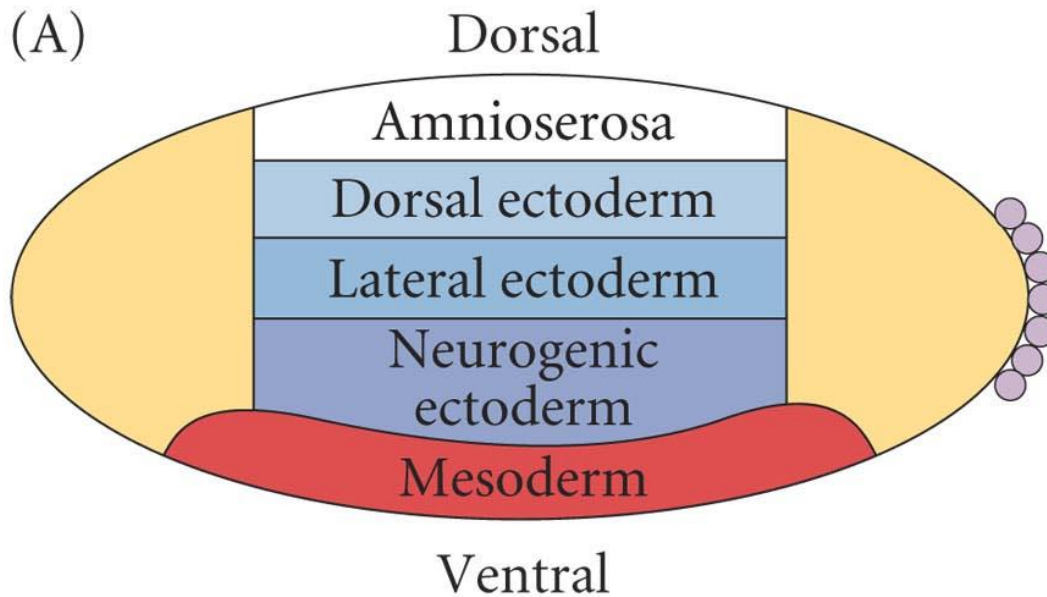


Dorso-ventral patterning

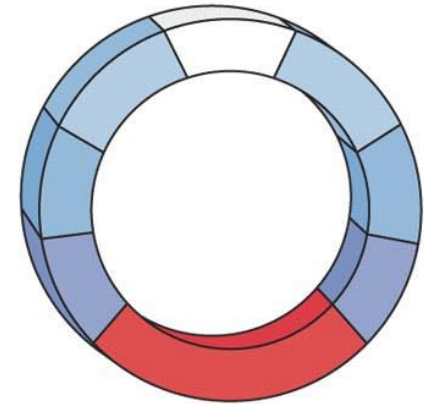
Sem 9.3.B.6
Animal Science

What?

(A)

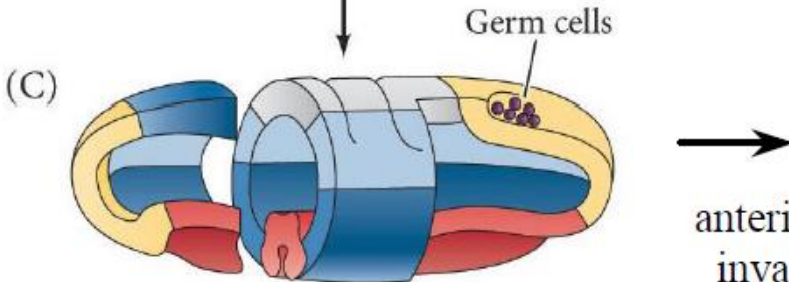
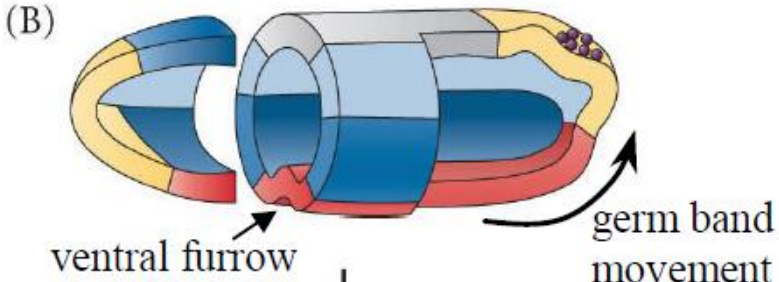
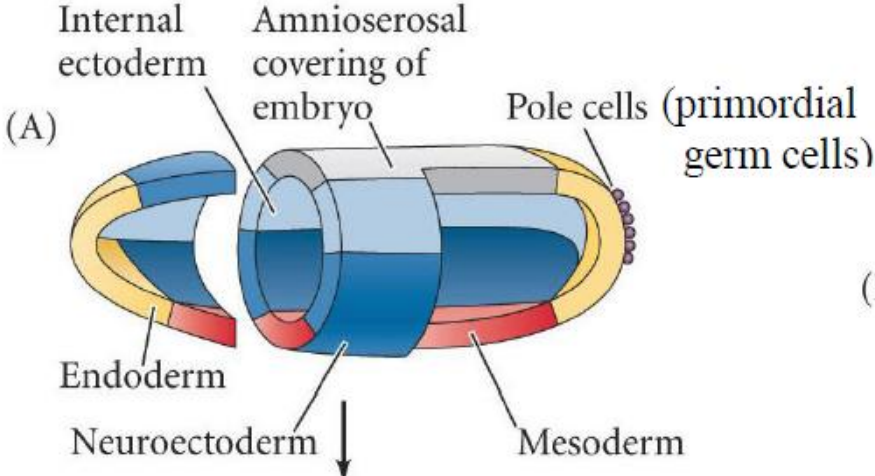


LATERAL VIEW

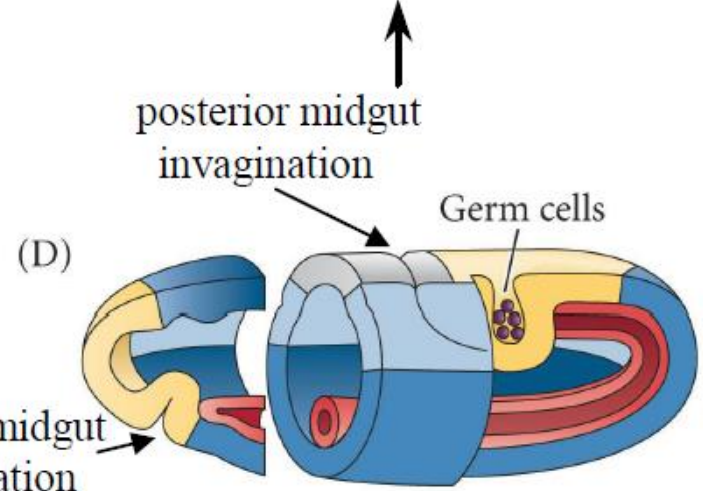
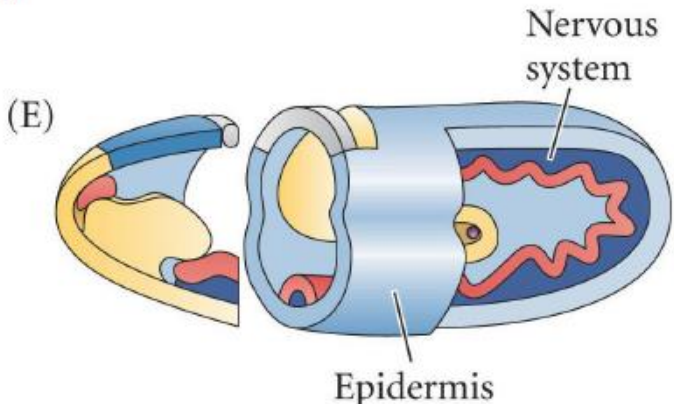


