

Human Reproduction

Lecture :- 01

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Reproduction in Human :-

Father of Human Embryology :- Karl Ernst von Baer.

Male reproductive organ
(♂) male sex organ.

Primary Sex organ
Essential

→ It produces ♂ gamete
Called Testis (singular)
Testes (plural).

↓ produces

Sperm and Testosterone.

Secondary Sex organ
Accessory

→ It provides passage for
gamete transfer and
helps in fertilisation.

Ex :- vasaefferentia.

- Epididymis.
- Vas deferens.
- Seminal vesicle.
- prostate gland
- Cowper's gland
- Burchell's gland
- penis.

Female Sex organ

Primary Sex organ Essential
It produces ♀ gamete called
ovary (plu- ovaries)

↓ produces
ovum (ova) ♀
(oestrogen & progesterone).

Secondary Sex organ.

Helps in gamete transfer
and fertilisation.

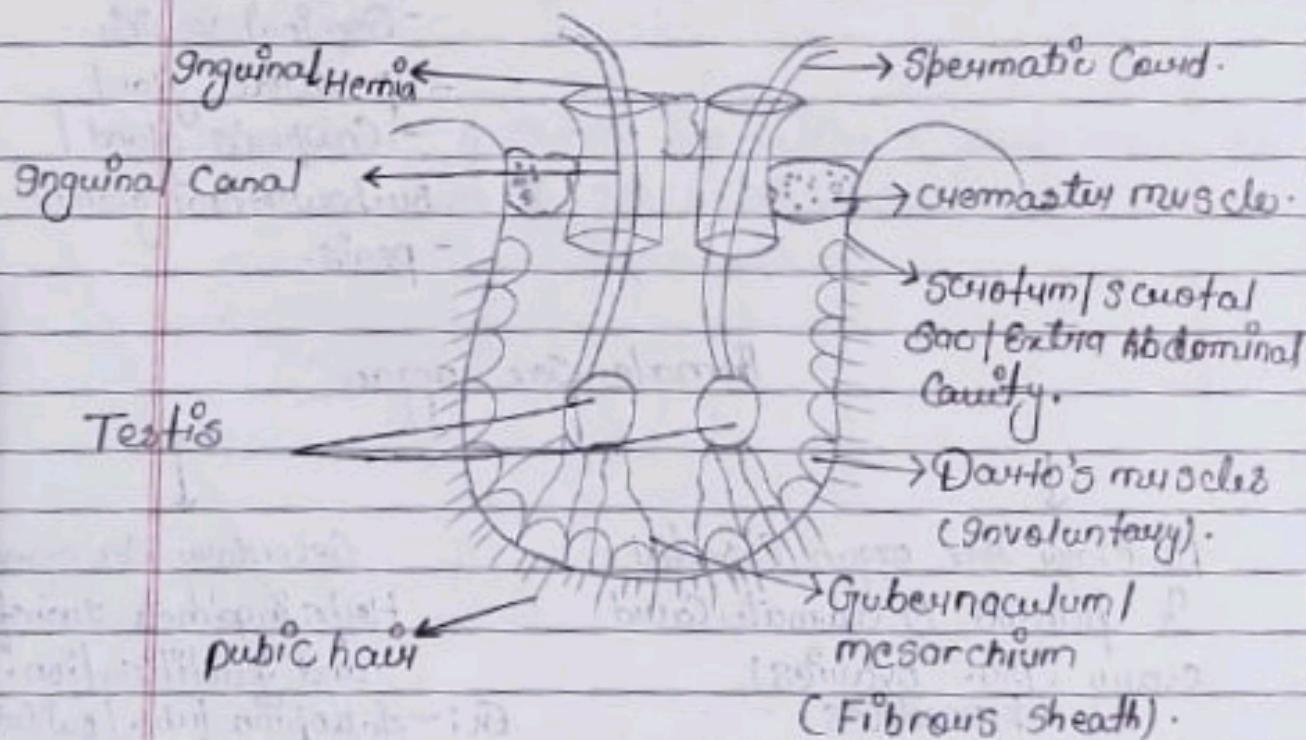
Ex :- fallopian tube, ovary,
uterus, cervix, vagina,
mammary gland, Bartholin gland.

Geographical

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- Both, Testis and ovary are mesodermal in origin.
 - Both, Testis and ovary are formed inside the abdominal cavity.
 - But Testis descent in scrotal sac at the time of birth because scrotal sac provide 2 to 2.5°C lower temp. than body temp. which is necessary of spermatogenesis.
- Formation of Sperm: Spermatogenesis.

Testis - Structure



Male reproductive System:-

Inguinal Canal:-

- The inguinal Canal is a short passage that extends inferiorly and medially through the inferior part of the abdominal wall.
- The Canal serves as a pathway by which testes can pass from the abdominal wall to the external genitalia.

Inguinal hernia:-

- Common Condition in which part of an intestinal organ or tissue bulges through a muscle.

An inguinal hernia occurs when the intestine or fat from the abdomen bulge through the lower abdominal wall into the inguinal, or groin, area.

Dartos muscle :-

- The darto's muscle is the part of scrotal.
- It is Composed of smooth Mus.
- Darto's acts to regulate the temperature of the testicles.
- which promotes spermatogenesis.

- Contraction reduces the surface area available for heat loss, thus reducing heat loss and warming the testicles.

Gubernaculum :-

- It holds the testes with scrotum.
 - During embryonic stage, gubernaculum helps in descending of testes from abdominal cavity to scrotum under the influence of testosterone.
 - Cremaster muscle help in movement of scrotum up and down.
- # Spermatic Cord → It provides passage for blood vessels, lymph vessels, nerves, vas deferens from testis to abdominal cavity.

Cryptorchidism :- If testis fails to descend and down.

Orchiopexy :- Surgical transfer of testes from abdominal cavity to scrotum.

Orchiectomy :- Surgical removal of testes from abdominal cavity.

Castration :- Surgical removal of testes from scrotum.

Hydrocoel :— Increase fluid in Scrotum which leads to enlargement of Scrotum.

Cells of the testis:

- Leydig Cells (Interstitial cells)
 - Secrete testosterone.
- Sertoli Cells (epithelial cells)
 - Support sperm development.
- Smooth muscle:-
 - peristalsis: propels sperm through the Seminiferous tubules.

- Male Reproductive System: Differentiated into

- # Testis:-

- Male reproductive gland or gonads in all animals, including humans.
- Functions of the testes are to produce sperm, primarily testosterone.

- # Accessory Duct:-

1. Rete testis.
2. Vasa Efferentia.
3. Epididymis (Convoluted tubes).
4. Vasa Ductus.

- # Glands:-

1. Seminal vesicles:- Fructose (Energy) + Calcium (Alkalinity) + Enzyme.
2. prostate Gland: - Citric acid - Sperm movement.
3. Bulbourethral / Cowper's gland: - Mucus Secretion - Lubrication.

[Semen = Sperm + Fructose + Calcium + Citric acid + mucus].

- # External Genitalia :- penis.

II. Rete Testis:-

It is a network of small tubes in the testis, that helps move sperm out from the testis to the epididymis.

III. Vasa efferentia:-

It consists of 15 to 20 ductules which helps in transport of sperm from rete testis to epididymis with the help of cilia.

IV. Epididymis:-

It is highly coiled long (about 6m long) tube, which helps in storage and physiological maturation of sperm. It consists of three parts:-

1. Head (caput).

2. Body (corpus).

3. Tail (cauda).

V. Vas deferens:-

It is about 40cm long tube which helps in transport of sperm from epididymis to urethra.

Vas deferens along with duct of seminal vesicle together opens into the urethra as ejaculatory duct.

Millions of sperm produce daily whether ejaculation occur or not.

- Spermatogen which is not ejaculated are absorbed in vas deferens.
- Cutting of vas deferens and tying with thread is called vasectomy.

NOTE - Testis Consist of about 250 Compartments
Called testicular lobule.

- In each testicular lobule 1 to 3 highly Coiled Seminiferous tubule are present.
- Seminiferous tubule, is the structural and functional unit of testis.

