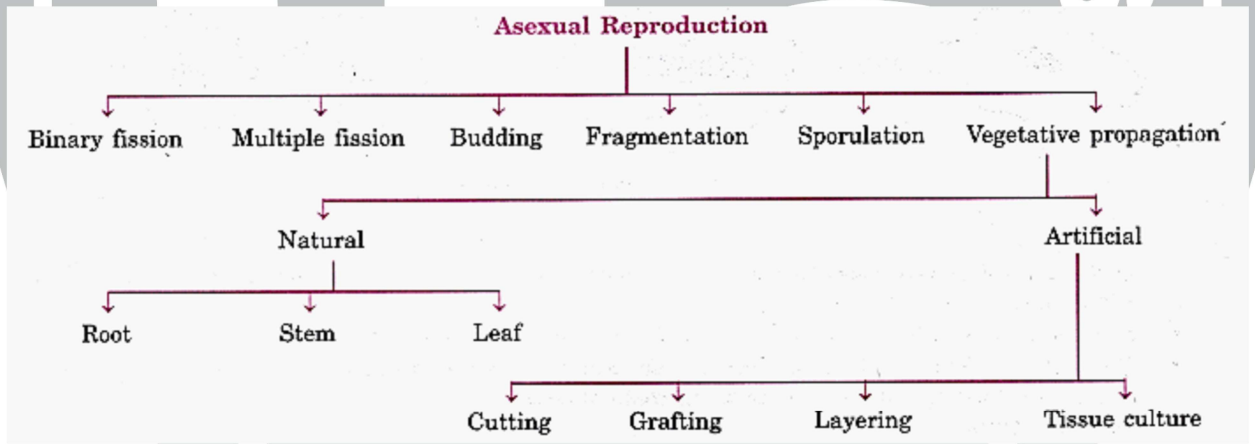
HOW DO ORGANISMS REPRODUCE

Reproduction:- The biological process in which every living organisms give birth to young ones of the own kind.

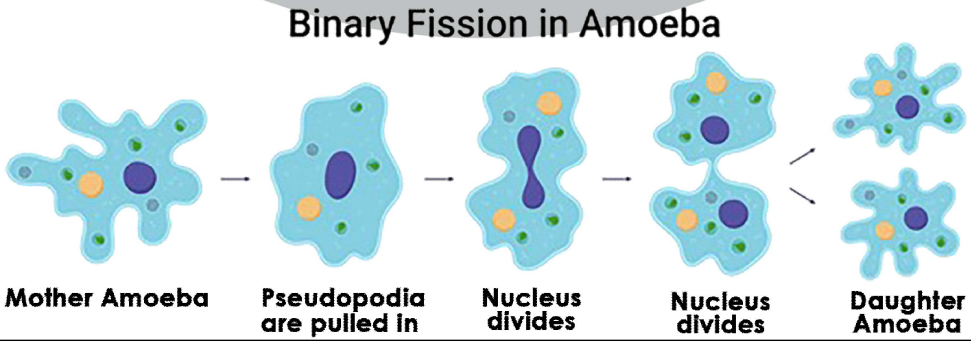
- **Significance:-** It ensures the continuity of various species.

→ Production of new organism from a single parent without involvement of sex cell is called **Asexual Reproduction**.

Asexual Reproduction	Sexual Reproduction
(i) Involves only a single parent.	Involves two parents (male & female).
(ii) The entire reproduction process takes less time and less energy.	The process takes longer time and more energy.
(iii) Population can increase at faster rate.	Population increase relatively slower.
(iv) It involves less variation. Only 1 parent DNA available.	It involves more variation.
(v) The species is very **vulnerable** (weak) to change in environment.	Species can adopt to an environment which changes.
(vi) This does not leads to evolution.	This leads to evolution.
(vii) Ex.- Bacteria, Yeast, Amoeba	Ex.- Humans, Flowering Plant, Fish, Chicken, dog.



