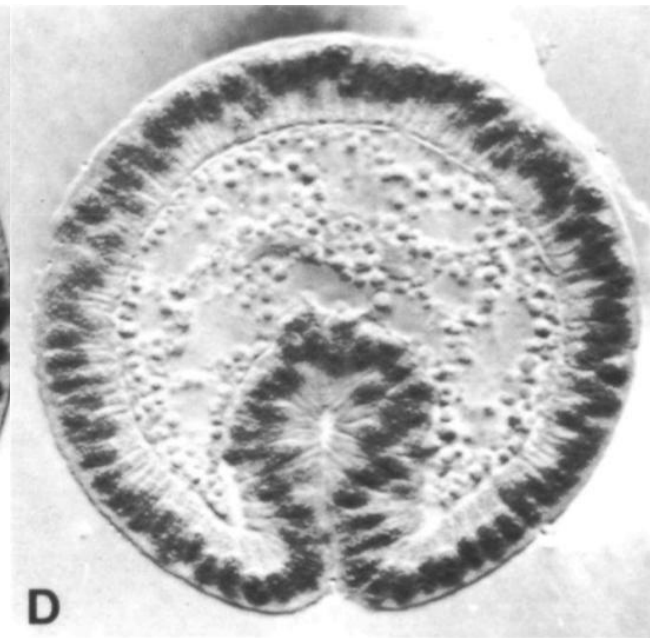
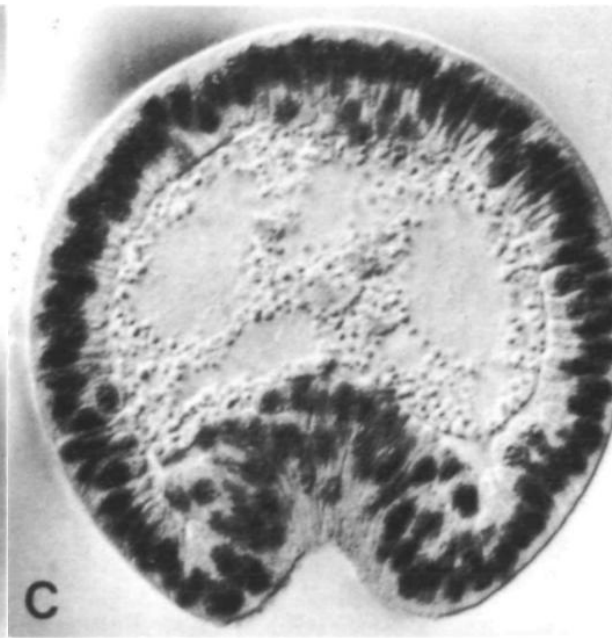
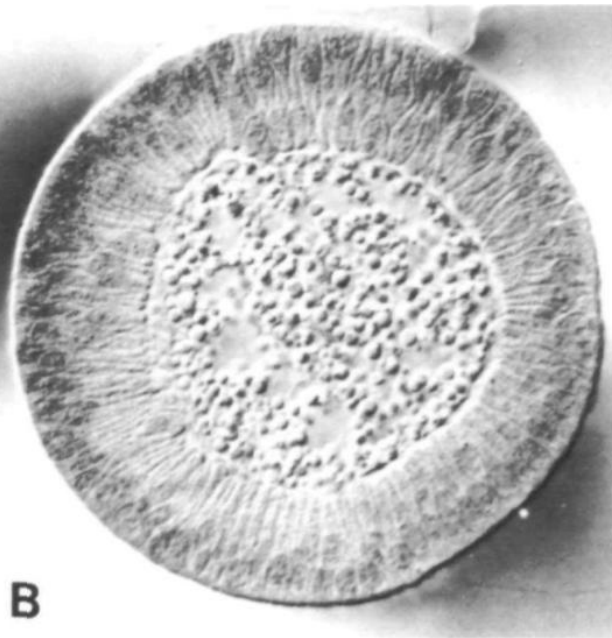
Invagination behaviour is cell autonomous