pathway for Sperm :-

Seminiferous tubule → Rete testis → Vas efferentia → Epididymis

↓
vas deferens

↓
ampulla

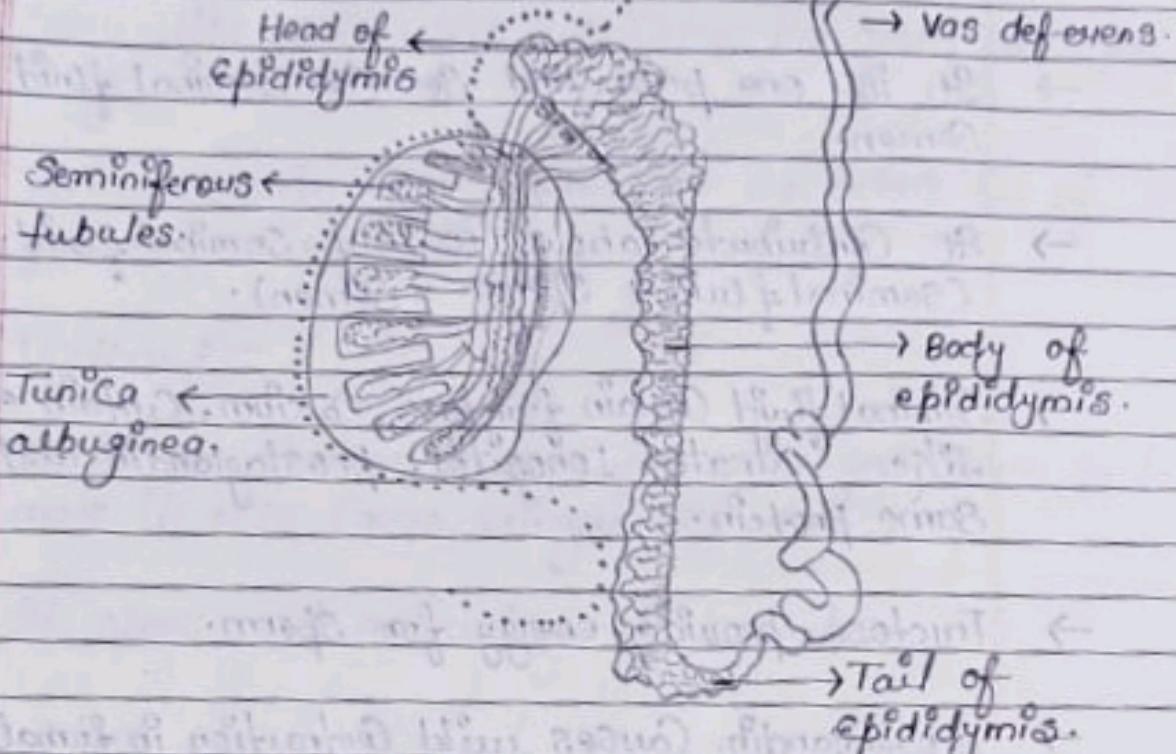
Sperm Ejaculated

Ejaculatory duct

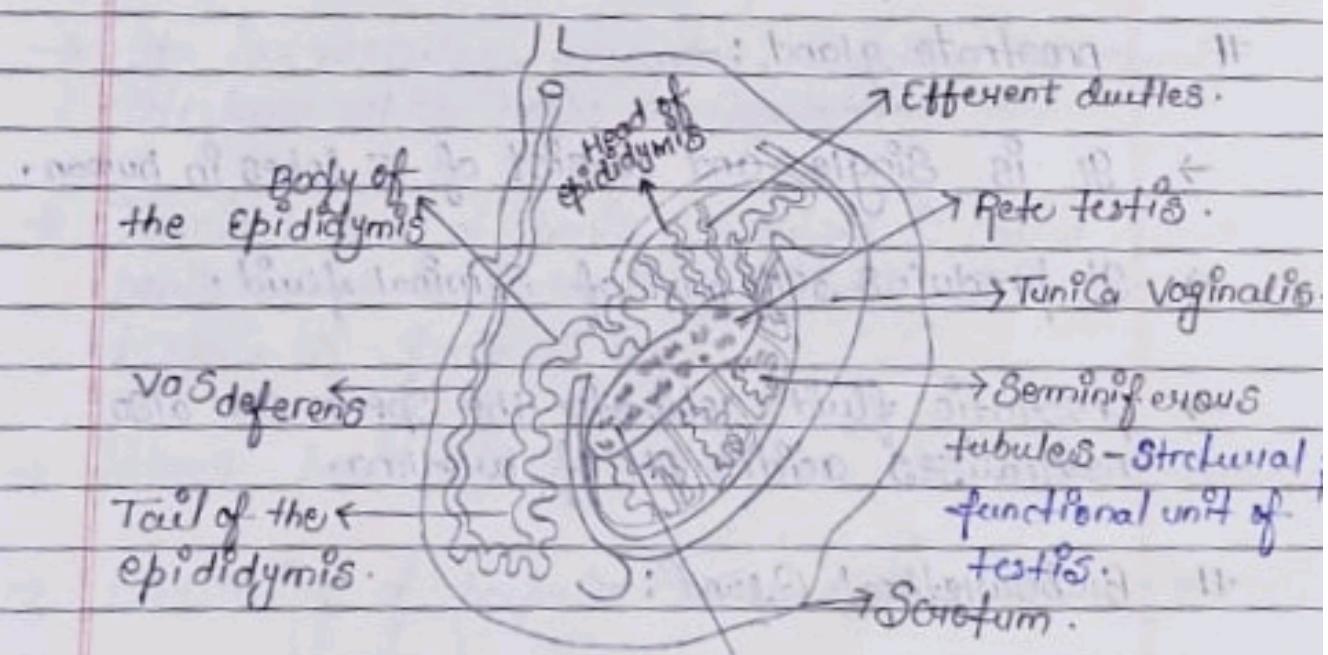
urethral meatus ← urethra

OR

urethral orif. G.



• Internal structure of Testis



• Anatomy of the testis

Seminal Vesicle :-

- It is one pair and Secrete Seminal fluid of Sperm.
- It contribute about 10% of Seminal fluid.
(Seminal fluid + Sperm = Semen).
- Seminal fluid contain Fructose, Calcium, certain enzyme like Citrate, Lecithin, prostaglandin and some protein.
- Fructose provide energy for Sperm.
- Prostaglandin causes mild contraction in female genital tract which helps in movement of Sperm.

prostate gland :-

- It is single and consist of 5 lobes in human.
- It produces 30% part of Seminal fluid.
- Prostatic fluid activate the Sperm and also neutralises acidic pH of urethra.

Bulbourethral Gland :-

- It is one pair and secretes a white thick

Jelly like fluid which lubricate the glans penis for easy copulation.

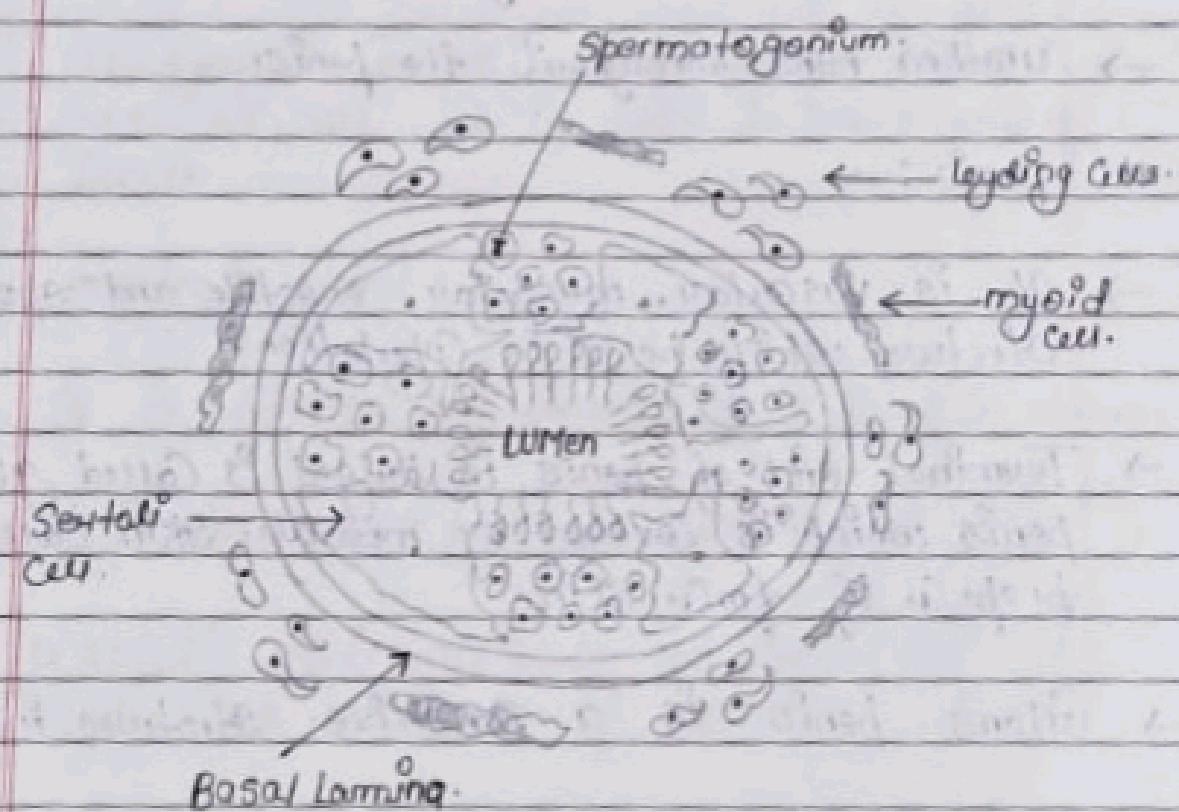
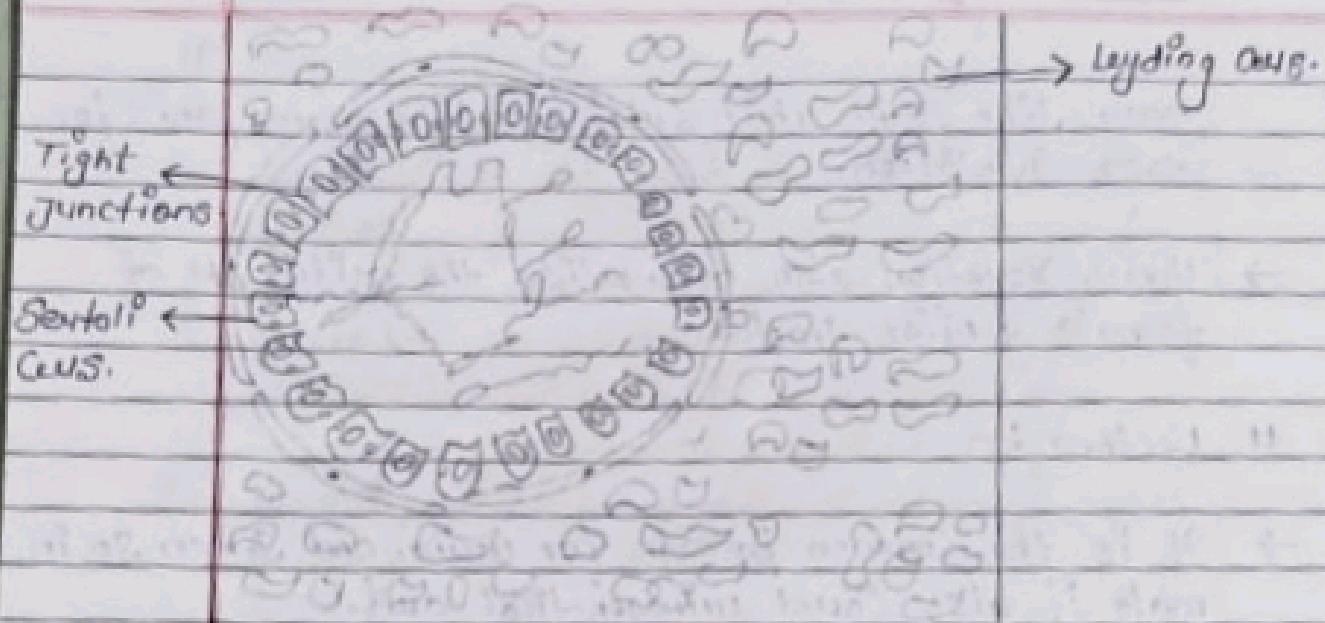
- Their secretion also neutralise the acidic pH of female genital tract.