TRANSVERSE SECTION

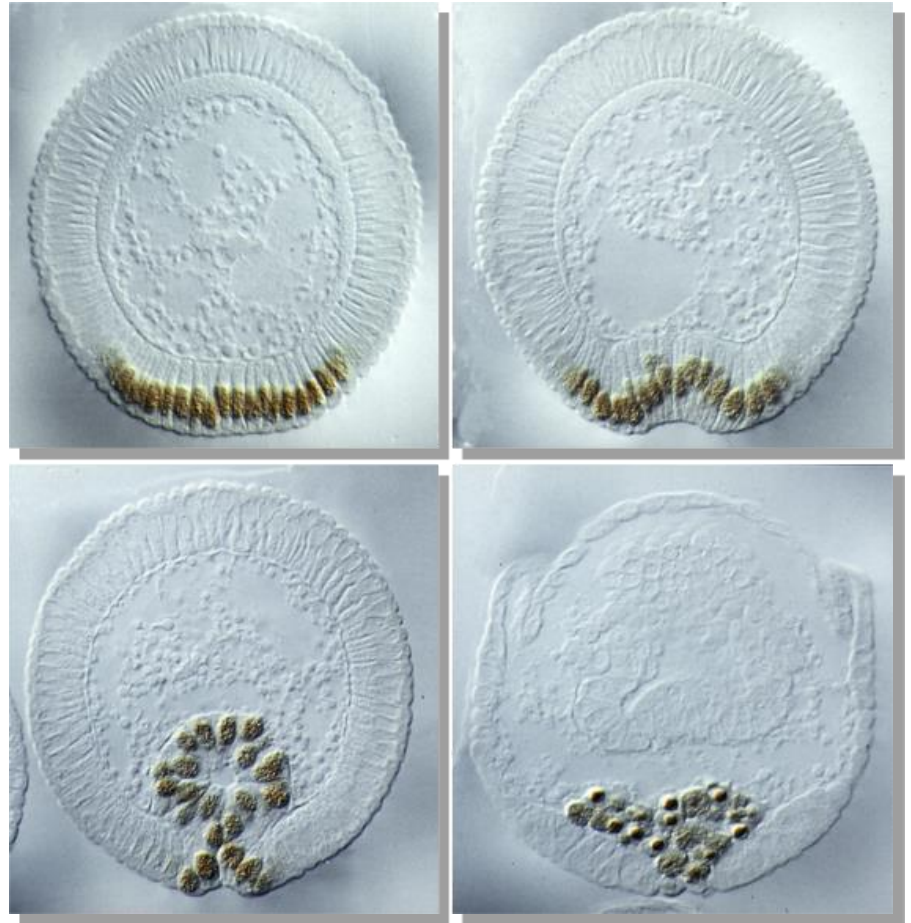
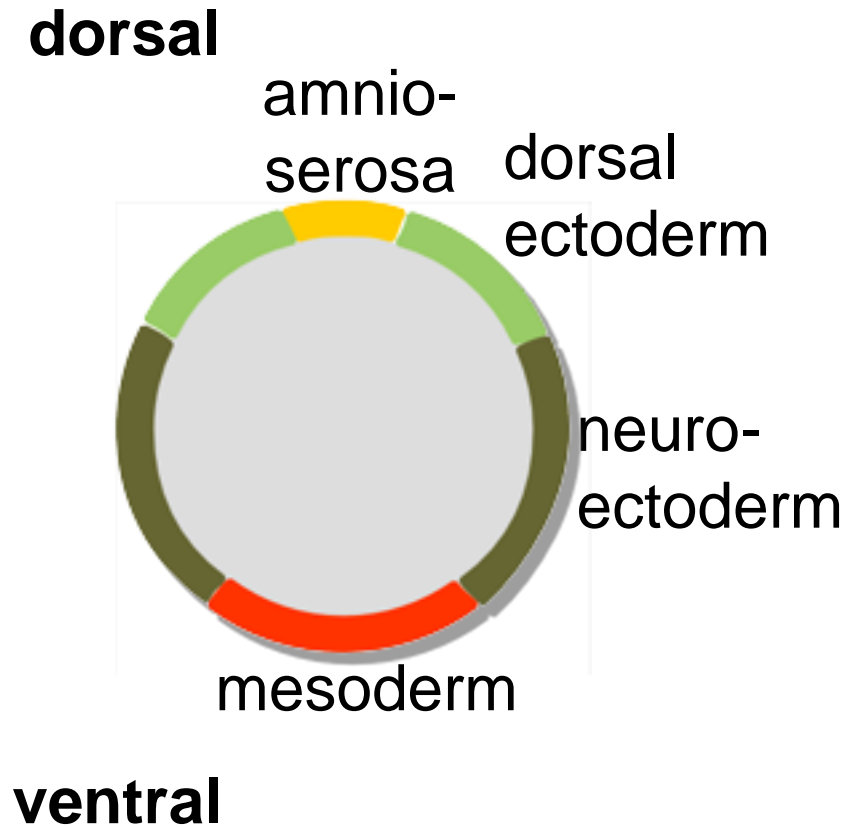
Gastrulation



Remember this?