Shape of invagination is determined by shape of patch expressing Twist



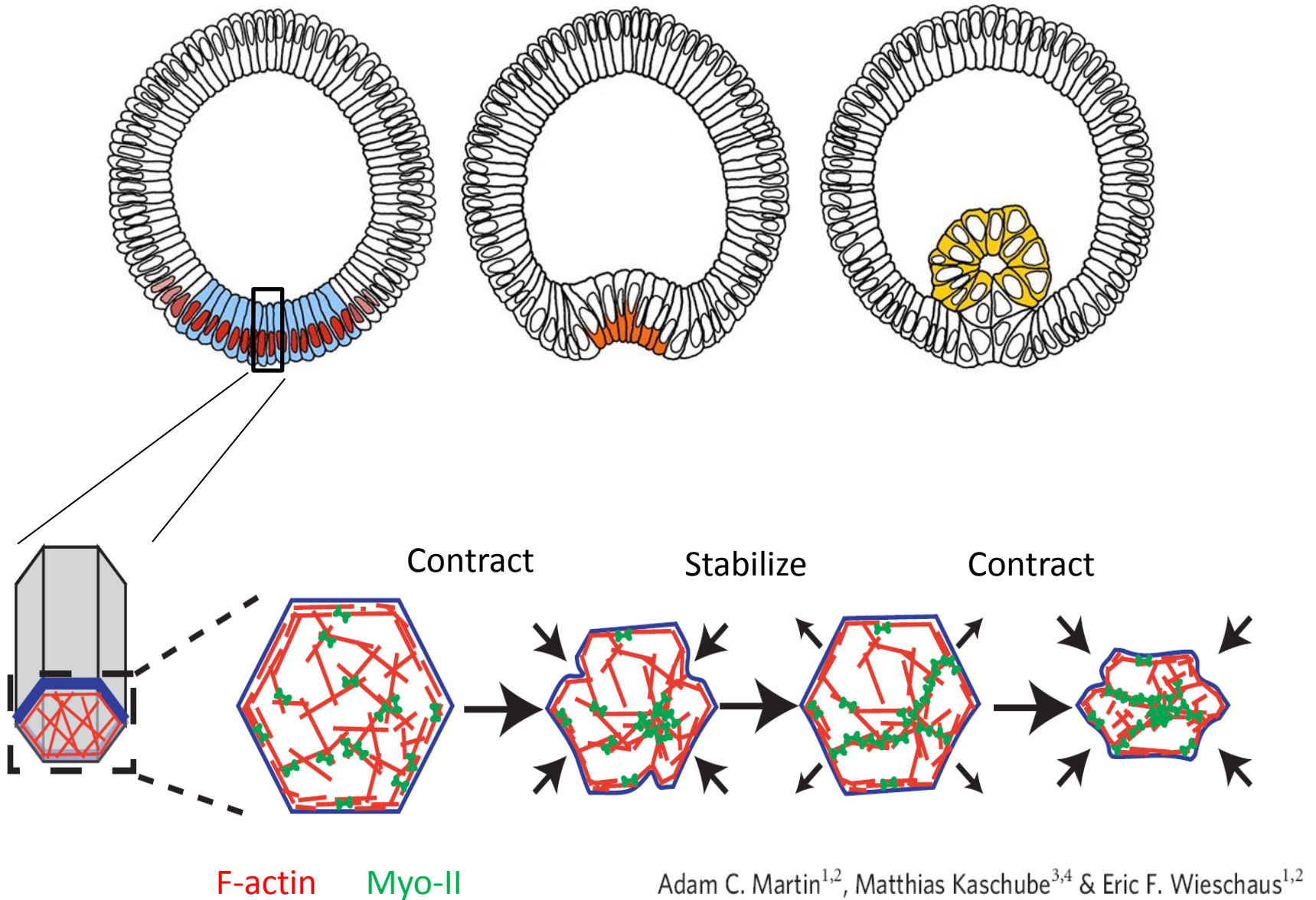
The fate of the other cells is irrelevant