Urethra :-

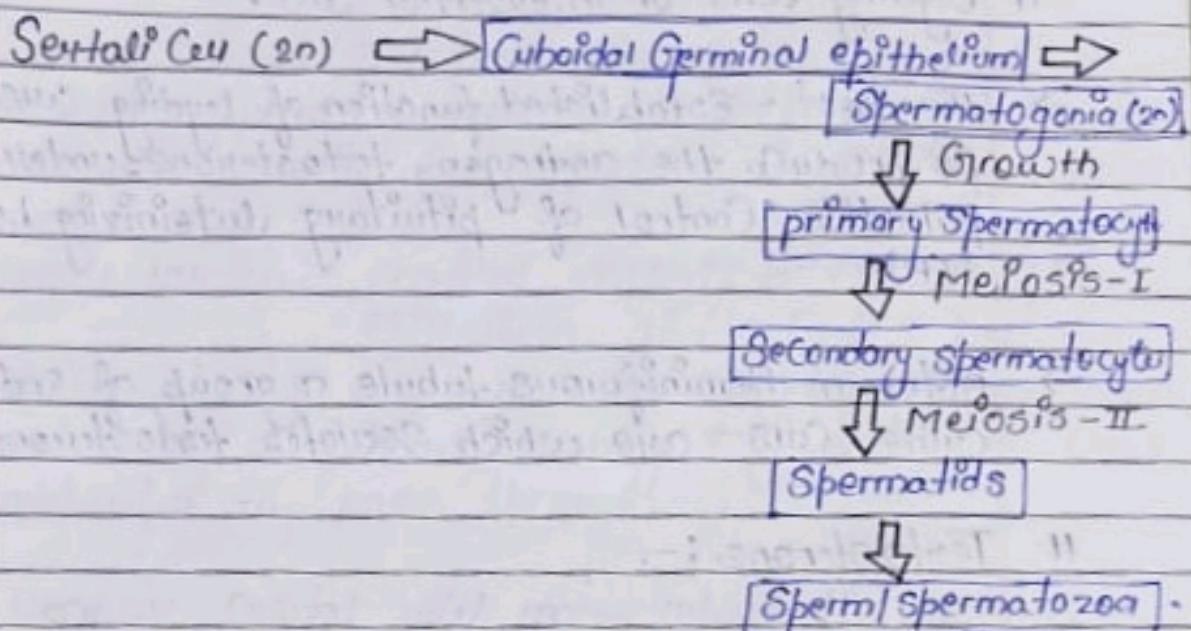
- It is the common passage for urine and semen. In male it also called urinogenital duct.
- It opens out as urinogenital meatus.
- Urethra runs throughout the penis.

penis :-

- It is vascular, muscular, erectile and spiny structure which helps in copulation.
- Terminal end of penis is bulged by glans penis which is covered by movable skin called prepuce or foreskin.
- Glans penis is a sensitive structure in male.
- Hardening of prepuce is called phimosis (disease).
- Surgical removal of prepuce called circumcision.



internal Structure of Sertoli^o GUS



- These cells are located within the seminiferous tubules.
- Between germinal epithelial cell many columnar cell are present Sertoli Cell.
- Sertoli Cell provide nourishment to the developing sperm so it is also known as nurse cell.
- Sertoli Cell provide blood tissue barrier and also phagocytose the dead.
- Sertoli Cell Convert the small amount of testosterone into estrogen.
- It also Secretes hormone ABP (Androgen binding protein) and inhibin.

Leydig Cells or interstitial Cells :-

- The best-established function of Leydig Cells is to produce the androgen, testosterone under the pulsatile control of pituitary luteinizing hormone (LH).
- Between Seminiferous tubule a group of endocrine cells are which secretes testosterone.

Testosterone :-

- Testosterone is required for process that are critical for spermatogenesis including maintaining the (Blood - Testis Barrier) BTB, supporting the completion of meiosis, the adhesion of elongated spermatids to Sertoli Cells and the release of sperm.
- Spermatogonium :— (plural: spermatogonia).

It is an undifferentiated male germ cell. Spermatogonia undergo spermatogenesis to form matured spermatocytes in the Seminiferous tubules of the testis.

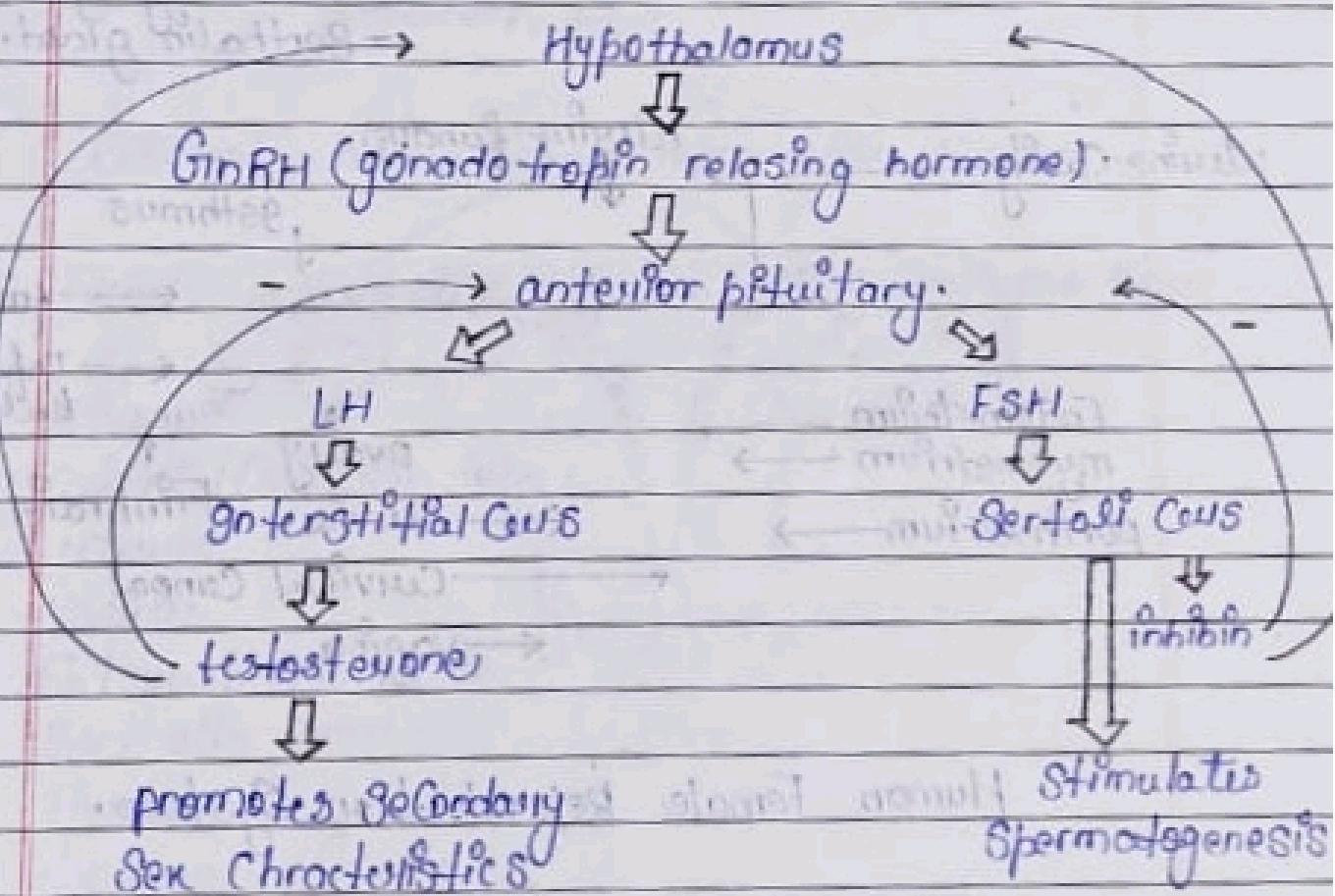
Myoid body :-

Their function includes structural regulation of the forming testis cords, in conjunction with

Sertoli Cells, and promotion of the movement of mature sperm through the seminiferous tubules of the adult testis for export to the seminal vesicles.

Basal lamina:— provides support to the overlying epithelium, limits contact between epithelial cells and the other cell type in the tissue and acts as filter allowing only water and small molecules to pass through.

Hormone Related with male reproductive system:-



Female (♀) Sex organ



pri. Sex organ

Essential

- It produces ♀ gamete & ovum

Ovary (plu = ovaries)

It produces

Ovum (ova)

8

oestrogen and progesterone.

Sec. Sex organ

- Helps in gamete transport and fertilization.

Ex:- Fallopian tube / oviduct

- uterus.

- Cervix.

- Vagina.

- mammary gland.

- Bartholin gland.

