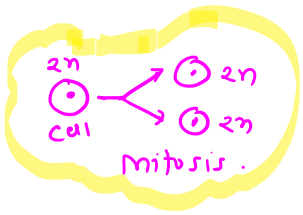
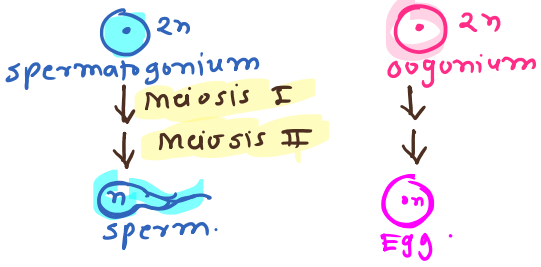
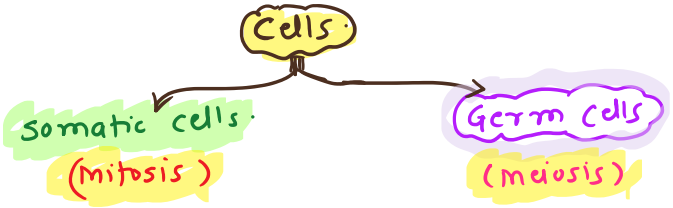
Gametogenesis.



- Production of variable gametes.
- Haploid gametes produce.

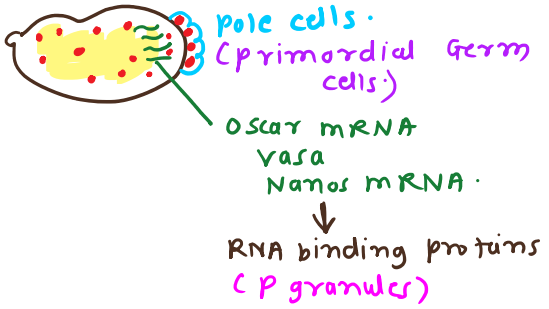


- Meiosis occur.

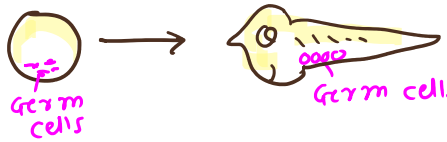


* Localization of Germ cells in Early Development.

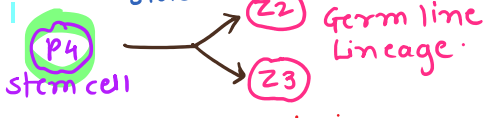
- In Drosophila →
  - Germ cells transfer to posterior side

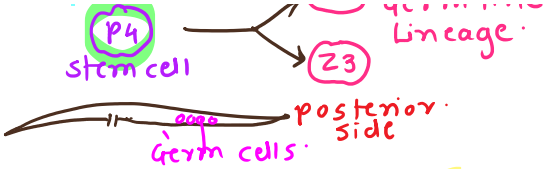


- In Amphibia -.
  Germ cells Located at vegetal pole.



- In Nematodes – C. elegans.
  - Germ cells Localized at posterior side.

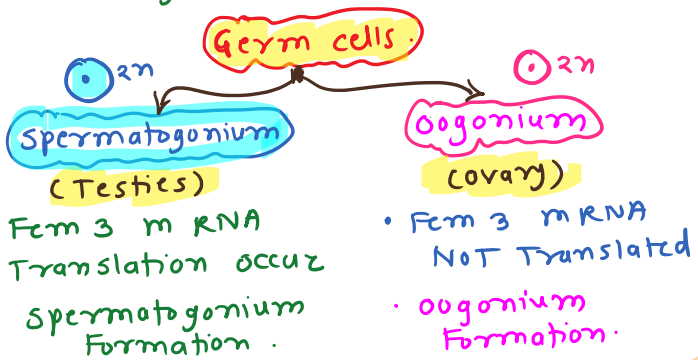




Germ cells specification

Delta-Notch signal play major role.

- Cells getting Delta signal → Convert into Germ cells.
- Cells Not getting Delta signal → convert into somatoplasm.



- Fem 3 m RNA Translation occur
- Spermatogonium Formation.

- Fem 3 m RNA NOT Translated
- oogonium Formation.

* In Higher Animals –

- Differential expression of Genes.
- In mammals – XX-XY system.
  - 44A + XX → Female
  - 44A + XY → Male.