- **Binary Fission:-** Division or splitting of one parent organism (cell) into two new organism. Ex.- (Amoeba, Paramecium, Lieshmania), Bacteria, Euglena etc.



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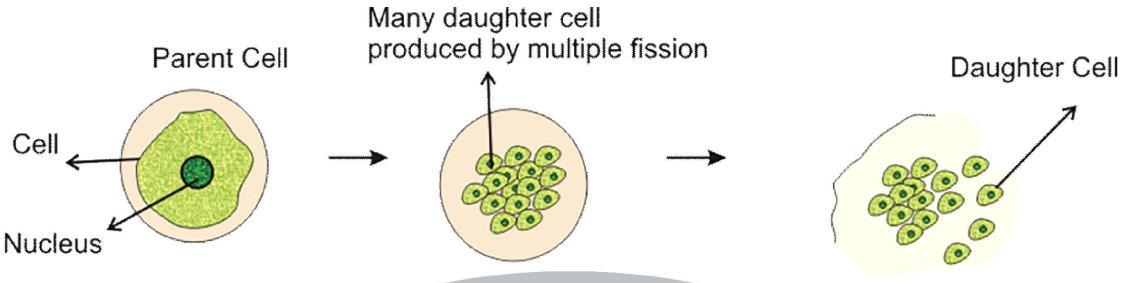
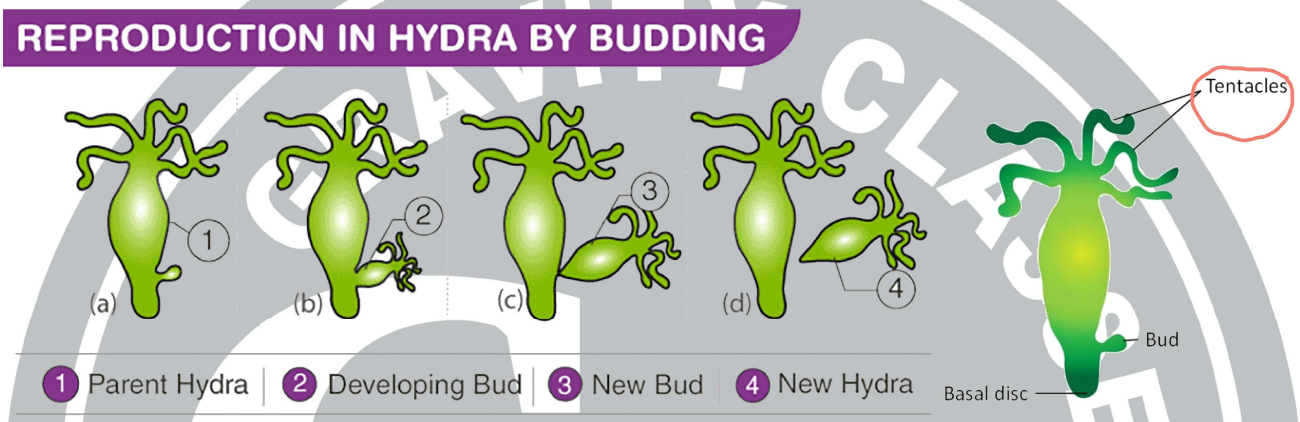
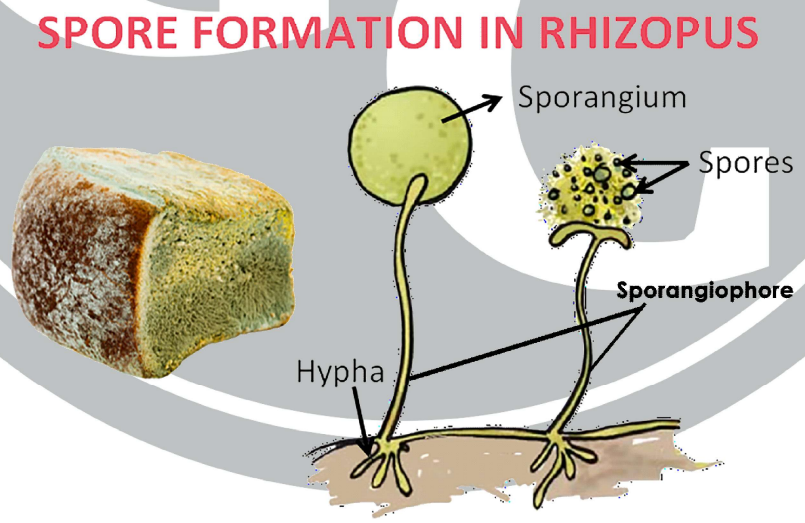
- **Multiple Fission:-** Division or splitting of one parent organism (cell) into many organism at same time. Ex.- Plasmodium, Chlamydomonous.