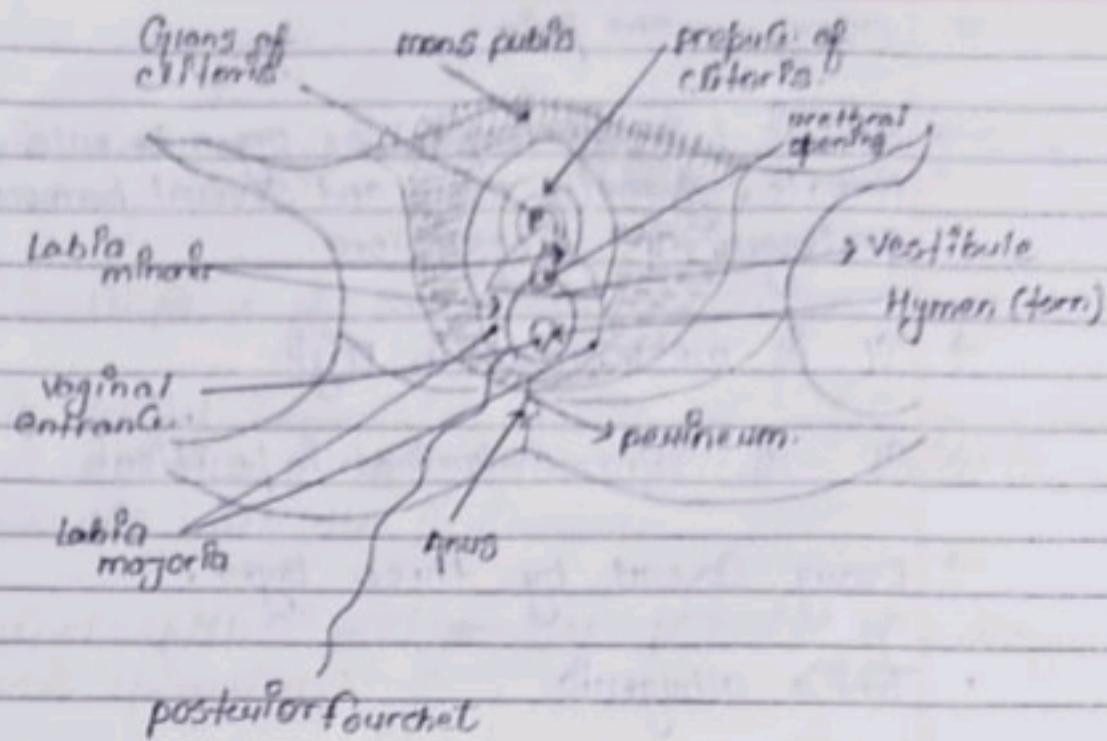
uterine cavity

uterine fundus

Endometrium
myometrium
perimetrium

gastrium
ampulla
infundibulum
ovary
cervix
fimbriae
cervical canal
vagina

Human Female Reproduction System.



External human female reproduction System.

Female Reproductive System:- Differentiated into-

- Ovary
- oviduct / fallopian tube.
- uterus
- Vagina
- External Genitalia
- Bartholin gland
- Hymen
- mammary Gland

II Ovary — One pair:

- It is primary female sex organ because it produces female gamete ovum and several hormones like oestrogen and progesterone.
- It is mesodermal in origin.
- It is intra-abdominal in position.
- Ovary covered by three layers:
 - Tunica albuginea
 - Germinal epithelium
 - Tunica vasculosa

Tunica avaginata :-

- It is a layer of condensed tissue on the surface of the ovary.
- It is composed of short connective-tissue fibres.
- It is located immediately inside the ovarian epithelium (previously known as germinal epithelium) which is continuous with the peritoneum.

Germinal epithelium / germinal epithelium of Waldeyer / Coelomic epithelium :-

- It is a layer of simple squamous to-cuboidal epithelial cells covering the ovary.
- The germinal epithelium of the ovary gives rise to follicular cells, groups of which are invaded by a single primordial germ cell to form a primordial follicle.

Tunica vasculosa / zona vasculosa / medulla of ovary :-

- It is highly vascular stroma in the centre of the ovary.
- It forms from embryonic mesenchyme (Theca cells) and contains blood vessels, lymphatic vessels and nerves.

- Ovary attached with the back wall of abdominal cavity through a ligament is called mesovarium.
- Ovary internally fixed up with connective tissue called Stroma.
- Outer Stroma is called Cortex and inner is called medulla.
- In Stroma many primordial follicles are present which contain primary oocyte.
- Immature follicles develops into mature graafian follicle so, primary oocyte converted into secondary oocyte.
- Corpus luteum (yellow body) - It forms during ovulation.
- It is made up of injured tissue, blood clot and follicular wall of graafian follicle.
- It is a endocrine part because it secretes hormone progesterone (pregnancy hormones).
- Corpus albicans — It is regarded part of Corpus luteum oocyte is not fertilized there.

- It is degenerated into bar with the ovary.
- II Oviduct / Fallopian tube :-
- One pair in female.
- Consist of three parts :
 1. Isthmus .
 2. Ampulla .
 3. Infundibulum .
- It is the site for fertilization.
- Inside the oviduct ciliae present which helps in movement of ovum.
- Isthmus :-
- Narrow section of the uterine tubes connecting the ampulla.
- Its folded mucosa forms a functional reservoir for sperm in the female tract.
- Ampulla :-
- This is highly ciliated portion of the oviduct.

→ Fertilization and early embryo development occurs.

→ The ampulla is most often also the site for ectopic implantation (ectopic pregnancy).

- Infundibulum:-

→ It is also known as pituitary stalk / infundibular stalk.

→ It is the connection between the hypothalamus and posterior pituitary.

→ The infundibulum is the cup or funnel in which a hair follicle grows is called Hair follicle.

- Fimbriae:-

→ Finger-like, ciliated projection.

→ Which capture the ovum from the surface of the ovary.

- Uterus:-

→ Only one uterus present in female.

→ Inverted pear shaped.

→ uterus is divided into three part :-

1. Fundus.

2. Body.

3. Cervix.

• Fundus :-

→ The fundus of the uterus is the top portion.

→ It is opposite from the Cervix.

→ Fundal height, measured from the top of the pubic bone.

→ It is routinely measured in pregnancy to determine growth rates.

• Body :-

→ It

Uterus is made up of three layers :-

• Perimetrium :-

It is outermost.

- Thin layer
- membranous layer.

- myometrium :-

- It is middle and thick layer.
- made up of Smooth muscle.
- It shows mild Contraction during child birth under the influence of hormone oxytocin or pitocin.

- Endometrium :-

- It is innermost and glandular layer.
- which replace during menstrual flow.

- Cervical Canal + vagina = Birth Canal.

Cervix :-

- Body open into the Cervix.
- The function of the Cervix is to allow flow of menstrual blood from the uterus into the Vagina.
- Direct the Sperms into the uterus during intercourse.

II Vagina :-

- 7.5 cm long.
- without gland.
- It receive penis during Copulation or Coping.

III External Genitalia :-

→ In female external Genitalia Called vulva.

→ It consist of following structure:-

- (i) Mons pubis.
- (ii) Clitoris.
- (iii) Labia majora.
- (iv) Labia minora.
- (v) Vaginal vestibule / urogenital sinus.
- (vi) Bartholin gland.
- (vii) Vaginal orifice.
- (viii) Perineum.

IV Mons pubis :-

→ It is an inverted triangular mass of fatty tissue, covered by hair-bearing skin.

→ Lying on top of the pubic bone.

→ It extends from the pubic hairline (the base of the triangle,) to the gland of clitoris inferiorly.

→ It's function is a source of cushioning during sexual intercourse.

- Vaginal orifice:

- vaginal vestibule / urogenital sinus:

Bartholin gland:

→ It is a paired gland present at both side of vulva present at both side of vulva.

→ It secretes a lubricating substance which helps in easy copulation.

→ It is homologous to bulbourethral gland / Cowper's gland in male.

Hymen:-

Hymen is a thin piece of mucosal and vascularised membrane present in vaginal orifice.

It surrounds or partially covers the external vaginal opening.

It is also called virgin membrane.

- It generally breaks during first intercourse (but may be persistent after intercourse so present or absence of hymen is not a symbol of virginity).
- Hymen may also rupture to following reason:
 - (i) late marriage condition.
 - (ii) In athletes related with horse riding cycling etc.
 - (iii) During first menstrual flow.
 - (iv) During exercise and yoga.
 - (v) Due to insertion of vaginal tampon.

Mammary gland :-

- Mammary gland is found in both male and female, but well developed mammary gland found in female.
- Development of mammary gland start during puberty (12 to 14 years).
- Development of mammary gland during puberty depends on hormone estrogen.
- Function of mammary gland is milk production after child birth and breast feeding (for parental care).
- Size of mammary gland varies from female to female and varies during pregnancy.

- Development of mammary gland during pregnancy.
- Milk secretion depends on hormone prolactin.
- Milk ejection depends on hormone oxytocin (pitocin).

II Mammary Gland :-

→ Formed of → Glandular Tissue + Fat.

→ Glandular Tissue, of Each breast divided into 15 - 20 mammary lobe.

→ mammary lobes contain - cluster of Cells - Called - Alveoli.

→ Alveoli° (from Cavity of (lumen) Alveoli) - Secretes milk.