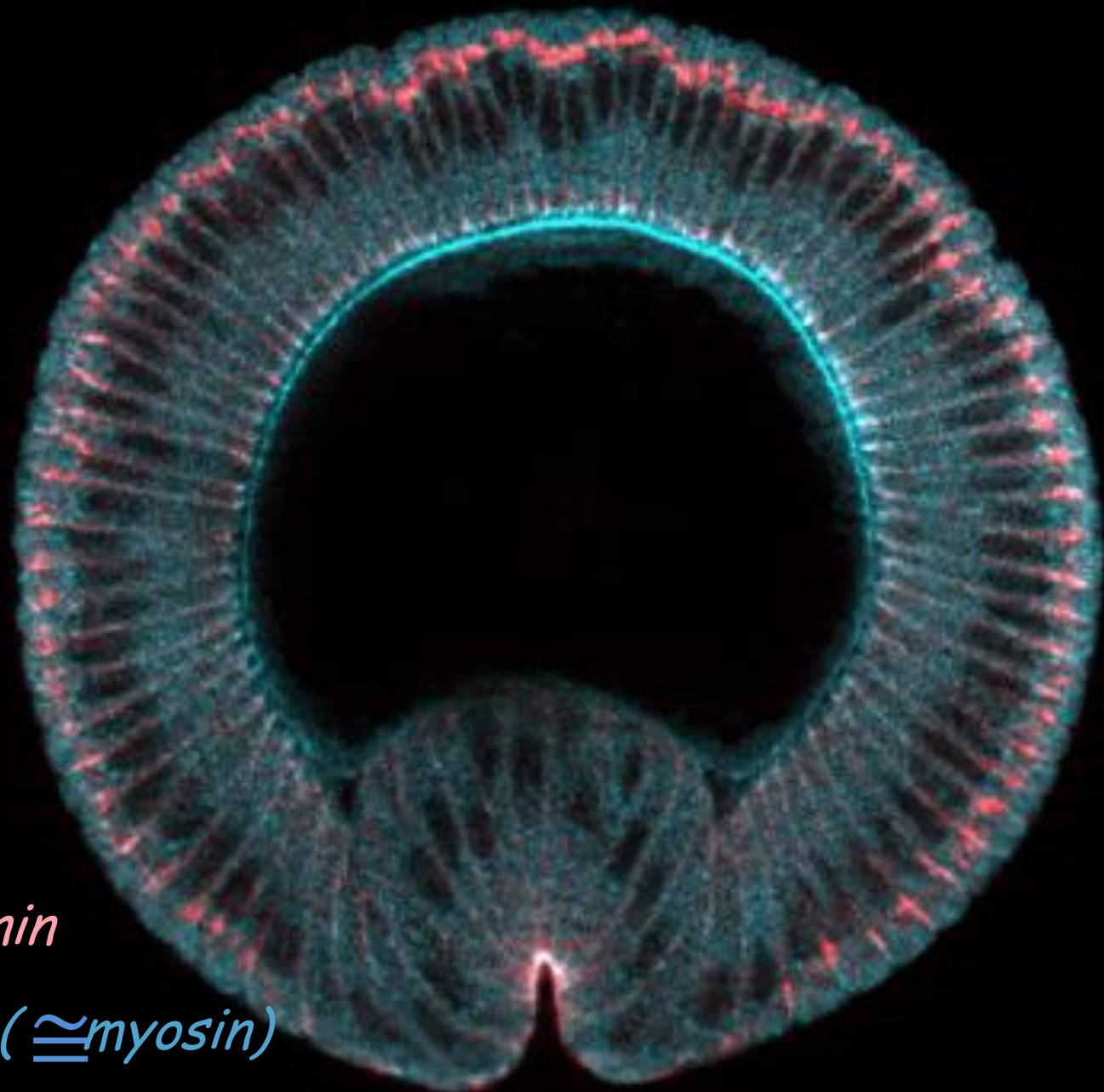


conclusion:

furrow formation is a cell autonomous,
genetically determined process that depends
entirely and exclusively on the events in the
furrow