- **Budding:-** A new organism develops from an outgrowth or bud. Ex.- Hydra, Yeast.



- **Spore Formation:-** Parents plants generates thousand of spores which individually grow in a plant. Ex.- Most of the fungi (Rhizopus, Mucor), bacteria and no-flowering plants i.e. ferns, mosses follow this formation.



- **Function:-** When the spore case bursts then the spore spread into air. When these air born spores land on floor under favorable condition (moist surface) then it starts grow up.
- **Fragmentation:-** A fragment of the parent breaks off and develops into an entirely new but genetically identical individual. Ex.- Spirogyra, lichens.

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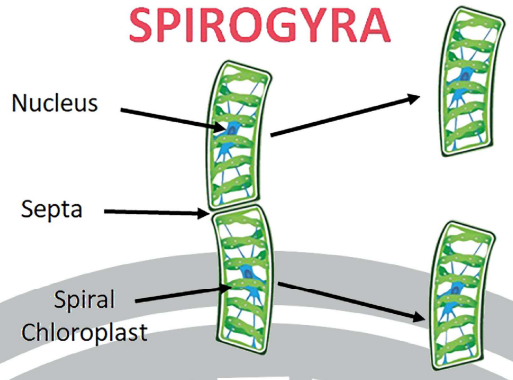
✳ There is **no regenerative cells present** as such.

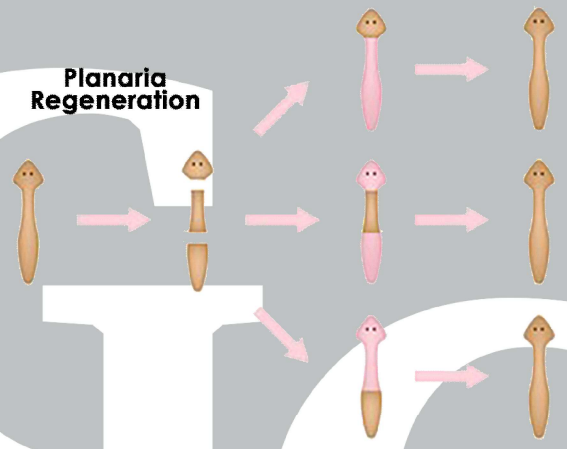
FRAGMENTATION IN SPIROGYRA



- **Regeneration:-** The regrowth of a damaged or missing organ part from the remaining tissue. Ex.- Planaria (Flatworm), Hydra.

✳ They have **specialized regenerative cells**.

✳ Eyes spot of planaria is very sensitive to (try to escape from light) light but can't see.