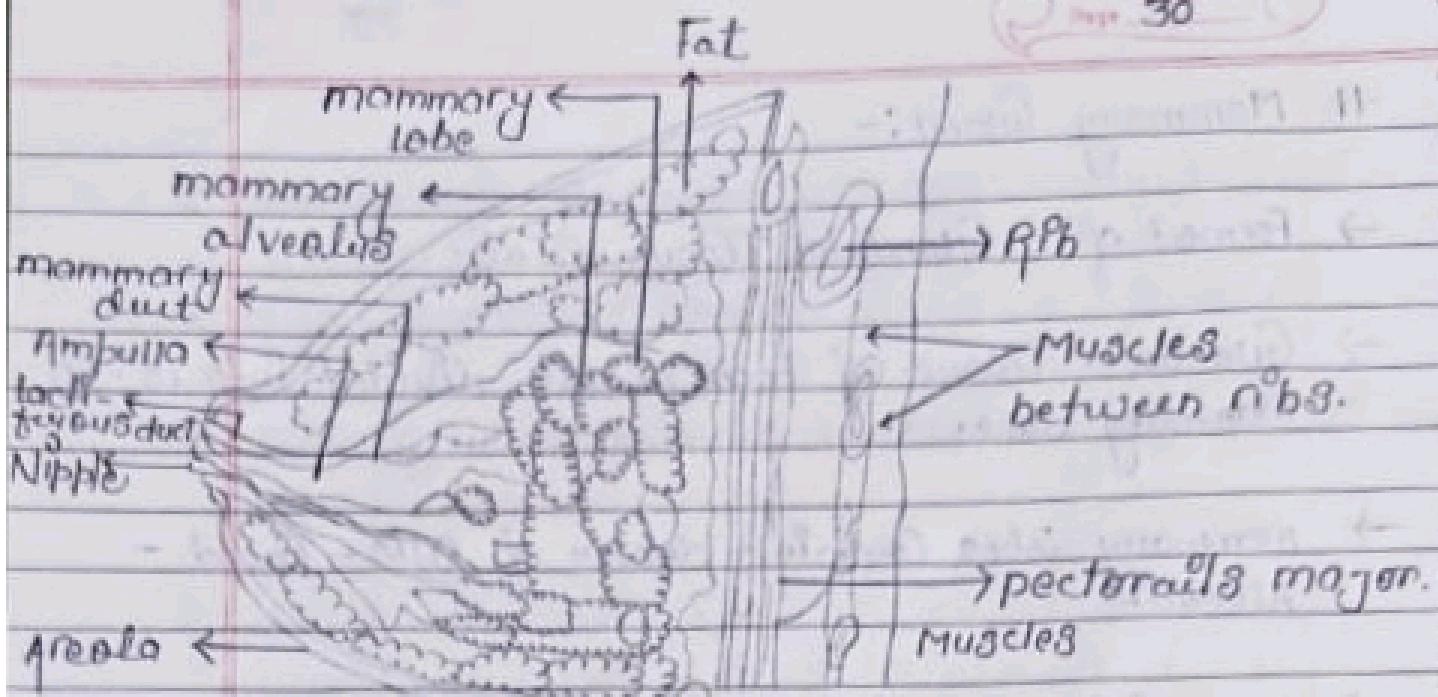
→ Alveoli° - opens into - mammary tubules.

→ mammary tubules - join on Lobe - to form - mammary duct.

→ many mammary duct - joins to form - wider mammary Ampulla.

→ mammary Ampulla - Connected to Lactiferous Duct.

→ Lactiferous Duct - milk Sucked out.



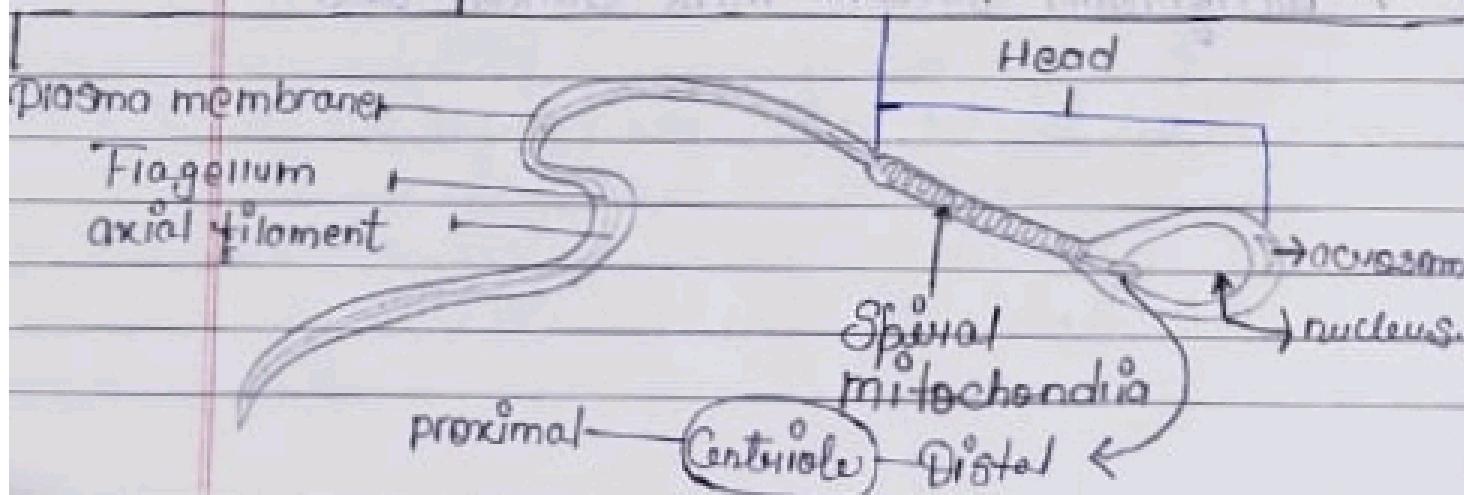
Human Reproduction

- Gametogenesis :— Formation of male and female gamete is called gametogenesis.

- Spermatogenesis :— Formation of sperm as spermatogonia.

→ It starts after puberty (12 to 14).

Structure of sperm :—



primordial Germ Cell (2n)

Type A Cell (2n)

Type B Cell (2n)

\downarrow
Growth
Spermatogonium (2n)
↓ mitosis.

pri. spermatocyte
 \downarrow meiosis I (2n)

Sec. spermatocyte
 \downarrow meiosis II (n)

Spermatid (n).
 \downarrow Spermatogenesis

Sperm (spermatozoa)

2n

2n

2n

n

n

n

n

n

n

Sperm

Sperm

Sperm

Sperm

→ A single primary spermatocyte give rise to few spermatocytes or sperm.

→ maturation of spermatids into sperm or spermatozoa is called spermatogenesis.

II. Acrosome :-

→ Formed by Golgi body.

→ It secretes enzyme Sperm Lyse which helps in fertilization.

→ It is present at the tip of head.

→ Entire Sperm is covered by plasma membrane.

- proximal Centriole : - Responsible for first cleavage

- Dorsal Centriole : - origin of axial filament occurs from this region.

III. Mitochondria :-

→ Mitochondria present in middle piece which provide energy to sperm.

→ Sperm is mobile due to presence of long tail.

→ 200 to 300 million Sperm per Ejaculation.

→ A single primary spermatocyte gives rise to four spermatogonia or sperm.

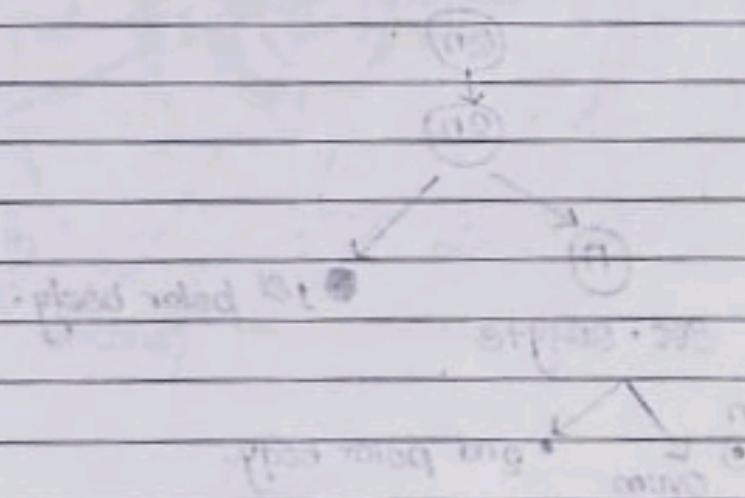
→ 2.5 to 4 ml Semen per Ejaculation during Emission.

→ pH of Semen is alkaline.

→ For normal fertility at least 60% sperm should be of normal shape and size and 40% should be vigorous motility.

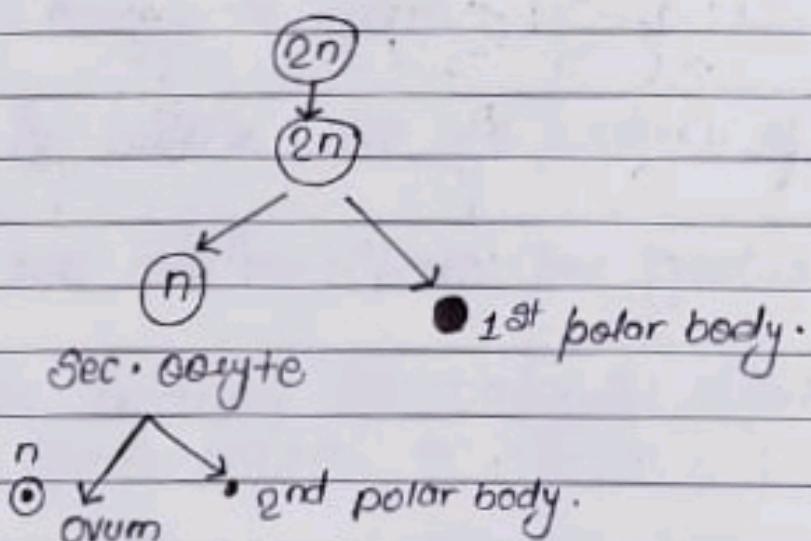
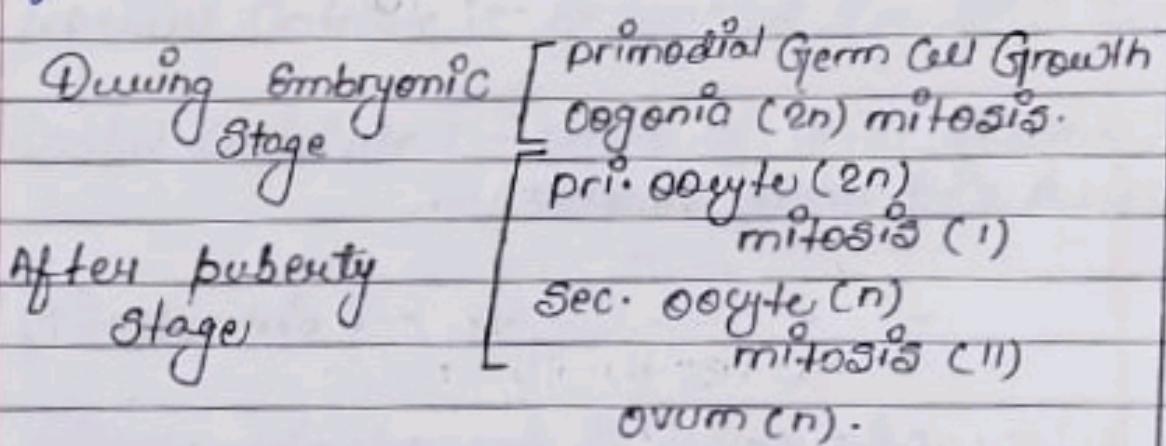
• Semen — Sperm + Seminal fluid