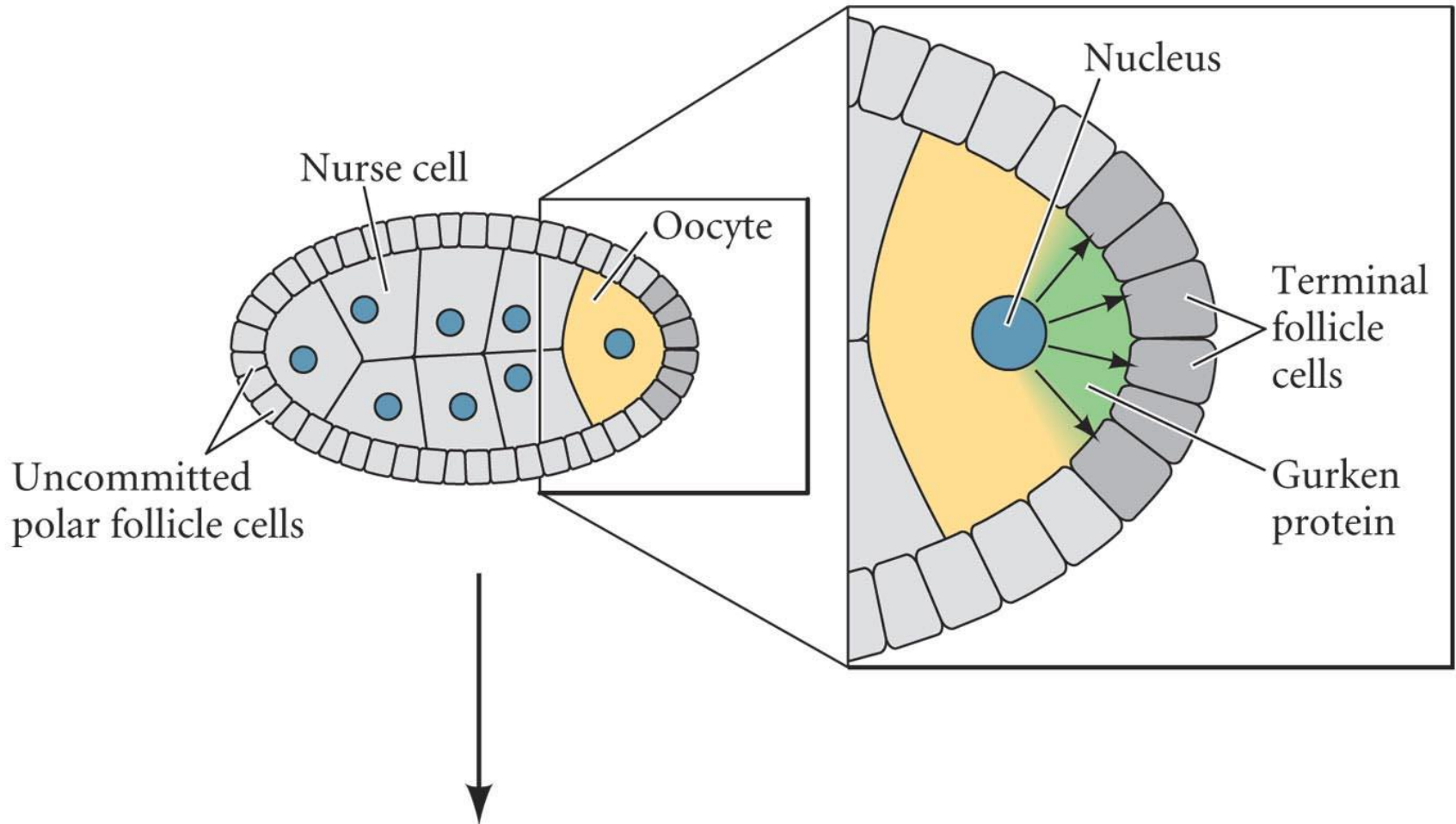
To reiterate



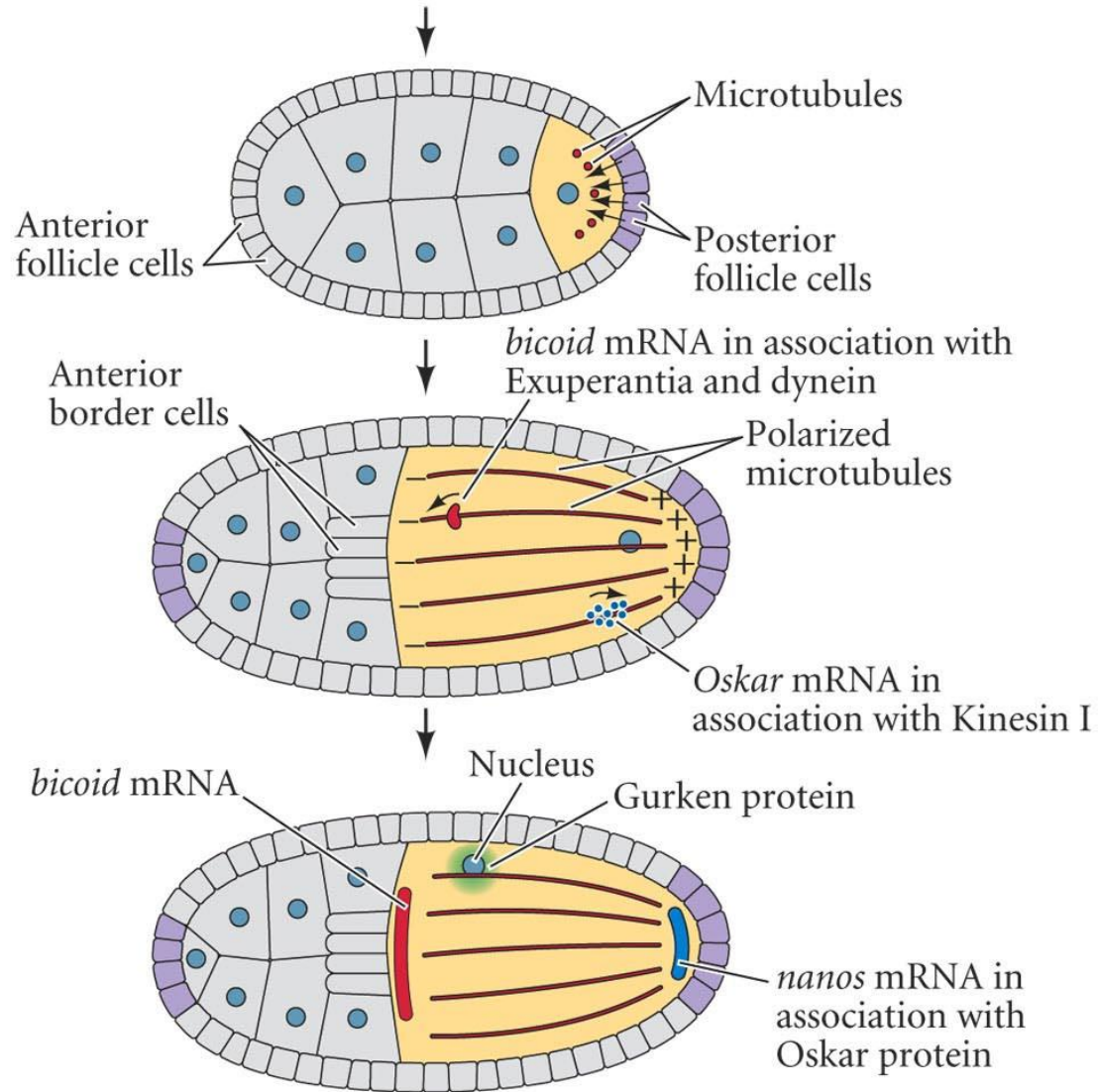
Ventral furrow formation

At first

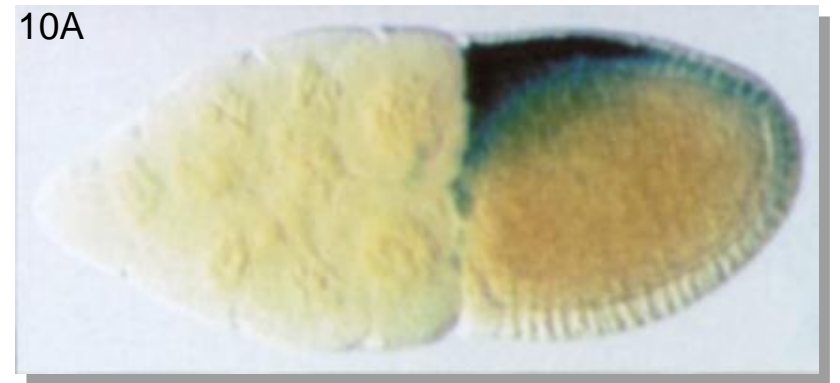
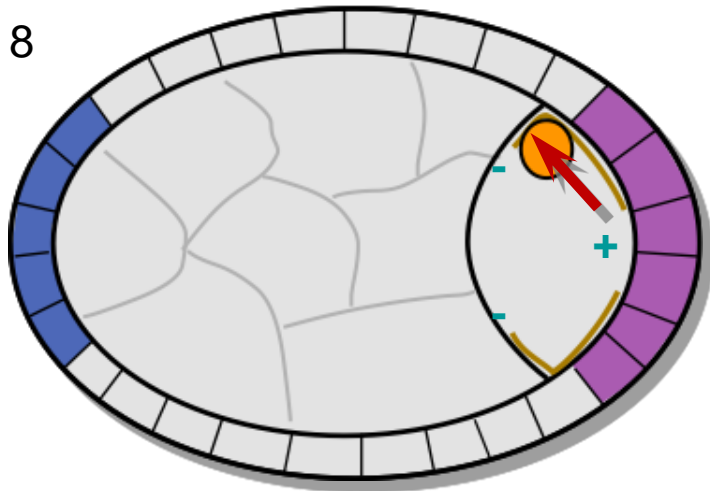
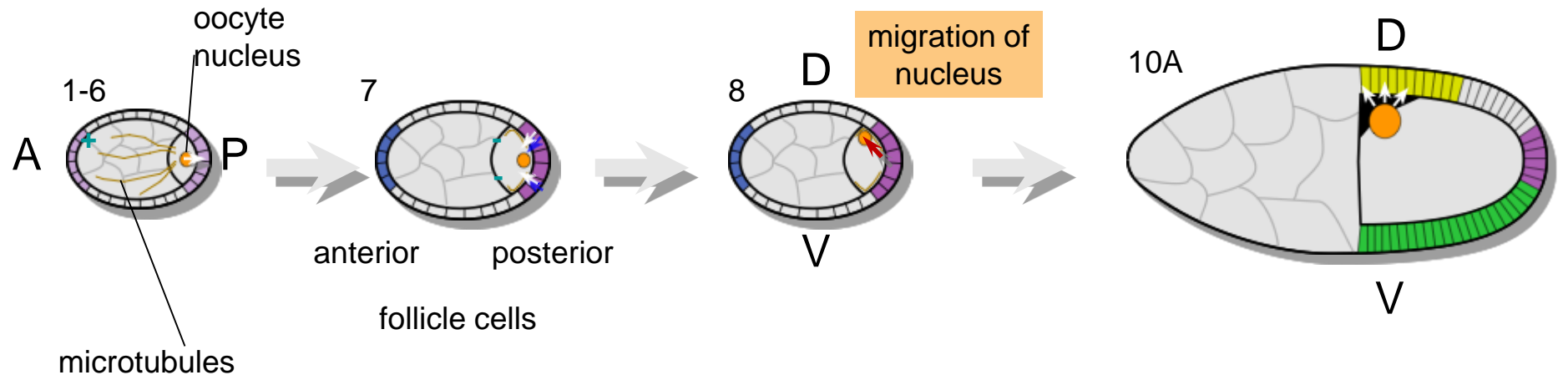
(A)