Current models and experimental data: only on apical constriction





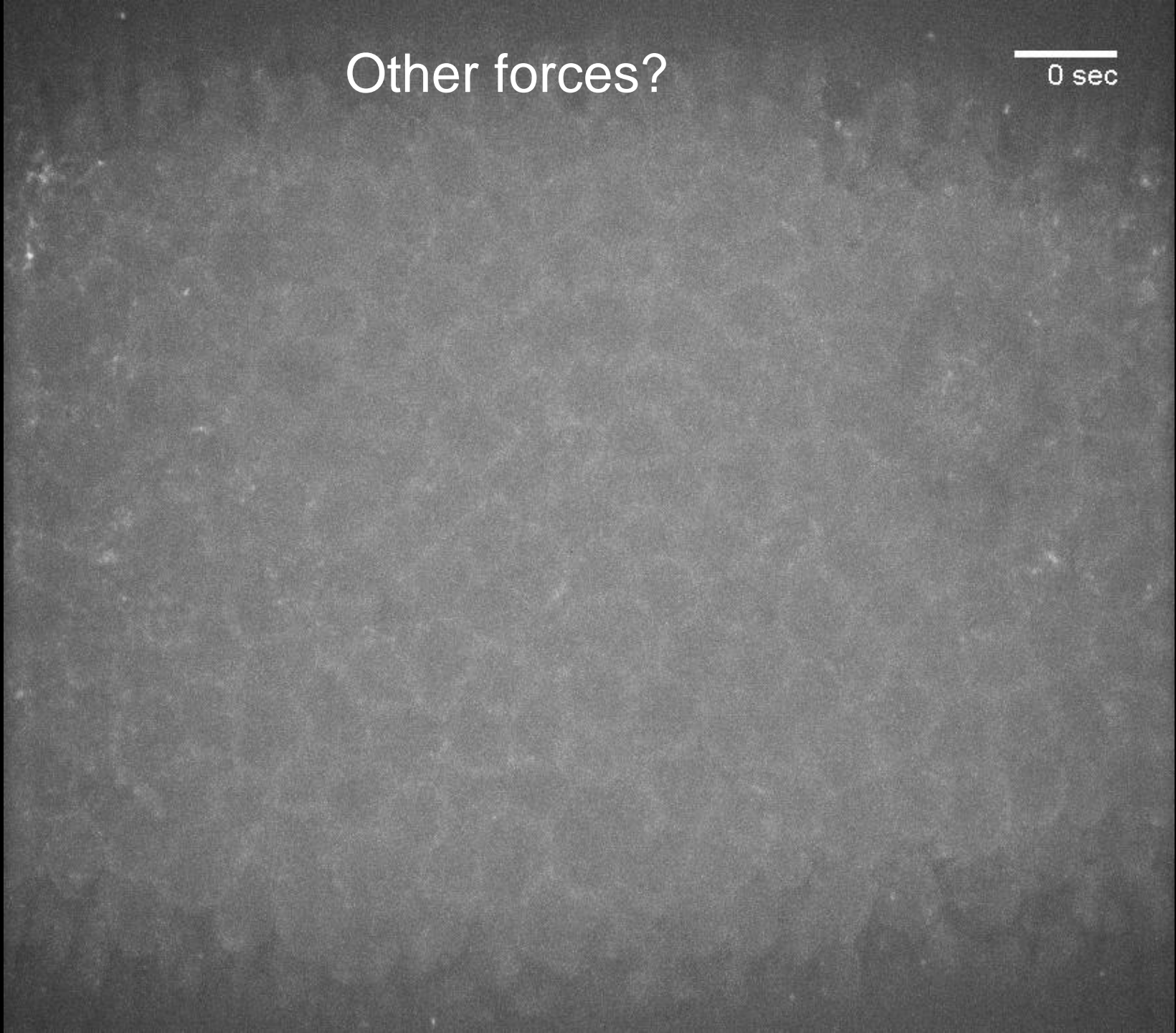
beta-catenin

RhoGEF2 (\cong myosin)