Secreted by Seminal vesicles, prostate gland and Cowper's gland.

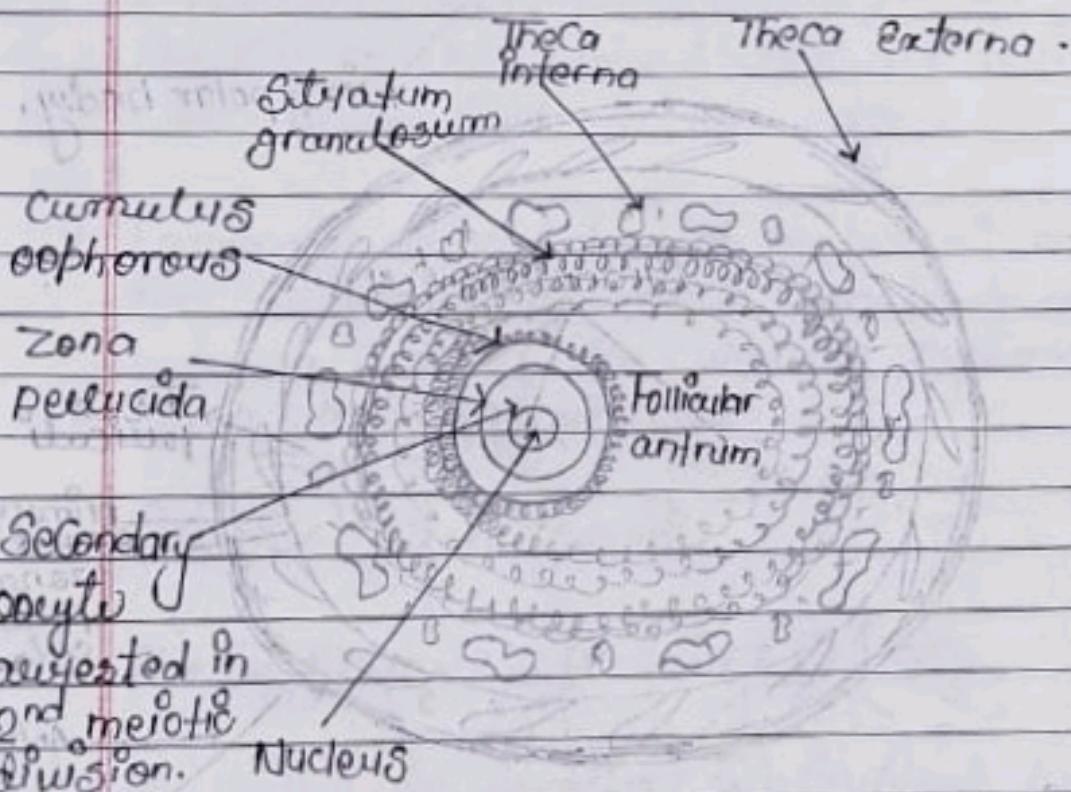


Oogenesis :-

- Formation of ovum or oöid is called oogenesis.
- In female process of oogenesis starts when female is 25 weeks (6 month old) in their foetal stage.
- About 60 to 80 thousand oogonia formed during embryonic stage. No more oogonia are formed after birth.

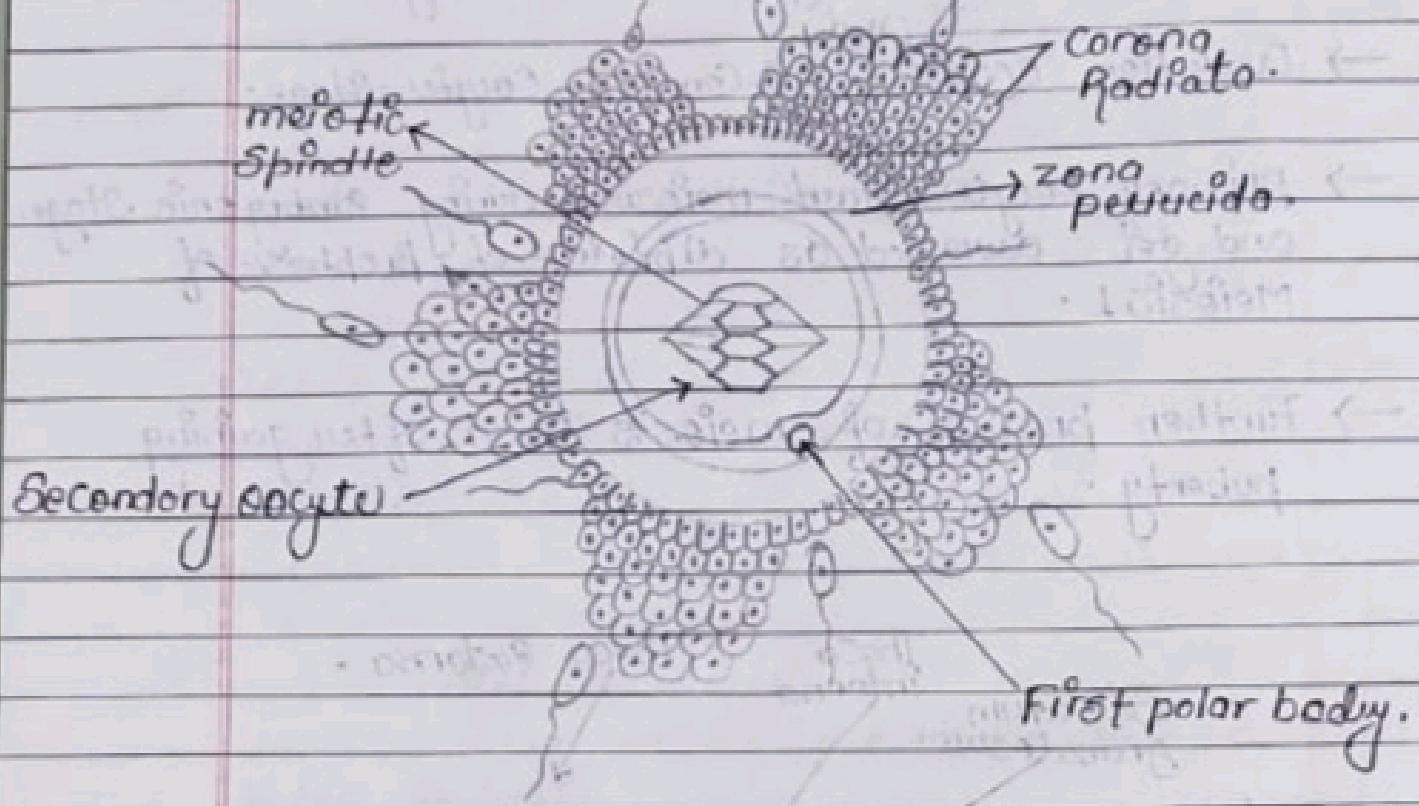


- A single oogonium gives rise to only one ovum.
- Ovulation occurs in Secondary Oocyte Stage.
- primary oocyte start meiosis I during embryonic stage and get arrested as diplotene of prophase of Meiosis I.
- Further process of meiosis start after gaining puberty.