Then

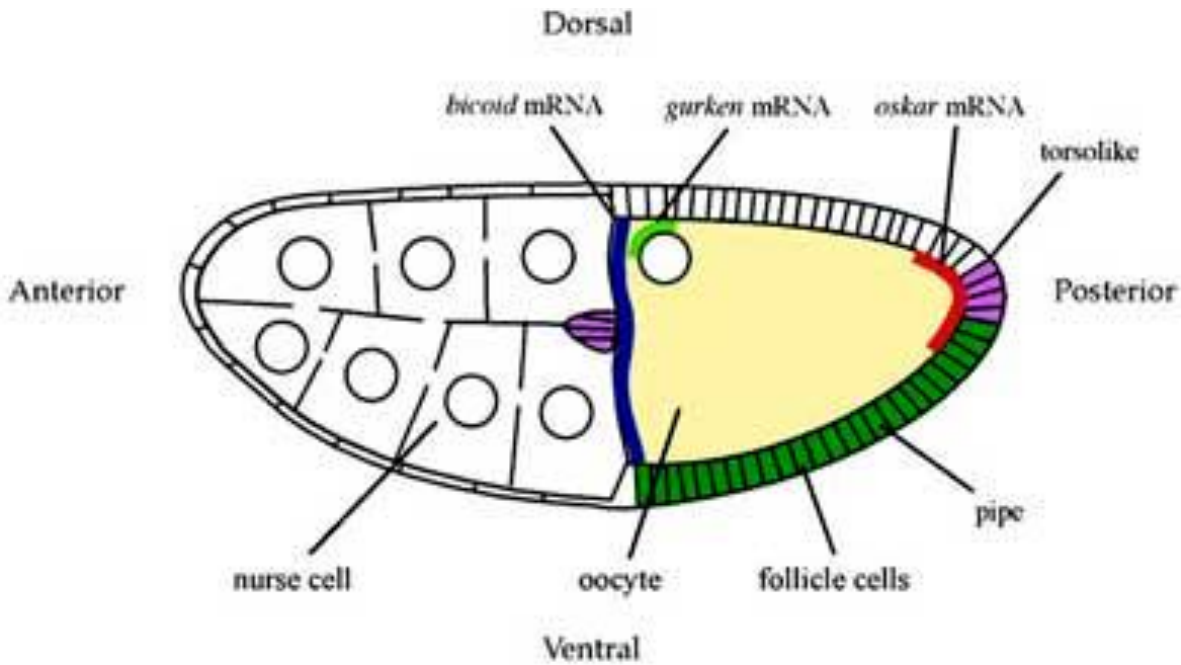


Also



***gurken* expression in the oocyte**

Dorsal



Gurken

Oocyte



Torpedo

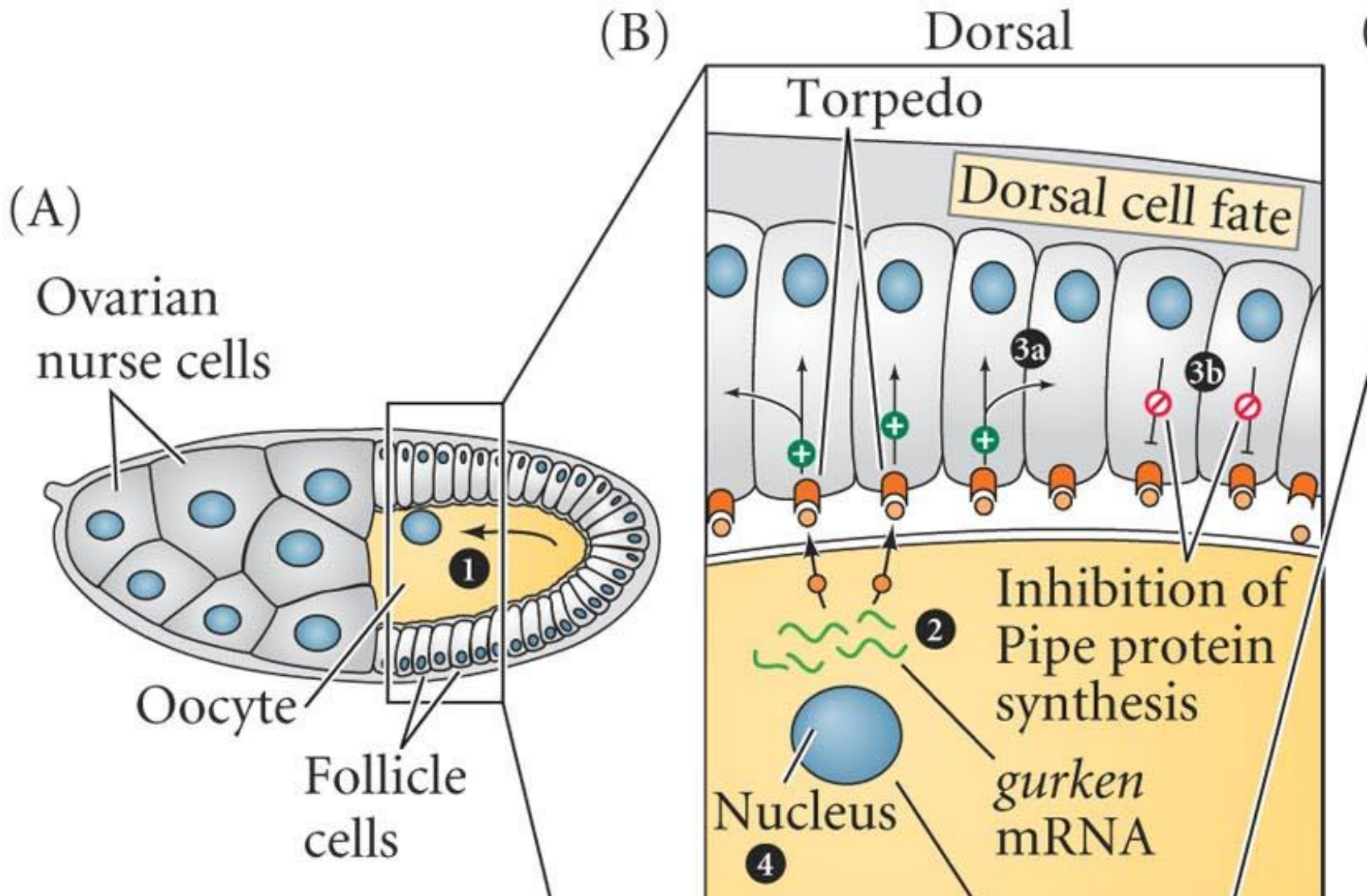
Dorsal FC



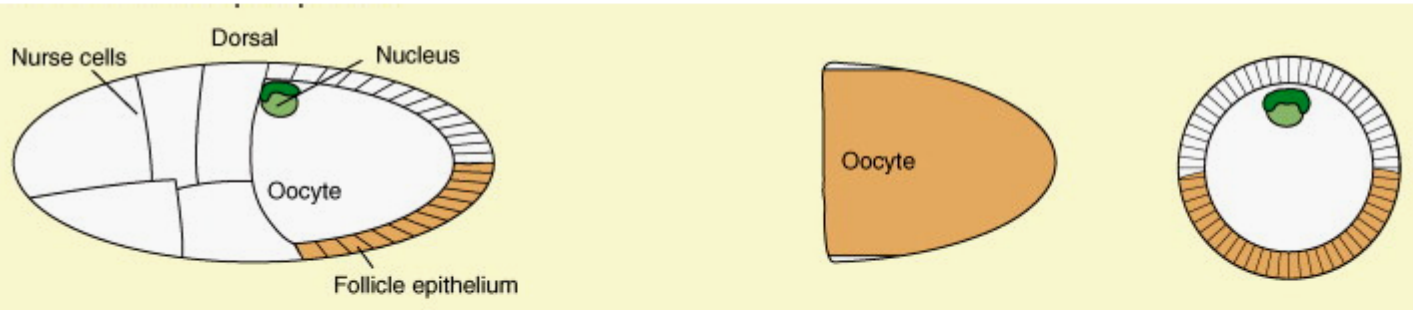
Pipe

Dorsal FC

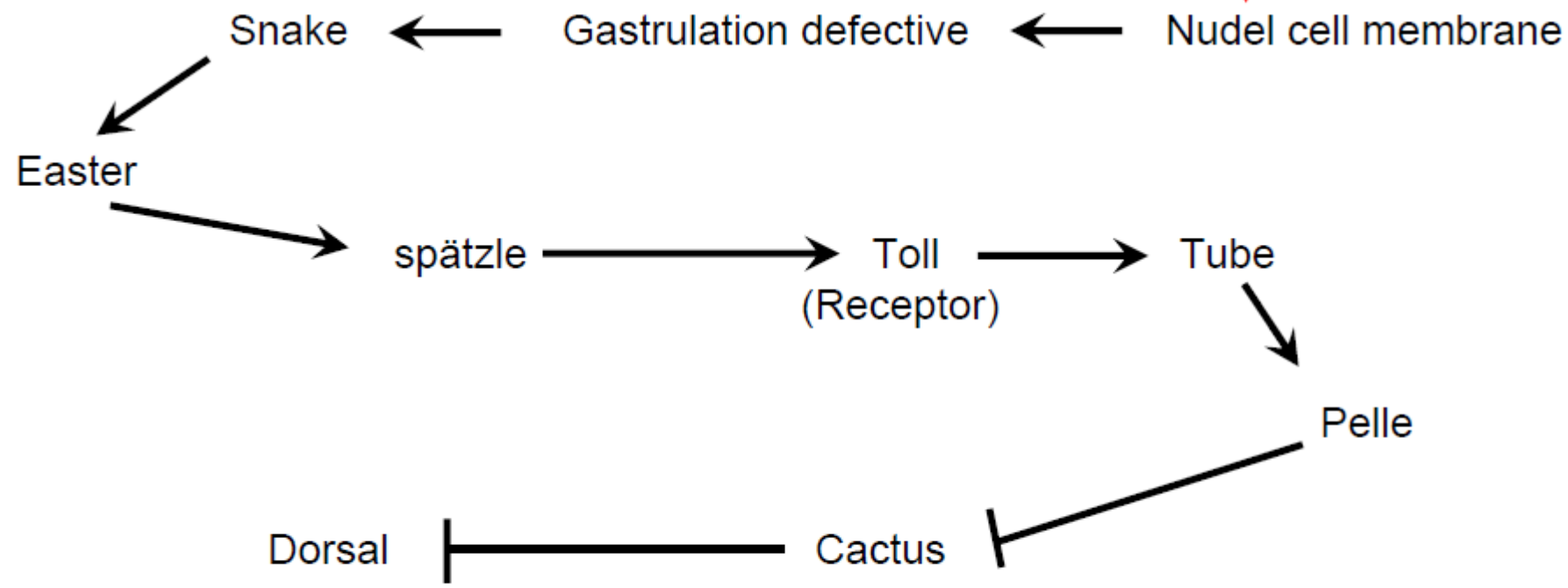
Or



What happens - Ventral

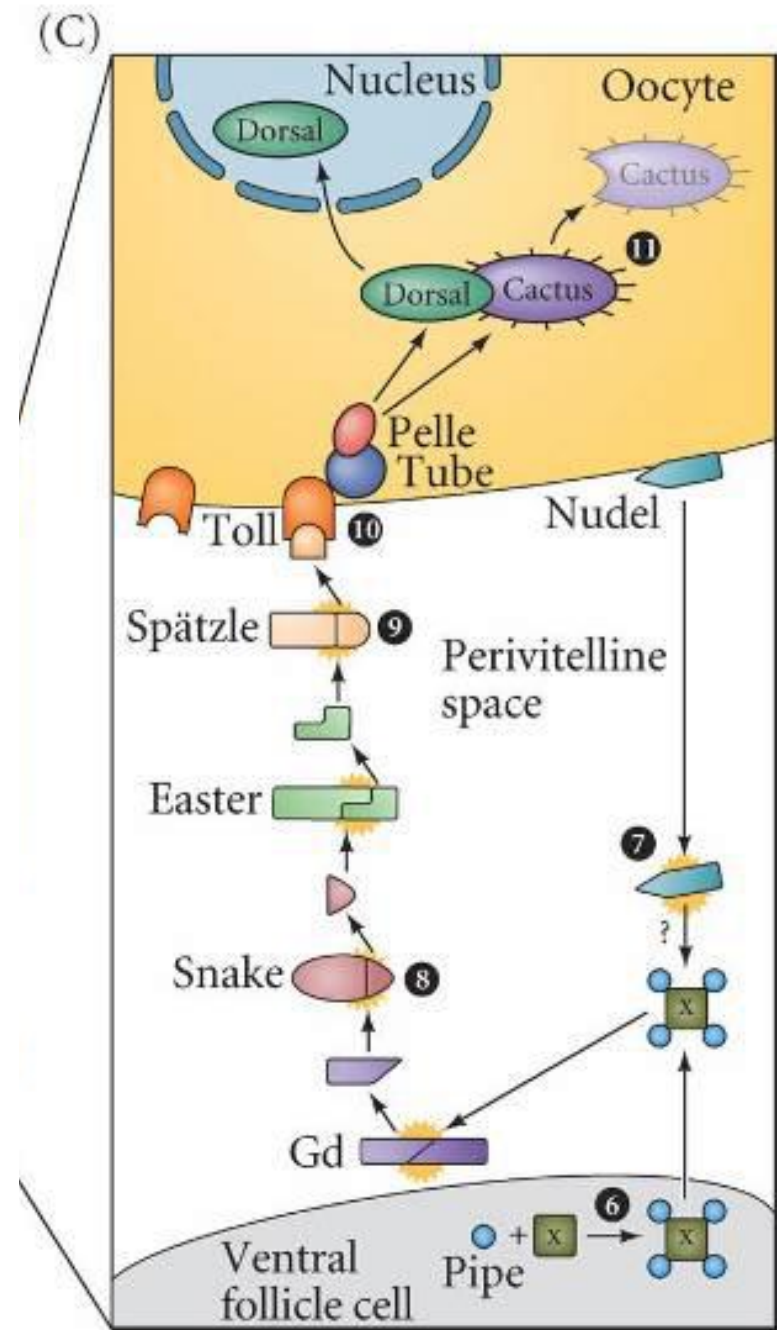


Pipe Ventral FC
 ↓
 Nudel Ventral FC

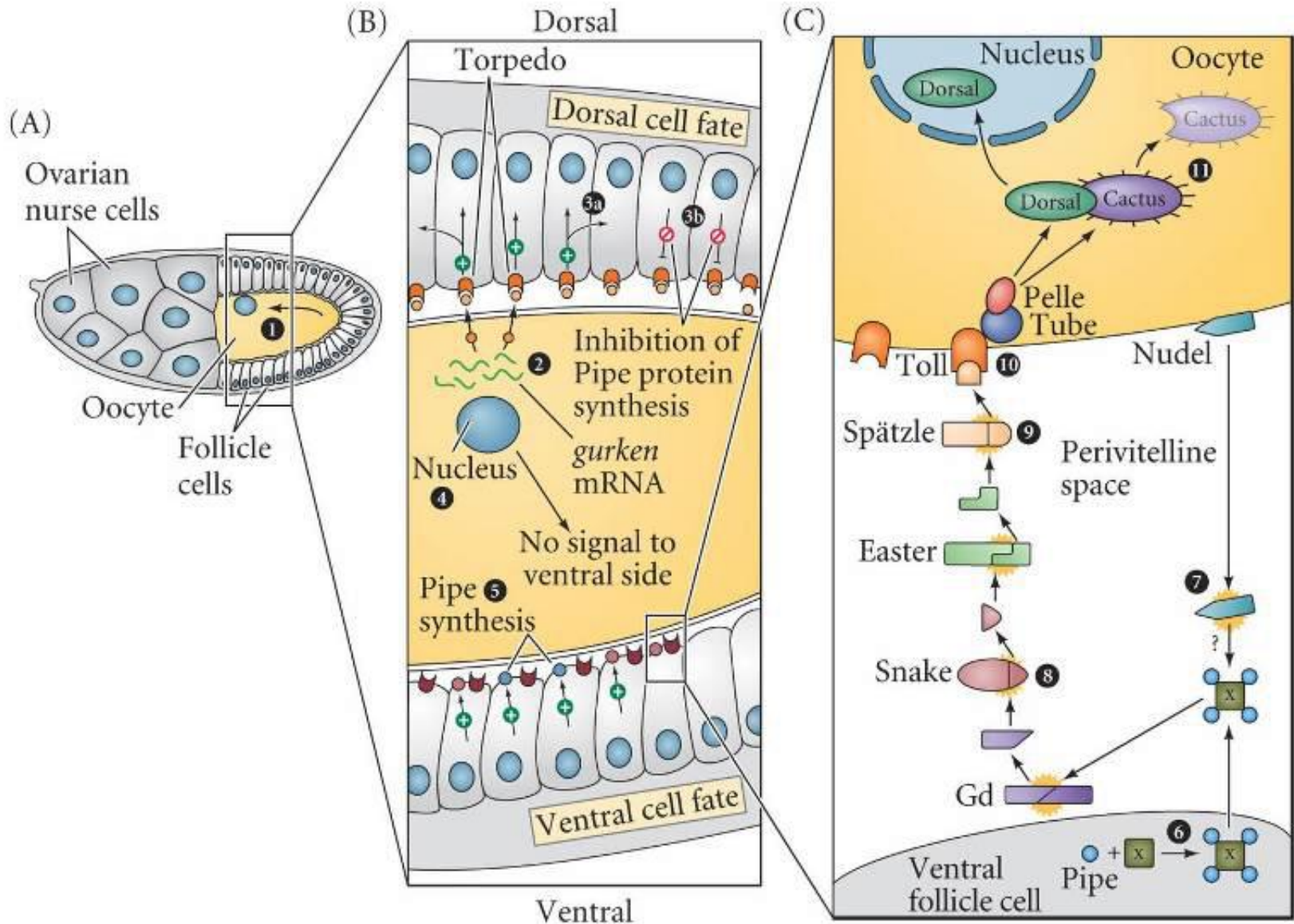


Or

There is nothing to stop pipe at the ventral follicle cells, therefore



In a nut shell

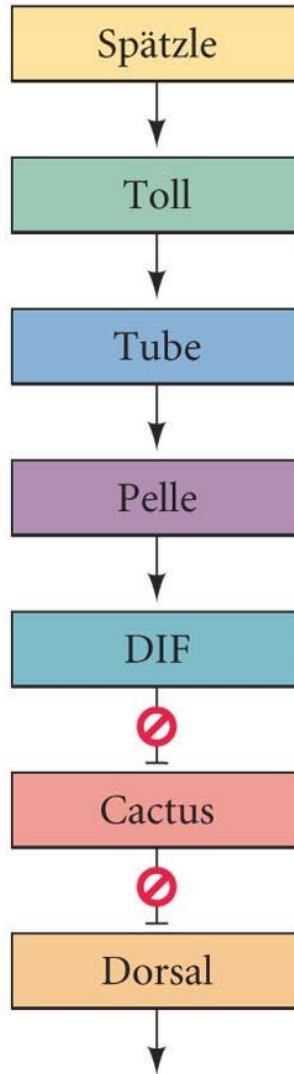


Or

- 1 Oocyte nucleus travels to anterior dorsal side of oocyte. It synthesizes *gurken* mRNA, which remains between the nucleus and the follicle cells.
- 2 *gurken* messages are translated. The Gurken protein is received by Torpedo proteins during mid-oogenesis.
- 3a Torpedo signal causes follicle cells to differentiate to a dorsal morphology.
- 3b Synthesis of Pipe protein is inhibited in dorsal follicle cells.
- 4 Gurken protein does not diffuse to ventral side.
- 5 Ventral follicle cells synthesize Pipe protein.
- 6 In ventral follicle cells, Pipe completes the modification of an unknown factor (x).
- 7 Nudel and factor (x) interact to split the Gastrulation-deficient (Gd) protein.
- 8 The activated Gd protein splits the Snake protein, and the activated Snake protein cleaves the Easter protein.
- 9 The activated Easter protein splits Spätzle; activated Spätzle binds to Toll receptor protein.
- 10 Toll activation activates Tube and Pelle, which phosphorylate the Cactus protein. Cactus is degraded, releasing it from Dorsal.
- 11 Dorsal protein enters the nucleus and ventralizes the cell.