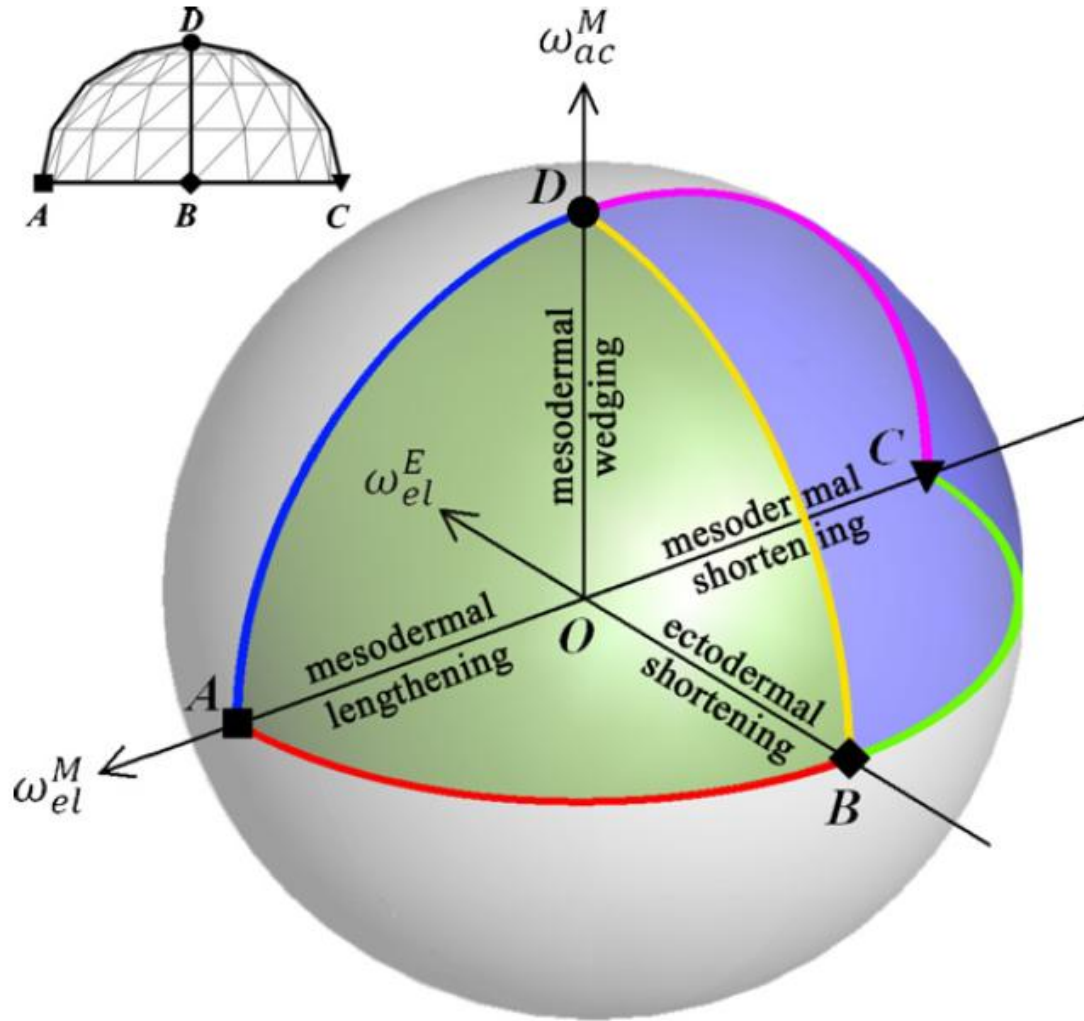
Myo-II

Other forces?