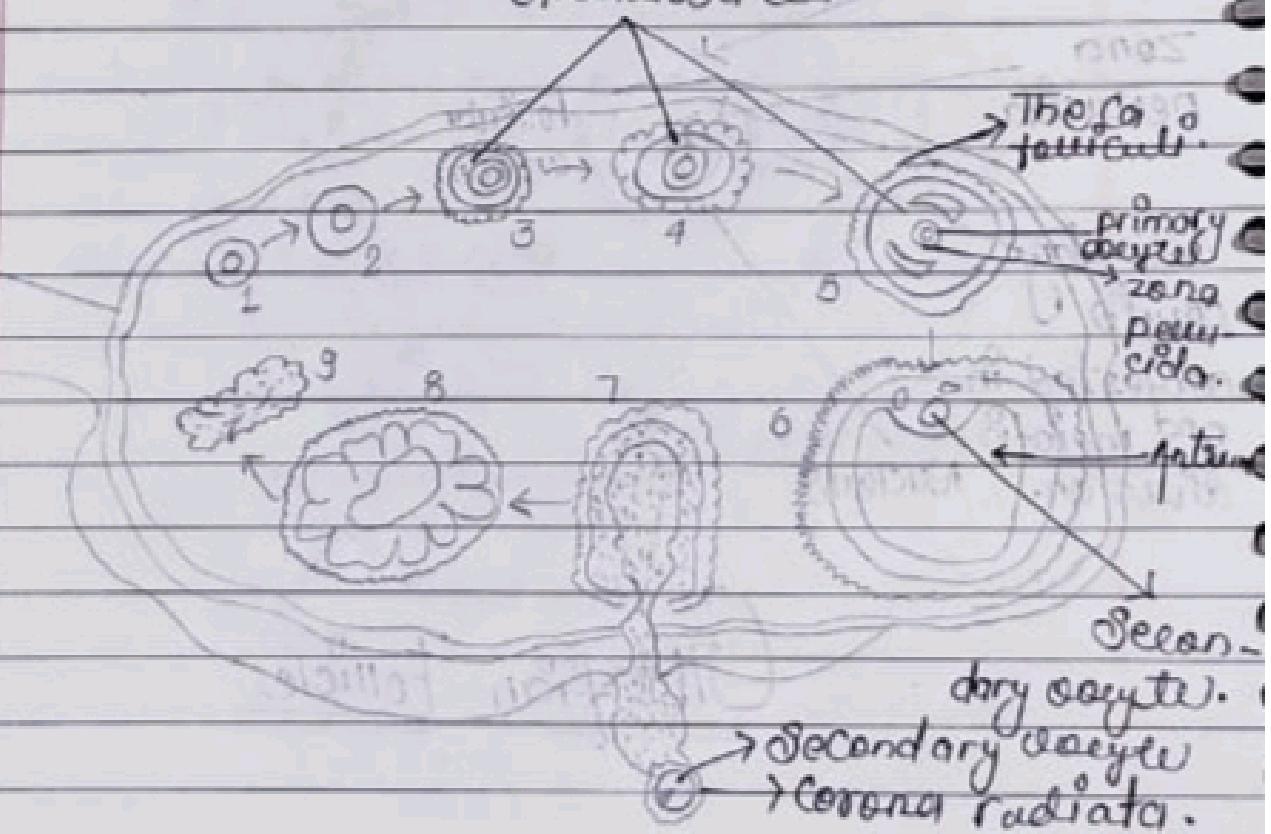


Graafian Follicle

Secondary oocyte / ovum



Granulosa cell



Cumulus Oophorus:-

- means - (egg - bearing little cloud).
- The ovulated ovum is surrounded by the cumulus oophorus, which is a sphere of loosely packed follicular fluid.
- As a sperm enters the cumulus oophorus, the enzyme hyaluronidase on the sperm head dissolve hyaluronic acid between the cells of the cumulus oophorus as well as between other cells in the body.
- Enzymatic dissolution of hyaluronic acid allows the swimming sperm to penetrate the space between cells of the cumulus oophorus and to reach the zona pellucida.

Stratum granulosum

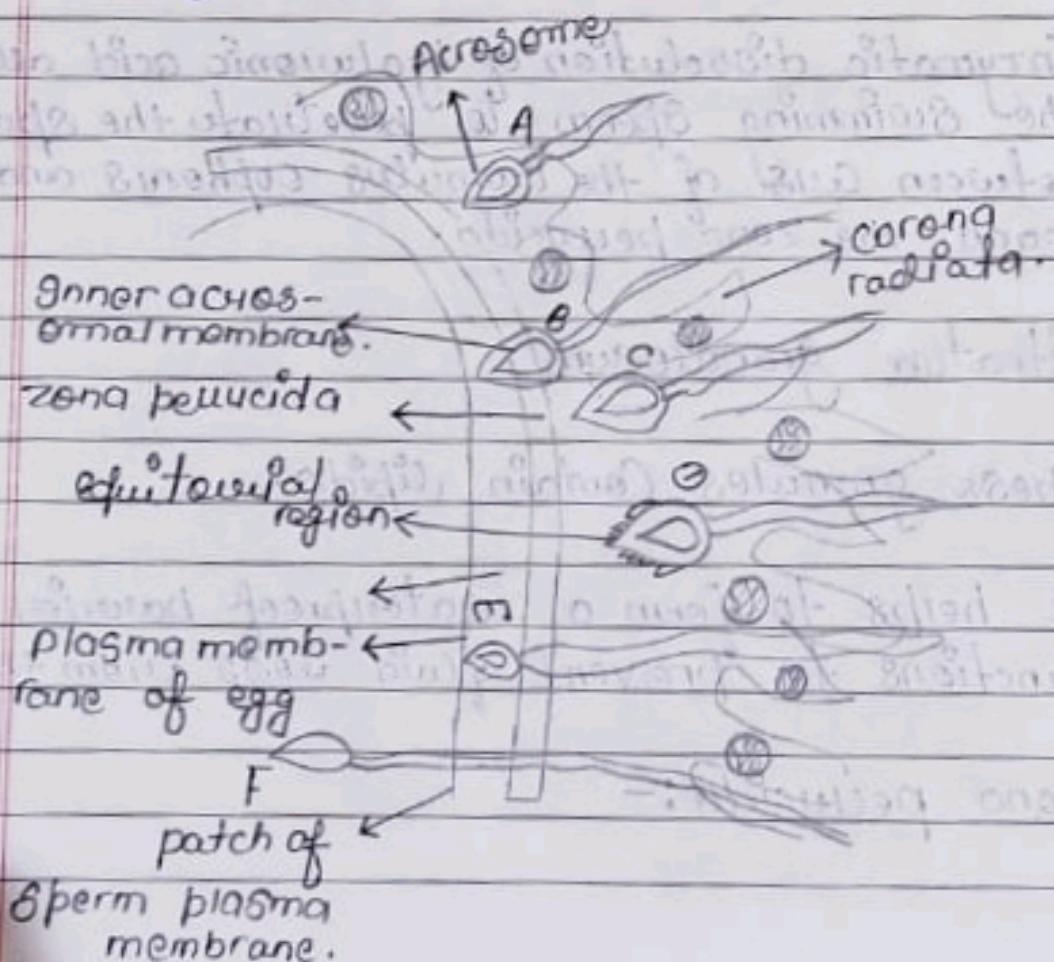
- These granules contain lipids.
- It helps to form a waterproof barrier that functions to prevent fluid loss from the body.

Zona pellucida:-

- The zona pellucida is a glycoprotein layer.
- Surrounding the plasma membrane of mammalian oocytes.
- Zona pellucida first appears in primary oocytes.

Corona Radiata:

- The zona pellucida is surrounded by the corona radiata.
- The corona is composed of cells that care for the egg when it is emitted from the ovary.



Menstrual Cycle

- It occurs in female primates (ex. Monkey, Apes, Human etc.)
- Standard period is 28 or 29 days (It may varies from 24 to 35 days).
- It starts after puberty (11 to 13 yrs).
- First menstrual cycle is called menarche.
- Last menstrual cycle is called menopause.
- After menopause female become sterile.

Menstrual cycle divide into three phase :-

1. Menstruation phase / Bleeding phase.
2. Follicular phase / proliferative phase / oestrogenic phase / pre-ovulatory phase.
3. Luteal phase / Secretory phase / progestogenic phase / post-ovulatory phase.

• Menstruation phase :-

→ This phase last for 3 to 5 day (from 1st to 5th day).

→ In this phase level of Gonadotropin (LH & FSH) decrease but suddenly increase at last phase.

→ In this phase level of progesterone and oestrogen also decrease.

→ In this phase menstrual flow occurs.

→ mens include

(I). fragments of endometrial.

(II). Blood (40 to 80 ml every cycle).

(III). unfertilized ovum at metaphase stage of meiosis II (in the form of Sec. oocytes).

In this phase complete destruction of Corpus Luteum occurs to form Corpus albicans.

Follicular phase :-

→ This phase last for 9 to 10 days (from 5th to 14th day).

→ In this phase immature follicle starts to grow to form graffian follicle.

- This follicular cu secretes hormone oestrogen so, level of oestrogen increases this phase.
- In this phase level of LH and FSH increases.
- During last period of this phase level of LH attains a peak level called LH Surge.
- which causes rupturing of Graffian follicle which leads to ovulation. So ovulation occurs at 14th day of M.C.

Luteal phase :-

- It last for 14 days from 14th to 28th day.
- In this phase graffian follicle is secreted converted into Corpus luteum.
- Corpus luteum secretes hormone progesterone.
- In this phase thickening of endometrium increase and formation of uterine bed occurs.
- Thickening of endometrium is by hormone progesterone.
- If fertilization takes place then Corpus luteum extend throughout the pregnancy and m.c stops.

- If fertilization not take place then Corpus luteum degenerates and next M.C. Starts.

NOTE:-

- In female only one ovary remains active alternately.
- In the entire reproductive phase a female can only produce 450 ova.
- If in a female menstrual cycle is of 34 days then ovulation occurs at 20th day.
- Risk period — 10th — 17th day = from mid-follicular phase to mid-luteal phase.
- Safe period — From mid-luteal phase to mid-follicular phase.
- Copulation — ventrally.
- AS orgasm — Copulation with intercourse is called orgasm. If it is true copulation.
- Ejaculation: Discharge of Semen.
- In Semination: Discharge of Semen in to the female genital tract with the help of penis in natural way is called insemination.

Giomete. Alive for viable for / o
fertilised with
Sperm 48 hrs. 24 hrs.

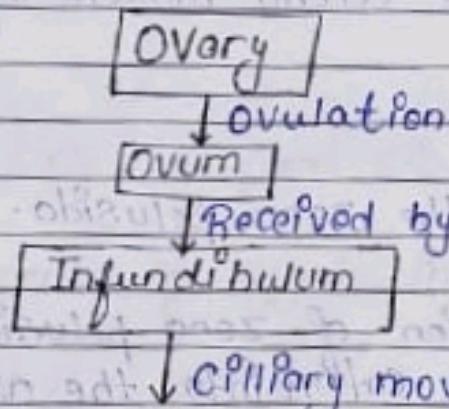
Ovum 72 hrs. 48 hrs.