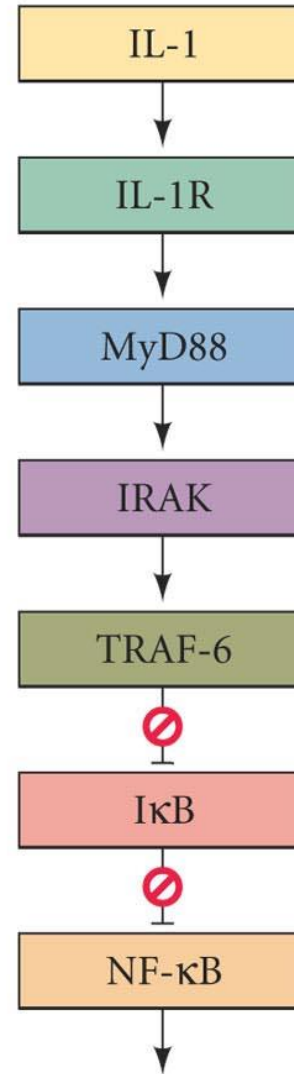
Note

(A) *Drosophila*



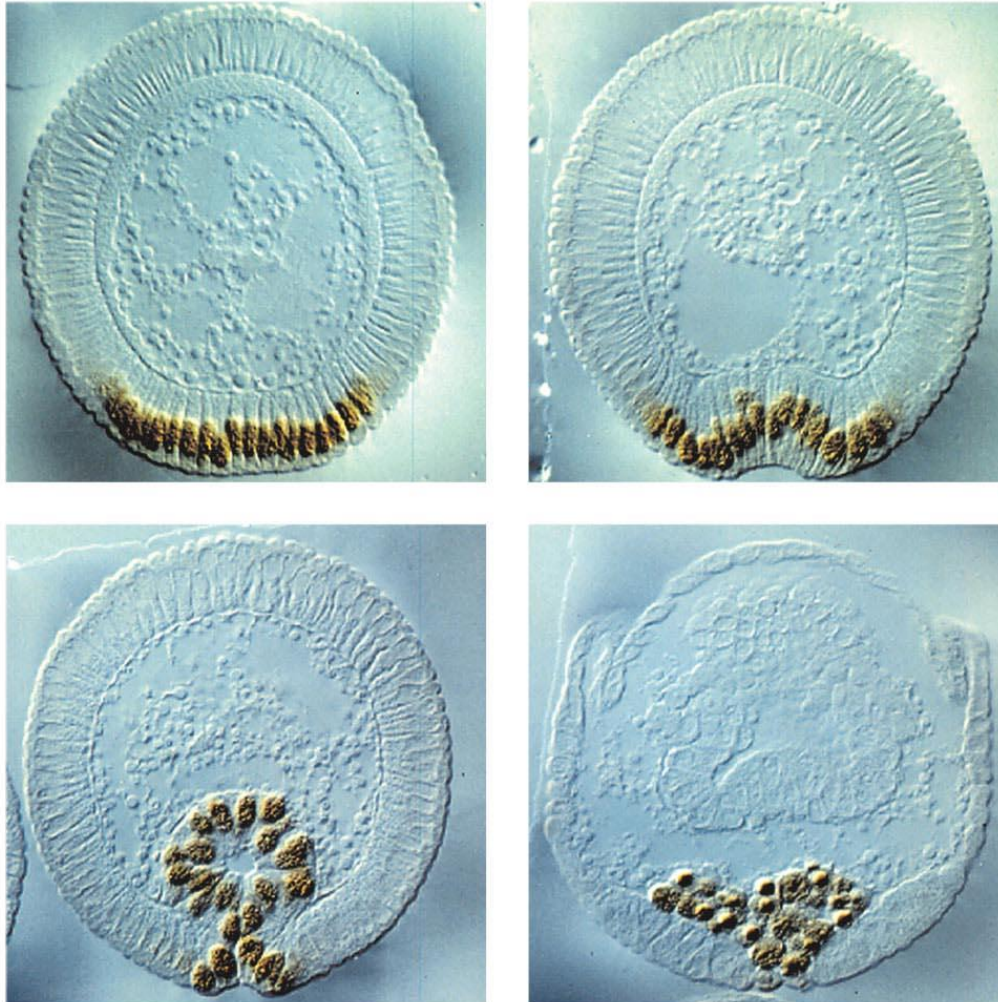
Ventralizing proteins

(B) Mammals

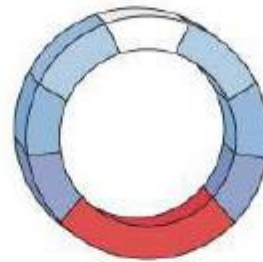
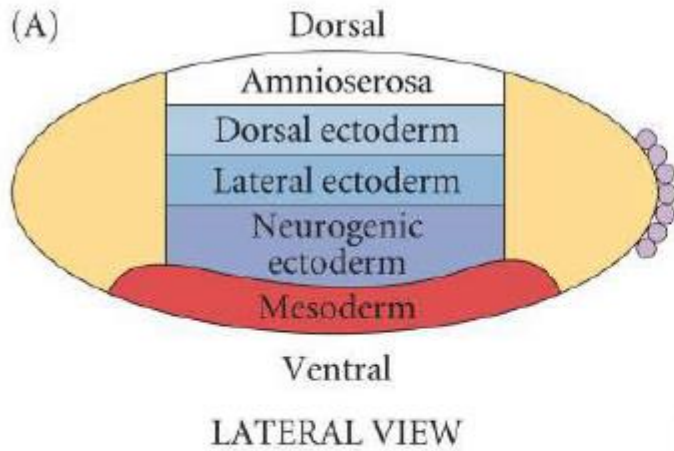


Inflammatory cytokines

Cells with highest nuclear Dorsal levels become mesoderm



dorsal



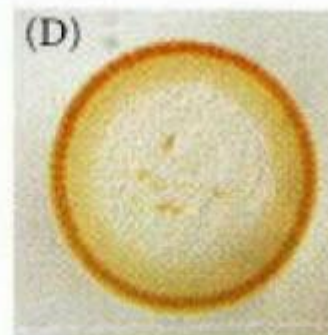
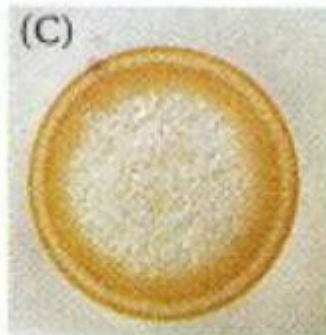
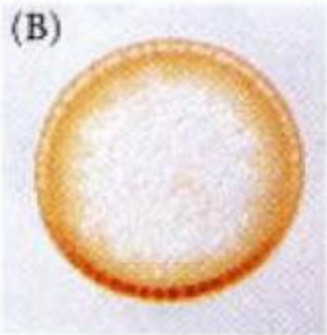
dorsal Amnioserosa