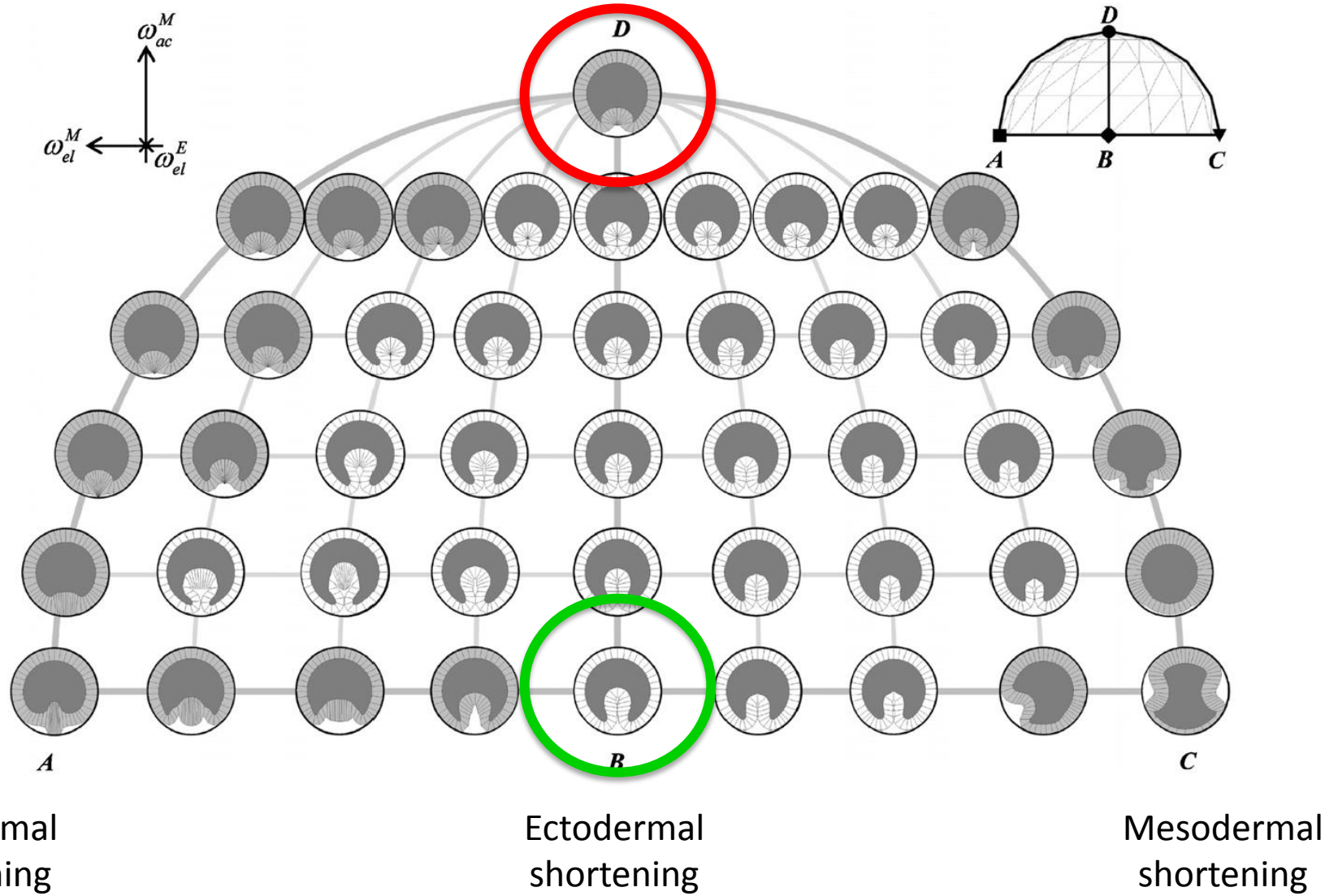
0 sec

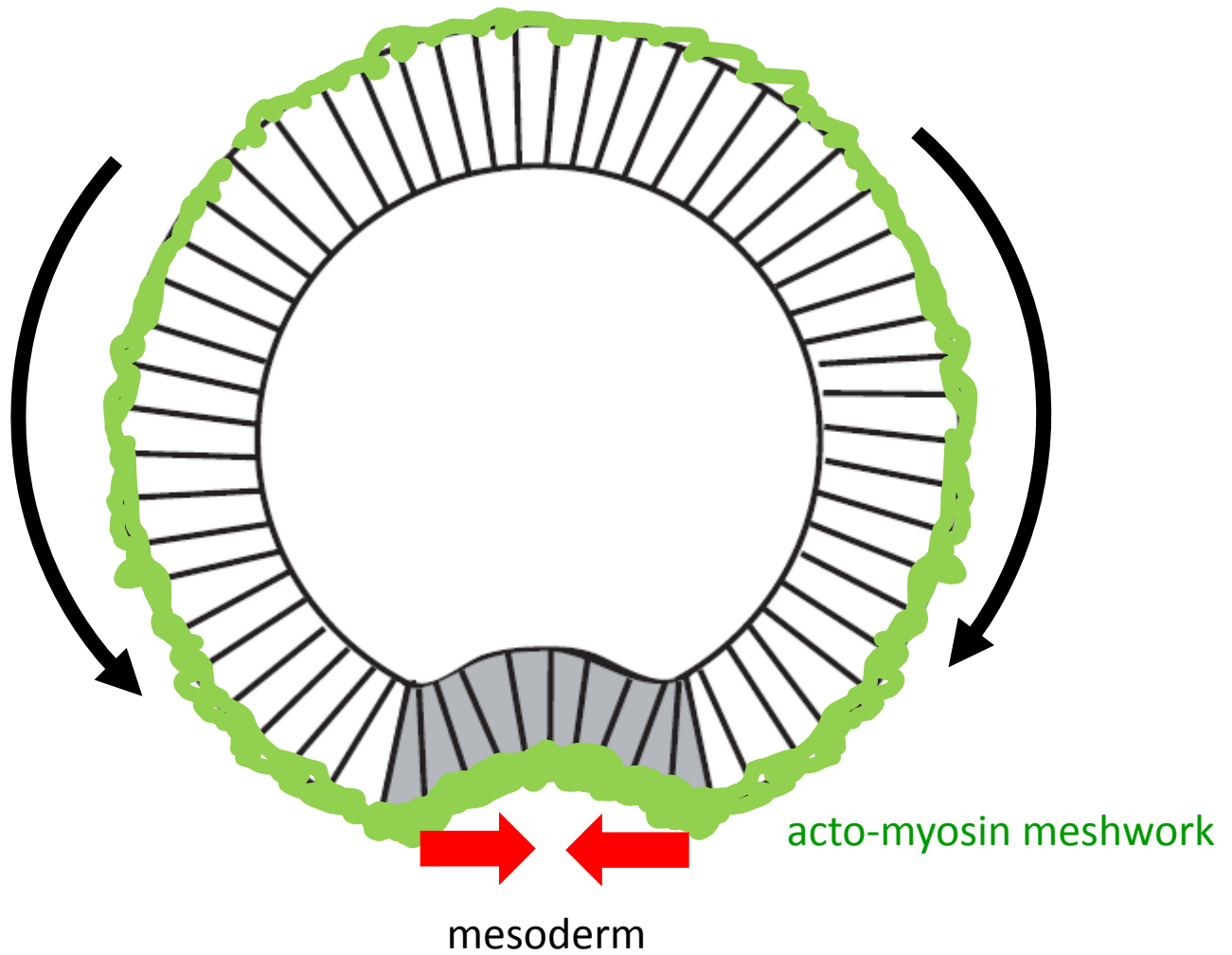


Other forces?



Mesodermal
Apical constriction