* In 44A + XY → Male.

y chromosome present → SRY Region (Active) → Testies Determining Factor expression (Sox9) gene → Testies Formation → Testosterone release → spermatogonium form (2n)

* In XX- Female –

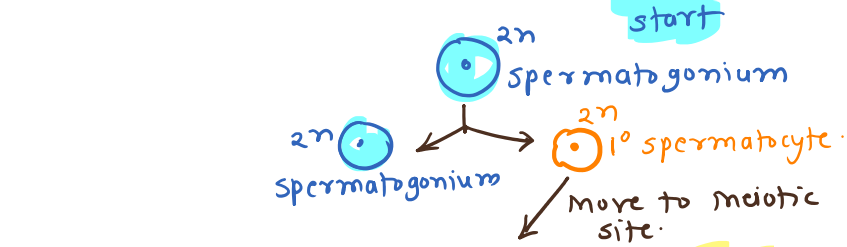
- y chromosome Absent.
- Wnt4 expression → Ovary Formation → Estrogen Release → 2n. Oogonium formation

Spermatogenesis...

Spermatogenesis...

- Occur in Testies (seminiferous tubules)
- Maturation of sperms.
- spermatogonium Division start at puberty stage.

↑ High LH Leutinizing Hormone secretion. → Acts on Leydig cells → Release Testosterone → Spermatogonium Division start



* Initiation of spermatogenesis –

- Hormones –

1) Leutinizing Hormone (LH) –
   - Regulate spermatogenesis.
   - Activate Leydig cells.

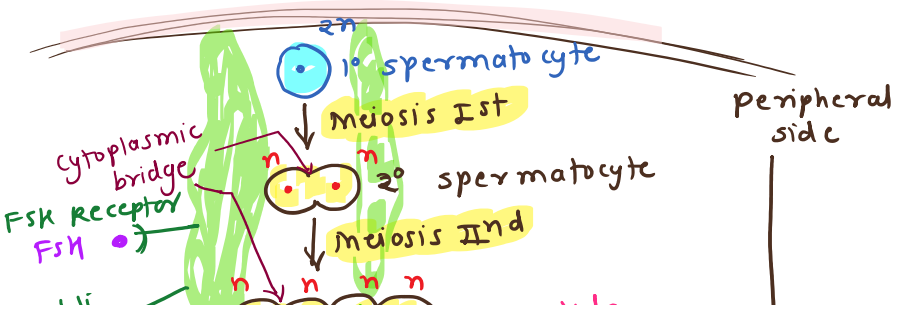
2) Testosterone –
   - stimulate spermatogenesis.
   - control sperm maturation

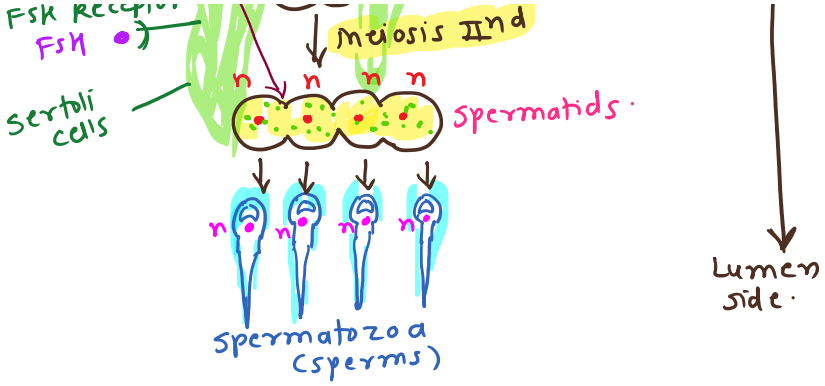
3) Follicle stimulating Hormone –
   - stimulate sertoli cells.
   - sertoli cells – Regulate spermatogenesis.
   - provide Nutrition, Nourishment.
   - provide Growth factors.
   - control spermatogenesis.