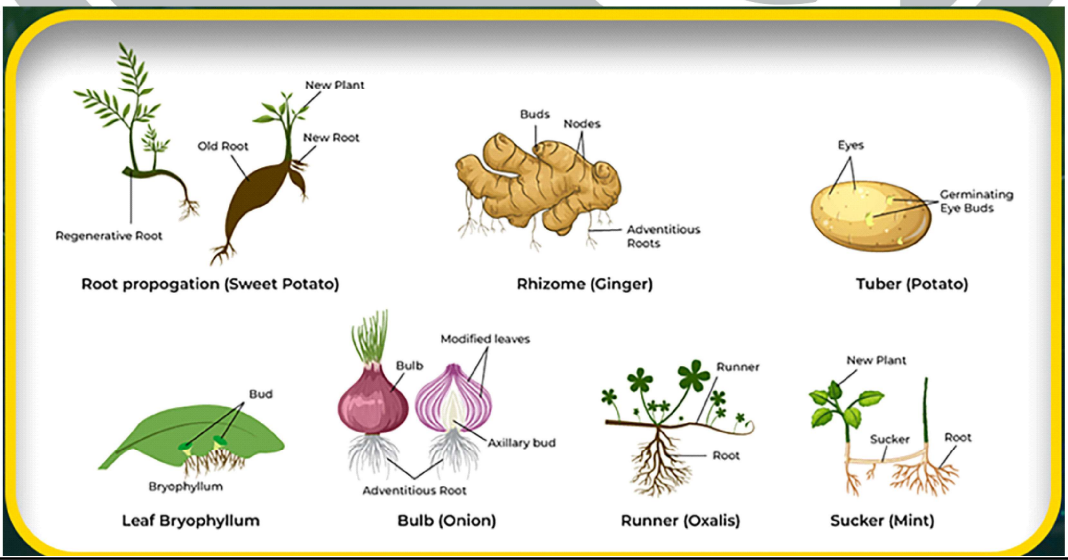
- **Vegetative Propagation:-**

Natural

→ **Root:-** Sweet Potato, Carrot →

→ **Stem:-** Potato →

Ex.- Mint plant, Money plant, Ginger, Onion, Lily, Tulips, Banana, Straberry etc.



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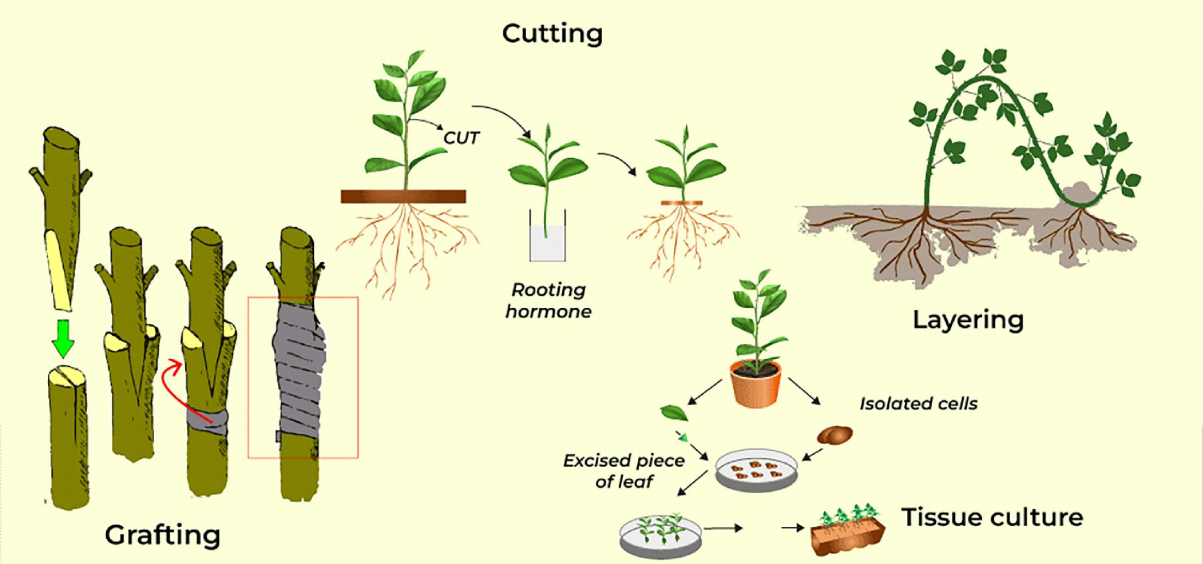
→ **Leaves:-** Bryophyllum or Begonia →

Artificial

→ **Cutting :-** Ex.- Rose, a small part of plant which is removed by making cut with a knife is cutting.