Martina Rembold



Matteo Rauzi





VS



wt



Df(3R)ri79c

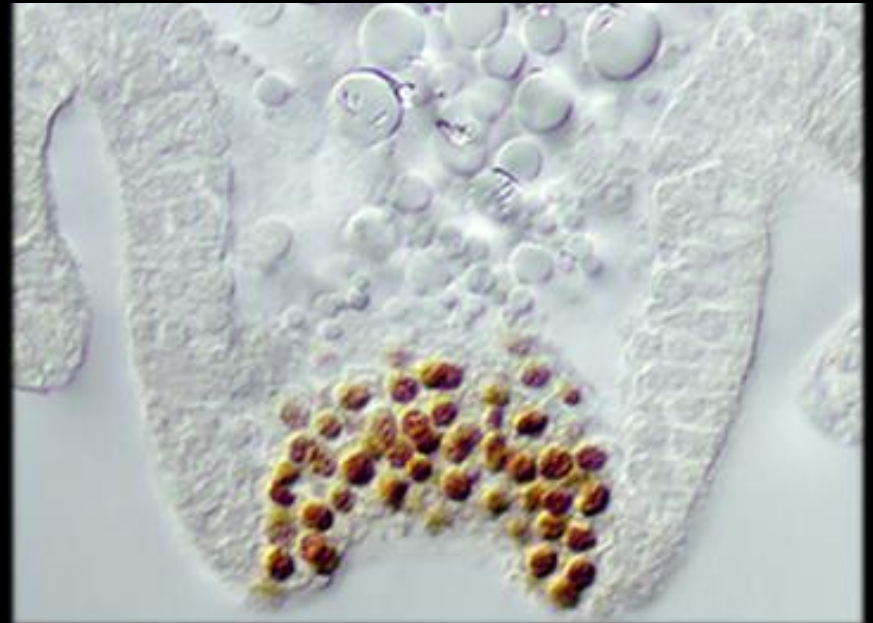
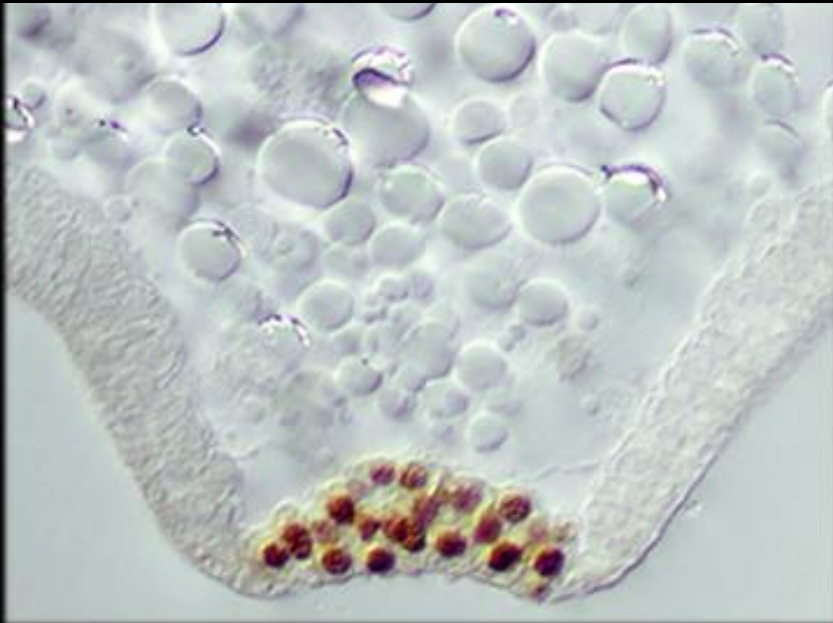