Fertilization:-

- Fusion of male and female gamete is called fertilization.
- Fertilization occurs in fallopian tube or oviduct at the junction of Ampulla and Isthmus.
- The process of fertilization completes in following 5 steps:-

1. movement of gamete up to fallopian tube.
 2. Fertilin - Antifertilin reaction.
 3. Acrosomal Reaction.
 4. Cortical Reaction.
 5. Amphimixis (meiosis + Fertilization).
-
- movement of sperm — Inside the female genital tract.
 - movement of sperm in female genital tract depends on their own tail and prostaglandin is present in Semen.

- Prostaglandin causes contraction and relaxation in female genital tract which helps in movement of sperm upto oviduct.
- Capacitation — Female genital tract make sperm capable of fertilising called Capacitation.
- It takes 4 to 5 hrs. During this process Acrosome become almost fully exposed.
- movement of ovum :-



Enters at the junction of Ampulla and Isthmus where fertilization takes place.

(ii). Fertilizin - Antifertilizin Reaction :-

- It occurs for the interaction of sperm and ovum.
- Fertilizin secreted by ovum which is a glycoprotein.
- Antifertilizin secreted by sperm which is an acidic amino acid.

(iii) Acrosomal Reaction :-

→ Acrosome Secretes Sperm Lysin which Contains following Enzymes:

- Hyaluronidase:-
→ It dissolve the ground mass, mucus etc present on the Surface of ovum.
- Corona penetrating Enzyme (CPE)
→ It dissolve the Corona radiata layer of ovum.
- Zona Lysin.
→ It dissolve the zona pelusida.
- After penetration of zona pelusida layer, head of Sperm enters into the ovum and neck region blocks the entrance.

4. Cortical Reaction :-

→ Cortical granules covers the ovum after entry of Sperm head so, Corona radiata layer becomes thick and strong to prevent entry of another Sperm or poly spermie.
I.e. We are mono Spermie.

Note:-

Human egg is alecithal (without yolk) and non-cladocic i.e. without or shell.

Egg of Reptiles and birds are cladocic i.e. shell present which is made up of CaCO_3 secreted by oviduct.

5. Amphimixis :-

- The process of meiosis is and fertilisation is called Amphimixis.
- After entry of head of sperm into ovum both nucleus fuse to form diploid zygote.

Development of zygote into embryo :-

Sperm (n)

Ovum (n)

Fertilisation (in oviduct)

↓ cleavage (mitosis without growth)

2-cell stage

or

2-blastomere stage (Developing ov.)

↓
4-blastomere

↓ cleavage

8-blastomere

↓ cleavage

16-blastomere

] morula

many Celled Stage

Blastula

Gastrula

morula Stage :-

→ 8 to 16 Celled Stage. At this Stage Embryo moves from outside to uterus (It takes 3 to 4 days).

Blastula :-

→ At this Stage Implantation occurs.

Implantation :-

→ Attachment of embryo with the wall of uterus through placenta is called Implantation.

Gastrula :-

At this Stage (3) germ layers.

1. Ectoderm.
2. Mesoderm.
3. Endoderm.

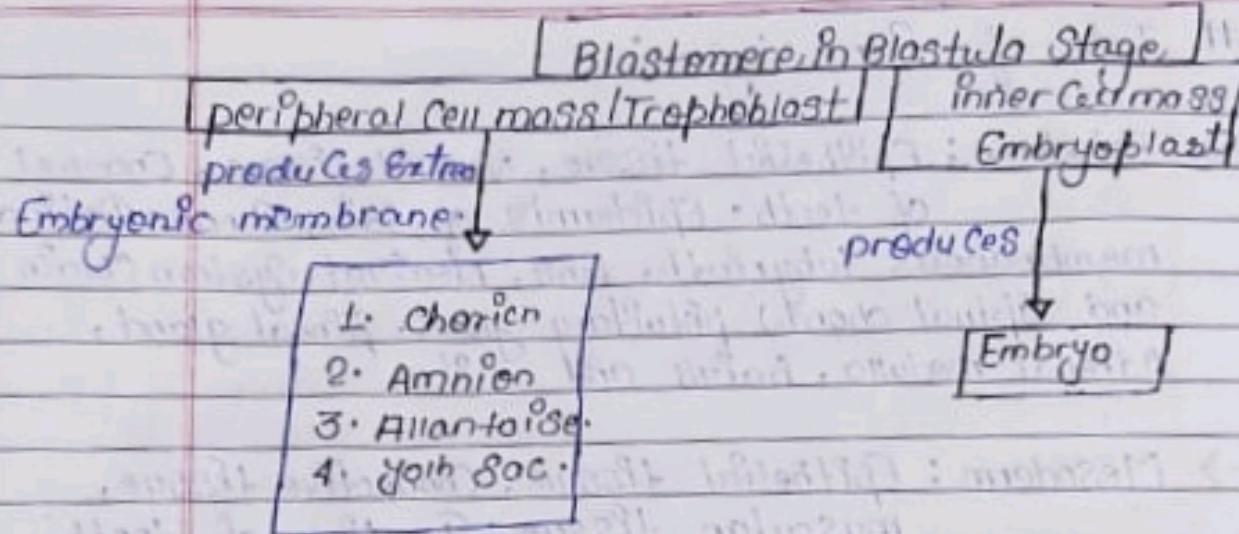
Fate of Germ layer :-

- Ectoderm : Epithelial tissue, Neural tissue, Enamel of teeth, Epidermis of skin, Cornea Retina, membranous labyrinth, Lens, Neural system (brain and spinal chord), pituitary gland, pineal gland, Adrenal medulla, hair and nail.
- Mesoderm : Epithelial tissue, Connective tissue, muscular tissue, Dentine of tooth, Decumis of skin, choroid, Sclera Cartilage, bone, blood, lymph heart, spleen, Adrenal cortex, Coelom, lining, serosa, musculans, Sub-mucosa, peritoneum, kidney.
- Endoderm : Epithelial tissue, middle ear, Eustachian tube, tongue, All digestive gland, lungs, thyroid gland, parathyroid gland, thyroid gland, mucosal layer, urinary bladder etc.

Site of development is uterus.

- uterine bed
- placenta
- Decidua

• These three are maternal tissue



- Extra embryonic membrane + uterine tissue
- Placenta :-
- It is formed by chorionic villi and uterine tissue.
- placenta attach with embryo through umbilical Cord.
- Umbilical Cord - is highly vascularized structure which help in transport of nutrients, Gases, Nitrogenous base, hormone, and antibody (IgG).
- IgG is the only antibody which can cross this placenta.
- placenta works as endocrine structure because

Pt Secrete several types of hormone like HCG (Human chorion Gonadotropin), HPL (Human placental lactogen), progesterone, Estrogen etc.

→ During pregnancy level of several hormones increases.

- Organogenesis :-

- At the end of 1st month Heart develops P.e. first sign of pregnancy observed often first month by listening near beat sound with the help of stethoscope.
- At the end of one month limbs and digits are formed.
- At the end of 3rd month major organ system develop lymph and external genitalia well developed.
- During 5th month hair appears on head first movement of child appear often 5th month (mother can feel it).
- At the end of 6th month body covered with fine hairs, eyelids separate eye/lashes are formed.
- At the end of 9th month foetus is fully developed and ready for delivery.

NOTE :-

Amniocentesis is a technique through which chromosomal abnormality of foetus is identified with the help of Amniotic fluid. But today it is largely used to identify foetus.

parturition or child birth :-

- Human Gestation period is of 270 days (9 month).
- parturition occurs due to foetal ejection reflex (given by fully developed foetus and placenta).
- During normal delivery oxytocin secreted by pituitary which causes wild Contraction & relaxation in the smooth muscle of myometrium of uterus which causes easy child birth.
- During late phase of pregnancy a hormone relaxin is secreted by ovary which relaxes the pelvic region of muscle.

Water's :-

- Before parturition Amniotic fluid comes out forcibly due to rupturing of amnion and chorion called water's.

After birth —

→ After few hrs. of child birth formed structure inside the uterus during pregnancy come out through birth canal formed after birth.

Extra embryonic membrane —

→ placenta, umbilical chord, Desidua etc are formed.

Colostrum :-

→ Milk secreted by mother after parturition (For few days) Contain Colostrus which is highly rich in nutrients and antibody which provide immunity to the child.

→ Colostrum contain IgA.

Twins —

Formation of 2 or more child by same parents in same pregnancy.

Twins

↓
Unidentical twins↓
Identical twins↓
Gêmeos twins

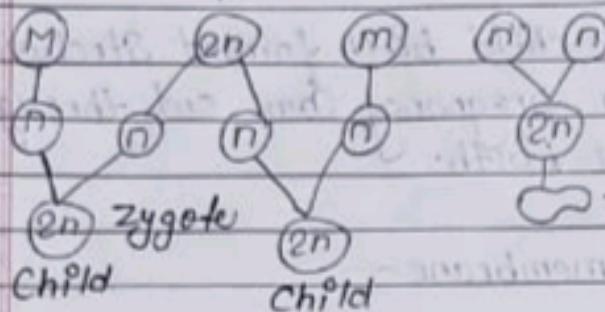
- Also called Fraternal twins. → Called maternal twins → Due to incomplete separation of cleavage egg.
- Due to release of 2 ova in m.c. → monozygotic twins. → Due to separation of cleavage egg.
- Sexes may be same / different → Due to separation of zygote during cleavage.
- Genetically different → Sexes same.
- Caused by dizygote. → Genetically different.
- Unidentical. → Identical.
- Genetically different → Identical by fingerprints.

unidentical

identical

Simease

F



2 head . Single body.

1 head : 2 body.

2 head . 2 body.

2n - 00

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