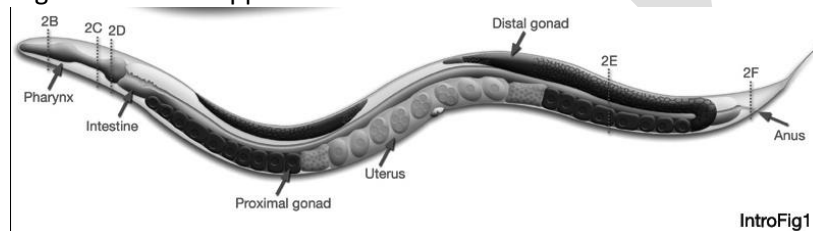


ORGANOGENESIS OF VULVA IN C.ELEGANS

• C.ELEGANS

- ◆ unsegmented, bilaterally symmetrical with cuticle integument.
- ◆ Two sexes: Hermaphrodite and males. Males only 0.05% of the population.
- ◆ 4 juvenile stages.(L1-L4)
- ◆ L3 called the Dauer.
- ◆ Oocyte pushes sperms into spermatheca where fertilization occurs.
- ◆ 5 pairs of autosomes and 1 pair of sex chromosomes. XO system of sex determination.
- ◆ Developmental fate of every single somatic cell known.
- ◆ 959 cells in adult hermaphrodite,1031 in adult male,302 neurons. First multicellular organism whose genome was mapped.



VULVAL DEVELOPMENT

- Vulva formation begins at L3 stage of larval development.
- There are 12 ectodermal cells designated as P1-P12.
- Out of these 12 cells 6 cells divide and give rise to P3.p, P4.p, P5.p, P6.p, P7.p and P8.p
- Anchor cell releases Lin-3 protein which regulates the development of three ectodermal cells P5.p, P6.p, and P7.p.

Lin-3 (abnormal cell *L1/Neage*) protein belongs to the class of Epidermal Growth Factors (EGF)

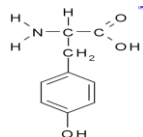
In humans EGF is found in Salivary gland tissue (Submandibular and Parotid glands), platelets, macrophages, urine, milk and plasma.

Salivary EGF is involved in healing of oral and oesophageal ulcers, inhibition of gastric acid and other protective functions.

MECHANISM OF EGF ACTION

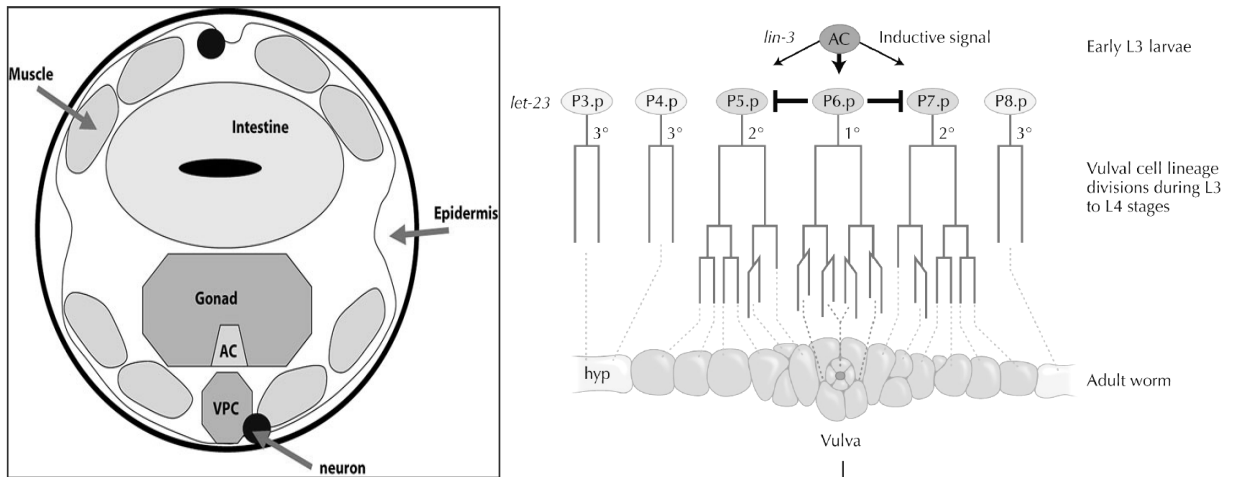
EGF binds to the Epidermal Growth Factor Receptor in the cell membrane. This binding induces the Tyrosine Kinase¹ activity of the receptor. This is followed by a signal cascade.

The signal cascade ends in increased calcium levels, increased glycolysis, DNA synthesis and cell proliferation in cells.