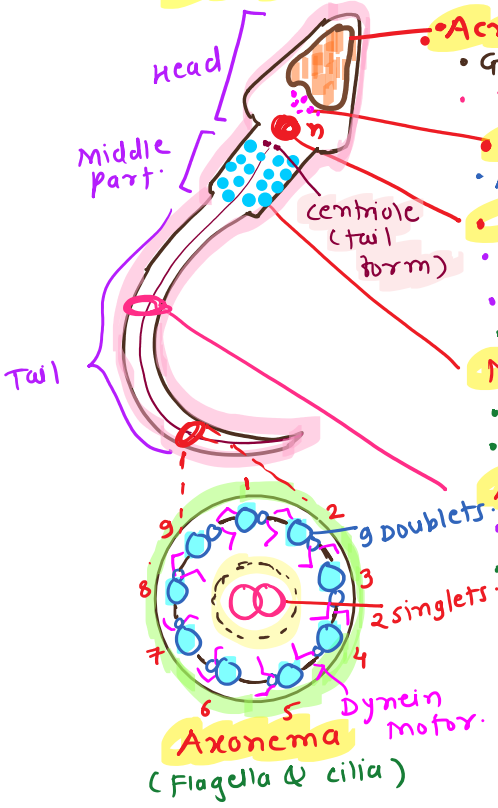
Testosteron → (sertoli cells.) → Estrogen → Require for Maturation of sperms.

4) Growth Hormone –
   - control metabolic Activities of seminiferous tubules.





* Structure of sperms –



- **Acrosome –**
  - Golgi derived Enzymatic sac
  - Hyaluronidase, protease
- **G Actin protein –**
  - Actin microfilament Formation
- **Nucleus –**
  - Highly condensed
  - compacted
  - protamines present → High basic protein; High Disulfide bond formation; Arginine Rich.
- **Mitochondria –**
  - ATP synthesis.
  - Respiration.
- **Axonema**
  - 11 Microtubule structure.
  - 9+2 Microtubule Arrangement.
  - 9 Doublets + 2 singlets.
  - Dynein Molecular Motor. (-ve Directed Motor) (ATP Dependent)

Oogenesis

Egg (n)

- Oogonium play major role in oogenesis.
- occur in ovary.
- Early stages of Development.
- Oogonium start Divide.

Oogonium (2n)

Mitosis ↓ Early stages of Development.

2n

1° oocyte.

Meiosis Ist ↓ Enter into Meiosis Ist

- **1st Arrest –**
  - Meiosis Ist – G2M check point
  - prophase Ist / Diplotene stage.

(Due to Absence of Leutinizing Hormone)

• prophase I ( ) Diplotene stage

(Due to Absence of Leutinizing Hormone)

↓ At puberty stage

↑ Increase conc.n of Leutinizing Hormone.

1° oocyte completes its meiosis Ist.

1° oocyte.

↓ meiosis Ist completed.

n ← 1° polar body.

n 2° oocyte.

Equal Karyokinesis
Unequal cytokinesis.

↓ meiosis IInd

• 2nd Arrest - metaphase II
• ↑ High cytostatic factor.
mos ⊣ Anaphase promoting complex.

↓

Ovulation

Release of 2° oocyte in oviduct region.

up to sperm entry



↓ sperm & Egg interaction.

• sperm – 2° oocyte interactions.
• within egg – Ca^{2+} Released into cytosol.
• Ca^{2+} Activate → CAM Kinase ⊣ mos (Cytostatic factor)
• Activation of Anaphase promoting complex.
• 2° oocyte completes its meiosis II.

n n → meiosis II → n nn ← 2° polar body → Degeneration Degradation.

↓

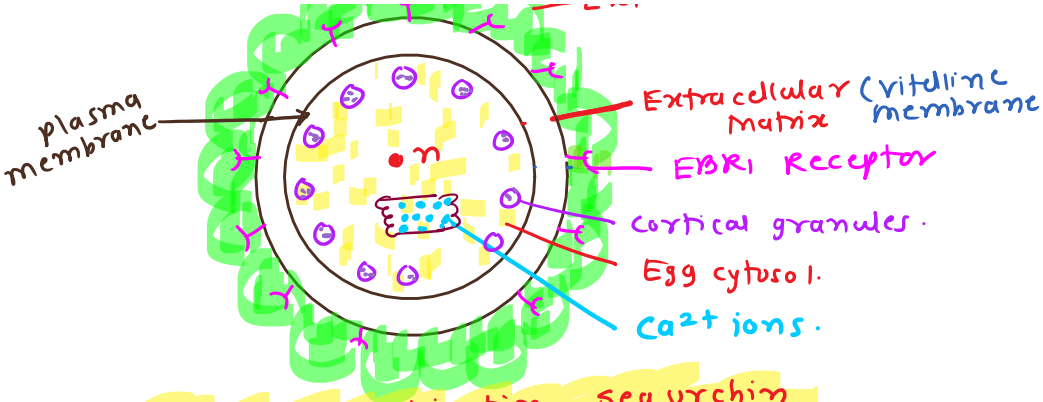
•n

Egg/ovum

* Structure of Egg –.