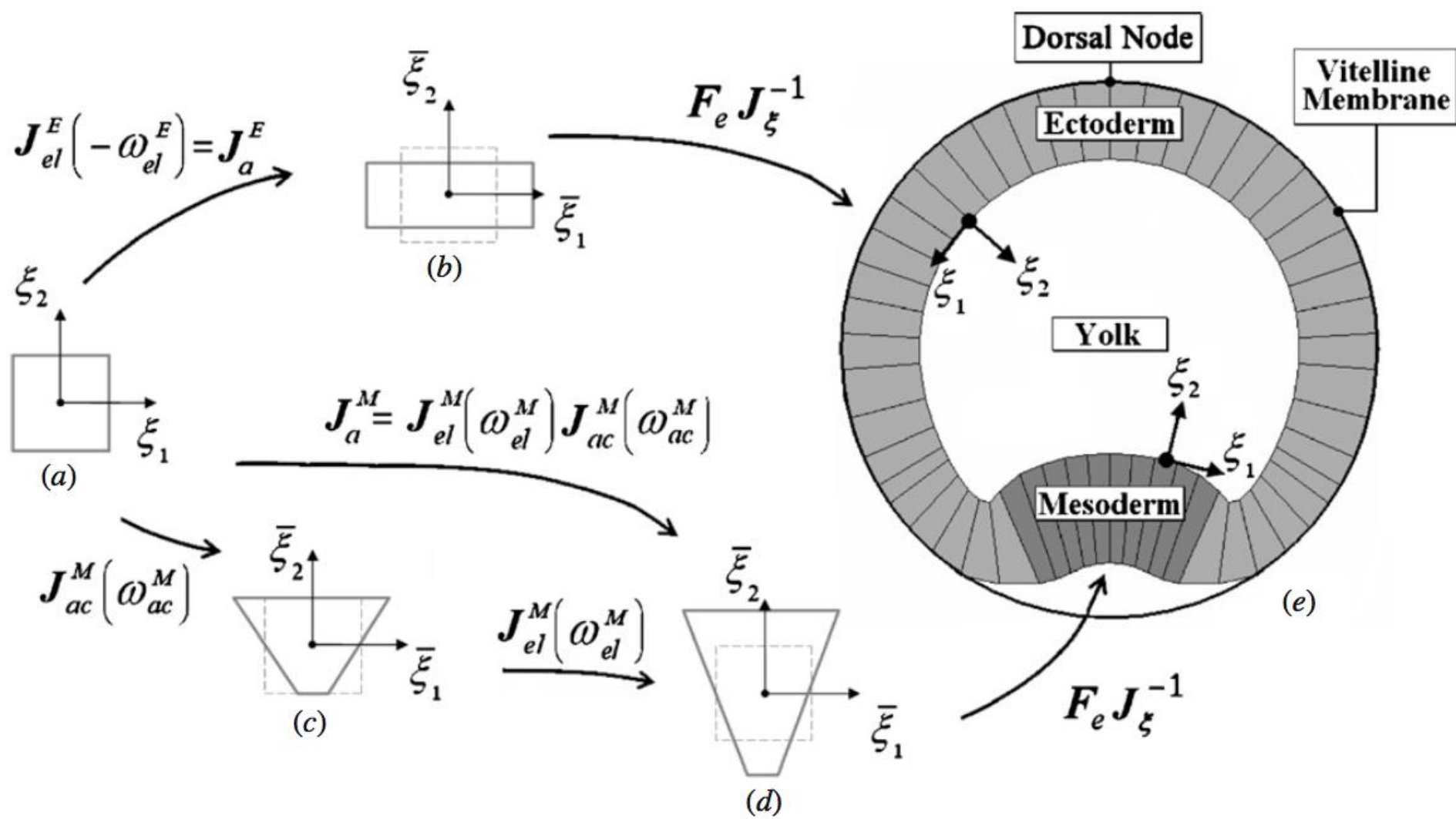
tribbles: required to suppress cell division

fog; t48



Tribolium castaneum Twist





Sara Sigurbjörnsdóttir
Mathew

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Renjith

Imola Aprill

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Matteo Rauzi