dorsal Dorsal Ectoderm

dorsal Lateral Ectoderm

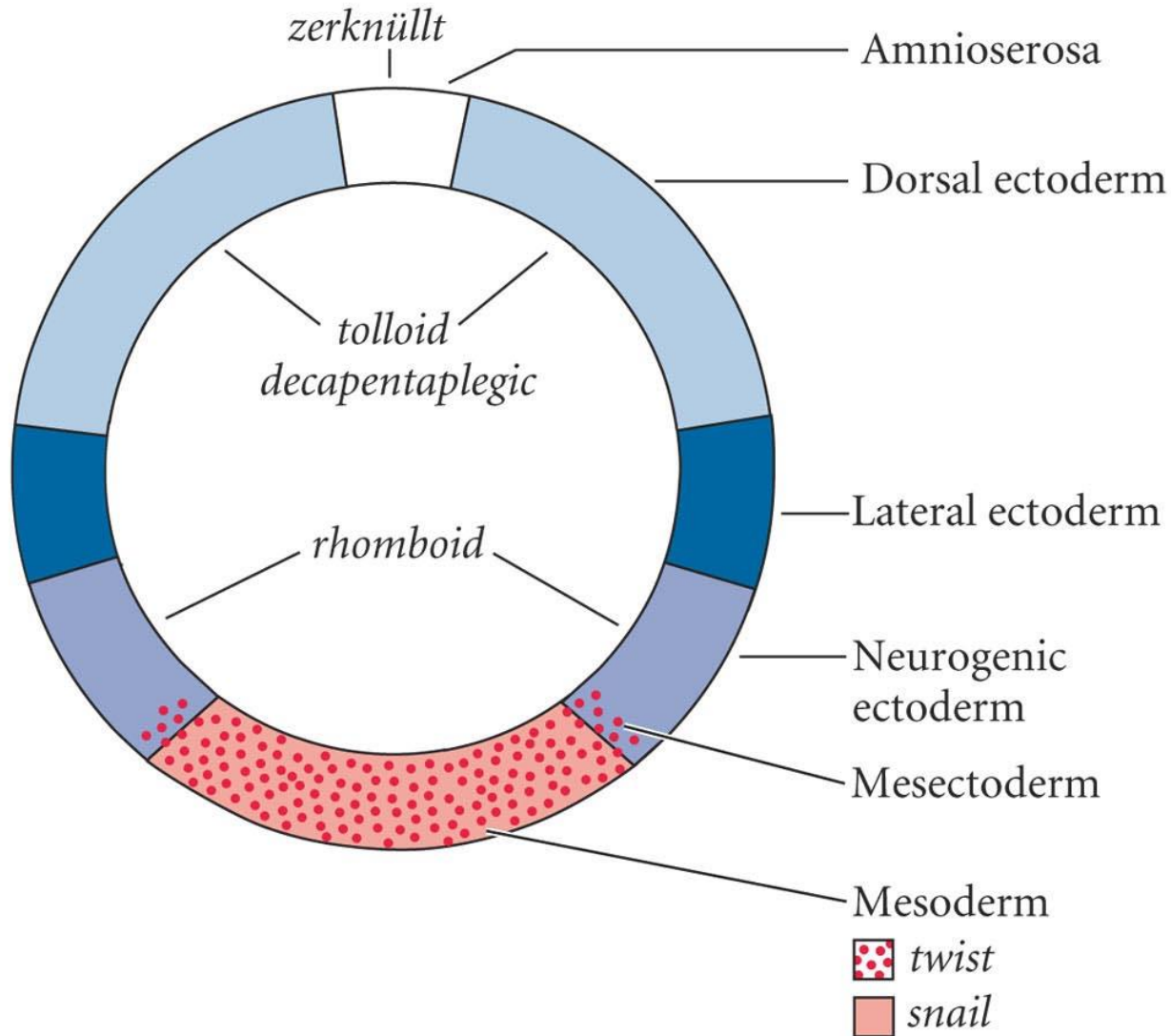
dorsal Neurogenic ectoderm

dorsal Mesoderm



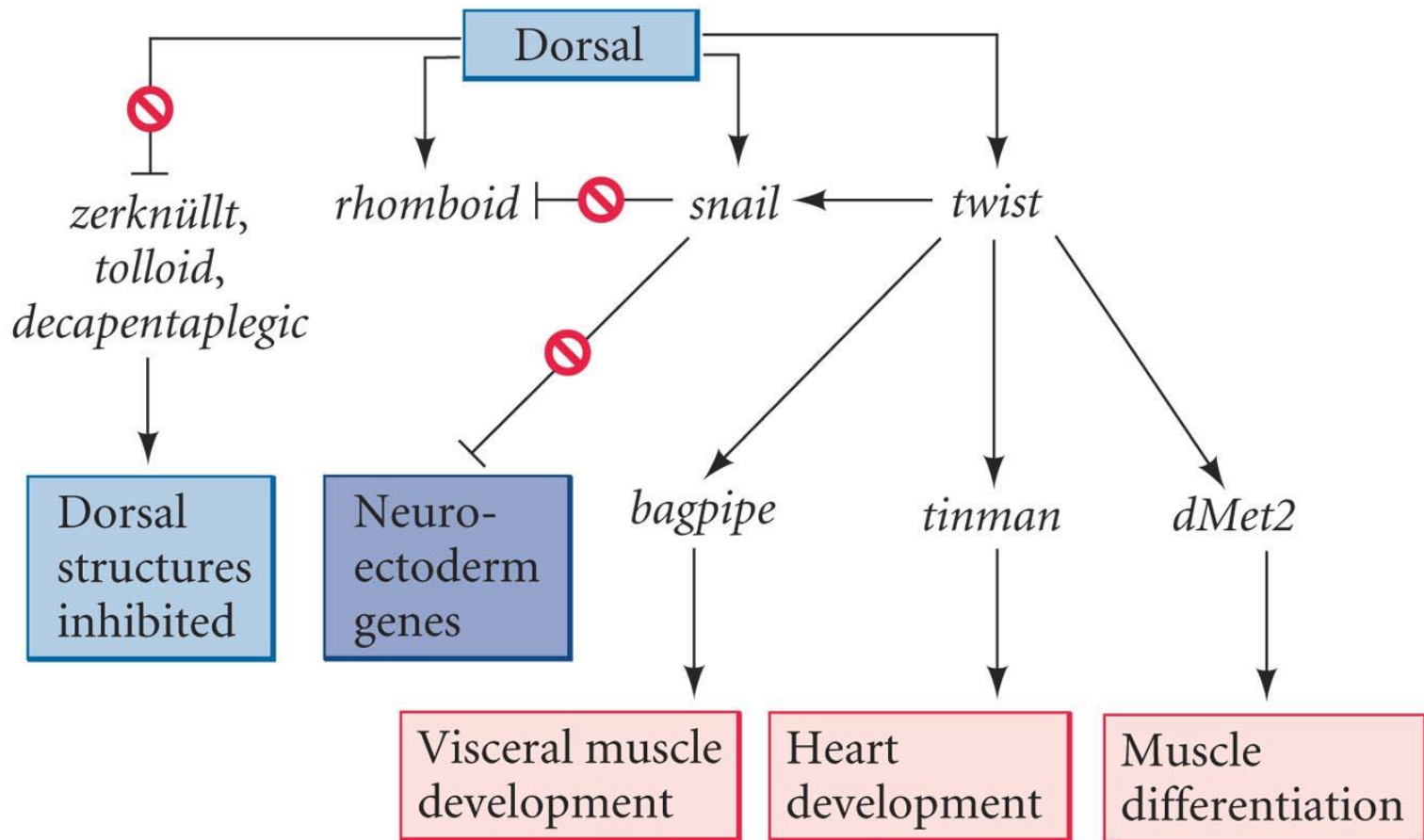
Zygotically expressed genes

(A) DORSAL PATTERNING

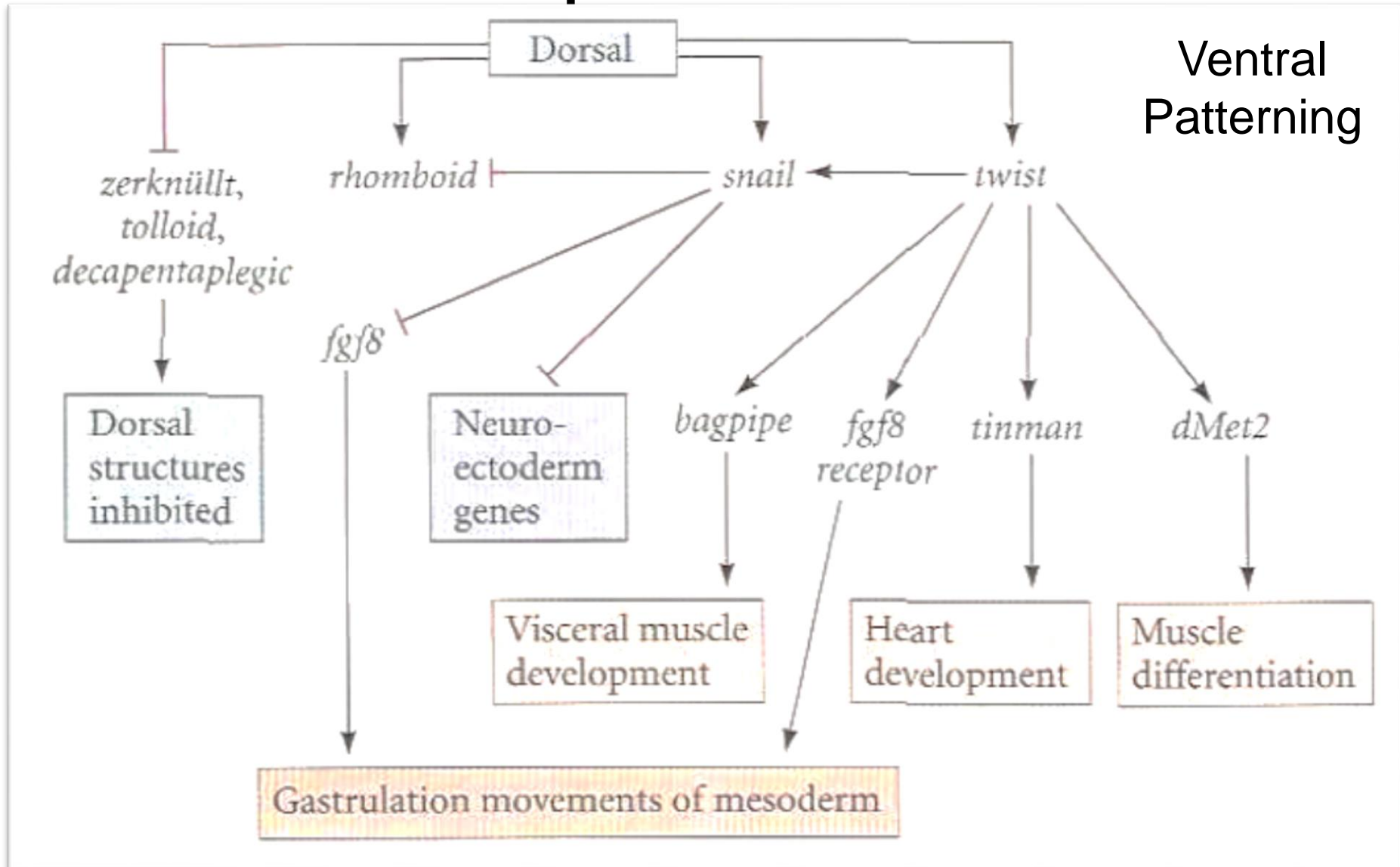


Action of Dorsal protein in ventral cells

(B) VENTRAL PATTERNING

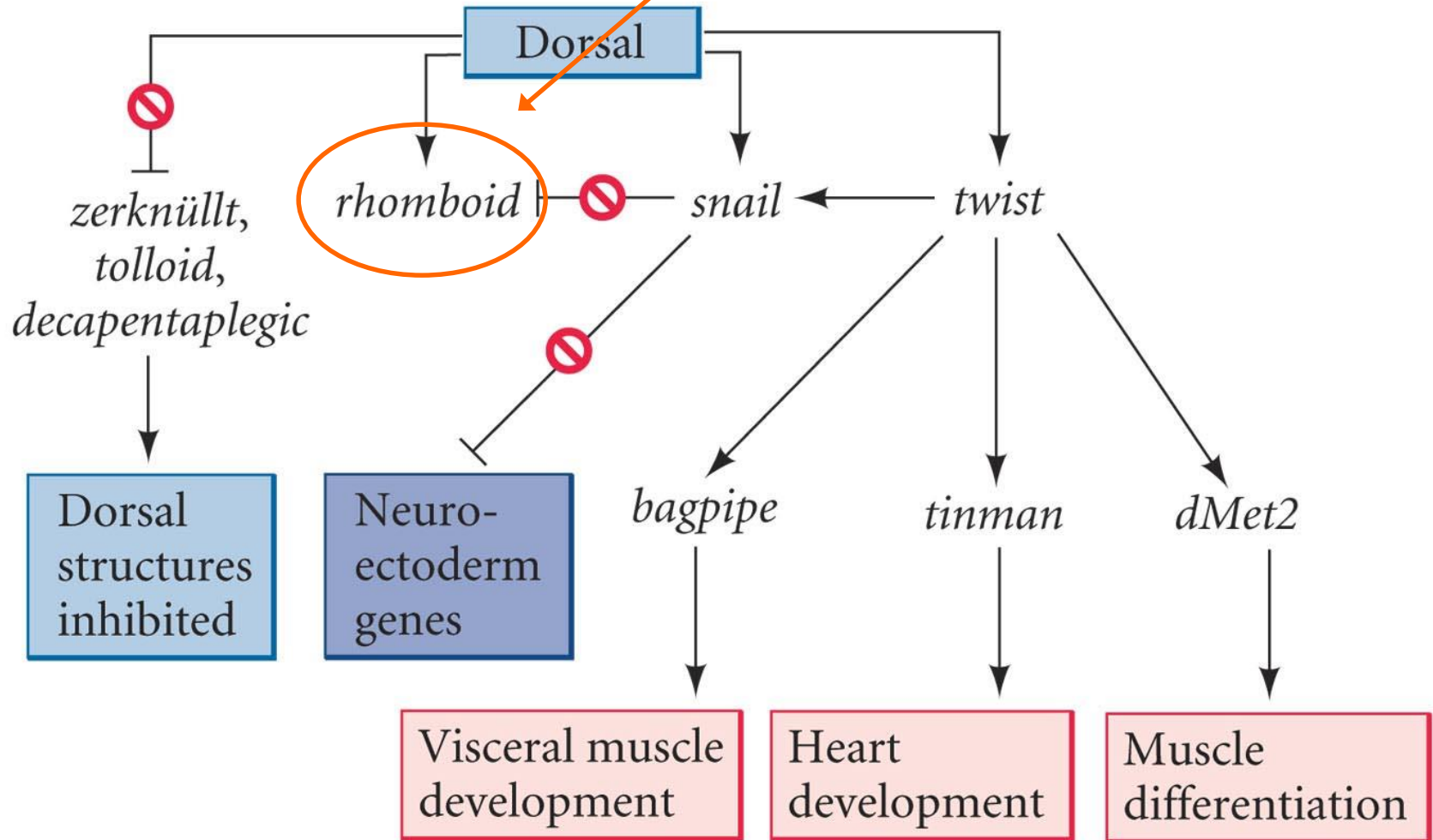


Action of Dorsal protein in ventral cells – Updated at 9th Ed