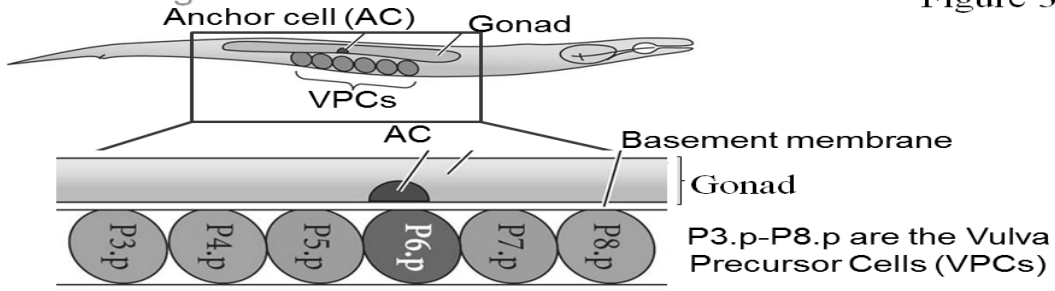


¹ Tyrosine kinase is an enzyme which transfers phosphate group from ATP to proteins. The phosphate group is attached to the amino acid tyrosine of the substrate protein. This results in a conformational change affecting protein function.

- P6.p receives the maximum signal and therefore shows primary fate.
- P5.p and P7.p takes secondary fate.
- Inductive signal for vulval development comes from Anchor Cell of the gonad which lies just dorsal to the tissue where vulval differentiation takes place.(Ventral Epithelial Cells)



larval stage



Later larval stage

- 1° and 2° VPCs make the vulva
- 3° VPCs are non-vulval

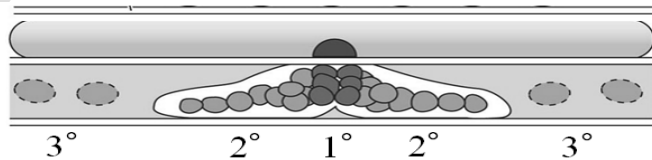
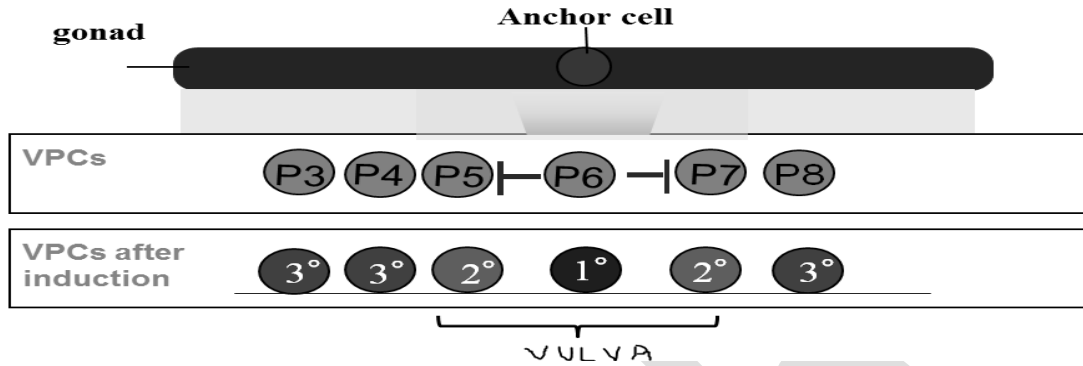


Figure 3.



- If anchor cell signalling is disrupted all VPCs take a non vulval fate and no vulva is formed. Eggs hatch in the uterus.
- This means VPCs are multipotent.

A signal from P6.p activates notch (*lin-12*) in P5.p and P7.p

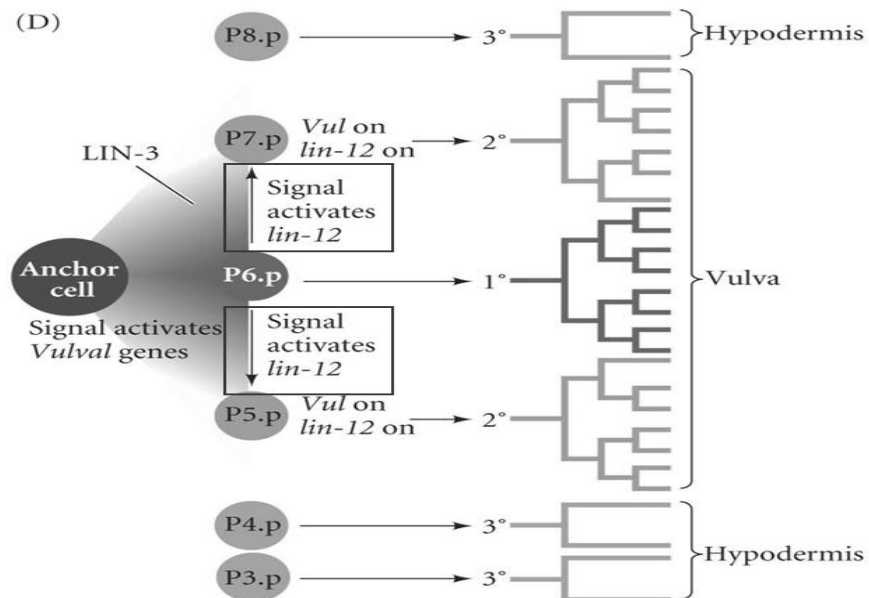


Figure 3.34

- Lin-12 is a homologous protein of NOTCH(notch in wings of Drosophila) proteins in humans.
- Notch proteins are transmembrane proteins with an extracellular and intracellular domain.

REFERENCES

www.wormbook.org.
www.ncbi.nlm.nih.gov