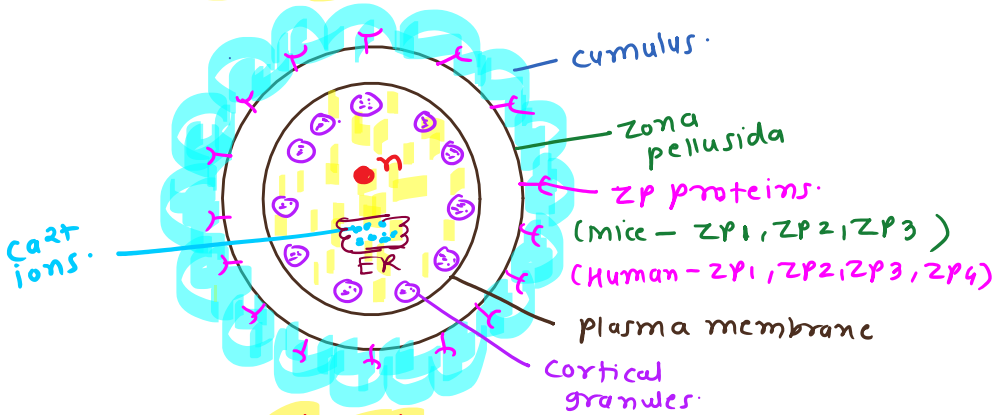
1) Sea urchin Egg –.





External Fertilization – Sea urchin (mature egg)

2) Mammals Internal Fertilization – (Mouse / Human egg)

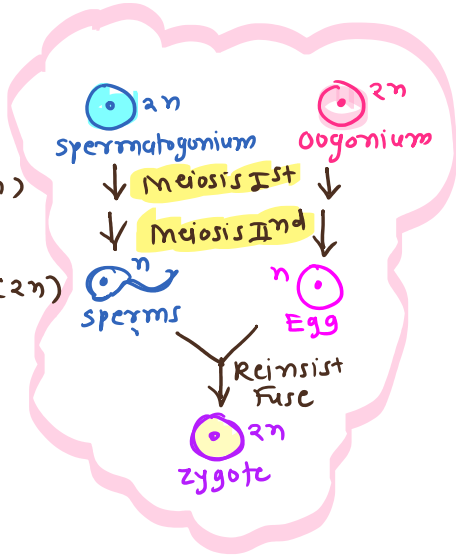




Fertilization

- Union of sperm (n) and Egg (n) Formation of zygote.
- Fertilization reinsist diploidy (2n) stage

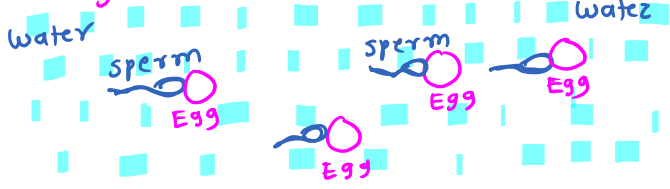
Fertilization → External / Internal



1) External Fertilization –

- Fertilization occur outside female reproductive tract
- Fertilization occur in water.

e.g. Aquatic Animals.



* Advantages –

Egg

* Advantages –
  - Large no. of egg Fertilization
  - Require small time, Less energy.
* Limitations –
  - only possible in Aquatic animals.
  - NOT occur in Terestrial Animals.
  - Large no. of gametes produce & Release.
  - Behavioral Adaptations.
  - Migrate to long Distance.
  - synchronise release of gametes.
  - Both gametes Release at same time.
  - sence Environment conditions. (Day length, Temperature)
  - sexual selection theory NOT applicable.

External Fertilization in Sea Urchin.

- Events occur during Fertilization –
- Chemoattraction – Resact, Speract.
- Binding of sperm to Extracellular coat (Jelly coat)
- Acrosomal Reaction.
- Binding of sperm to Extracellular matrix. (Vitelline membrane)
- Species specific interaction. (Bindin – EBR1 Receptor)
- Fusion of sperm Acrosomal process membrane to egg plasma membrane
- Block to polyspermy –
  - Fast block – Nat influx
  - slow block – Ca^{2+} ions.
- Egg Metabolic Activation
- Fusion of Genetic material.