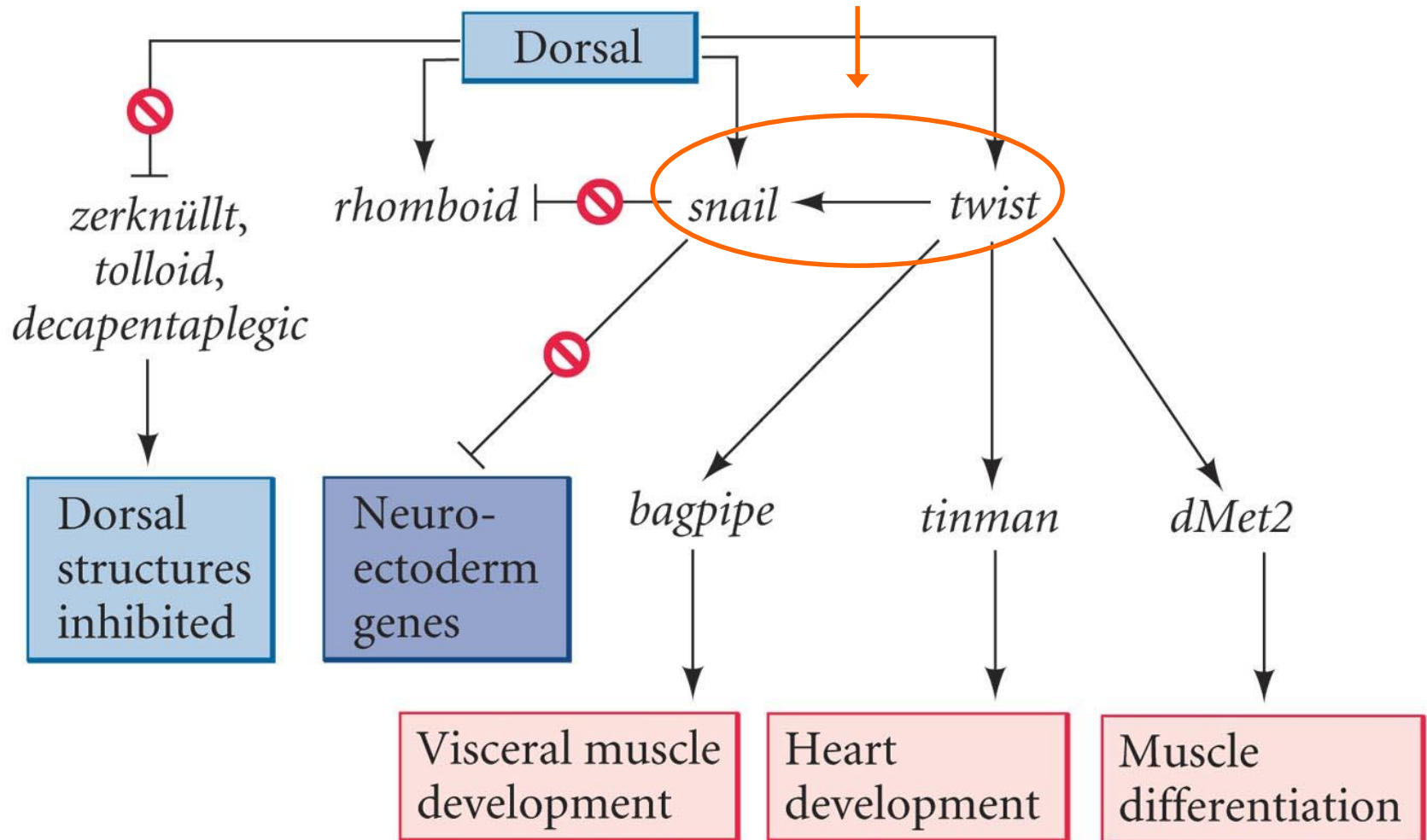
(B) VENTRAL PATTERNING

High affinity for promoter,
Not much Dorsal needed to activate



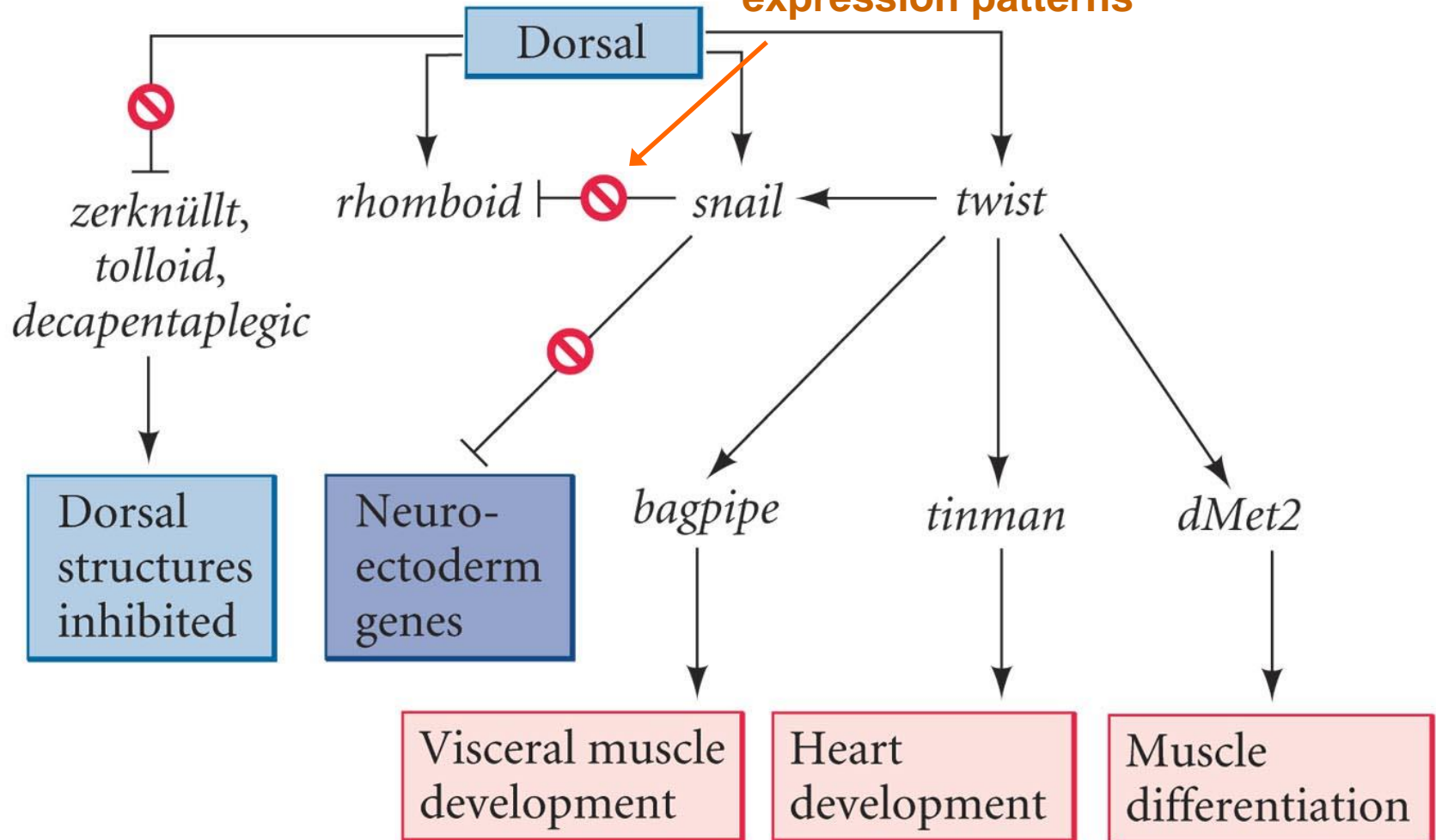
(B) VENTRAL PATTERNING

Lower affinity for promoter,
More Dorsal needed to activate



(B) VENTRAL PATTERNING

Snail repression of *rhomboid* creates domains with distinct gene expression patterns



Developmental biology
Scott F. Gilbert

& others