→ **Grafting:-** Ex.- Mango, is horticultural technique whereby tissues of plants are joined so as to continue their growth together.

→ **Layering:-** Jasmine.



- **Grafting:-** New plants are obtain from the part of old plants like stem, leaves, root etc. without the helping any reproductive organs.
- **Layering:-** The development of roots on a stem while the stem is still attached to the parent plant is called layering.

  A layer is the rooted stem following detachment (removal) from the parent plant.

✳ Sometime plants propagate naturally by layering, but sometimes plant propagators assists the process.

Vegetation Propagation	
Advantages	**Disadvantages**
(i) True to type-each is a clone of the parents. Only way for some varieties.	(i) Little chance of a new variety arising. Monocultures are susceptible (impact) to disease.
(ii) Uniformity-each will be exactly the same.	(ii) Cost-requires skilled labour and aftercare.
(iii) The only way to reproduce sterile (बाँझ) varieties such as Vitis vinitera 'Thompson's Seedless' [good quality grapes to form vine thin skin and no seeds in that grapes]	(iii) Time-each plant has to be individually propagated (फैलाना).
(iv) Speed to maturity is much quicker.	

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TISSUE CULTURE

- It is the production or propagation of new plants from isolated plants cell or small pieces of plant tissue in a synthetic medium of Culture Solution.

→ Plants are grown by removing tissues or separating cells from the growing tip of the plant and put in an artificial medium.

→ The plant tissue divide to form small group of cells or **Callus**.

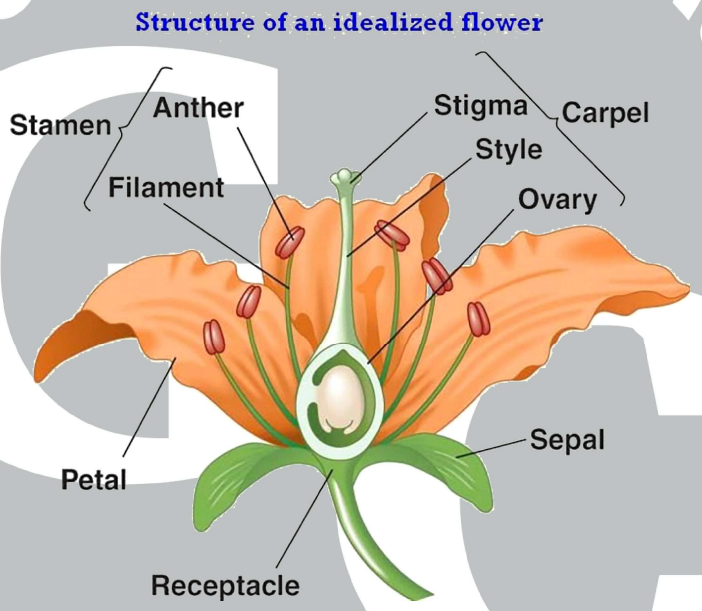
→ The callus is transfered to another **medium containing hormones** for **growth** of differentiation, that forms **plantlets.**

→ The plantlets produced are transplanted into pots or soil where they can grow to form mature plant.

→ This technique is also known as **Micropropagation** in **Vitro** because it takes places outside the body of the parent plant in a test tube using an artificial environment.

→ Micropropagation technique is being used for the production of ornamental plants like orchids, Dahlia and Carnation.

Sexual Reproduction in Plant



- **Parts of Flower:-** A typical flower has four main parts the calyx, the corolla, the androecium (male part) and the gynoecium (female part).

(i) Calyx:- Is the outermost whorl of a flower. It is usually green in colour. The individual members of the calyx are called **Sepals**.

They **protect** the young flower **bud**.

(ii) Corolla:- Is the second whorl of the flower. The individual members of the corolla are called **petals**. They are usually coloured and **attractive** and also **protect** the **essential whorls**.

(iii) Androecium:- Is the third whorl from outside. It is the **male part** of the flower. It consists of structure called **stamens**.

Each stamen has two main parts:-

→ Filament.

→ Anther

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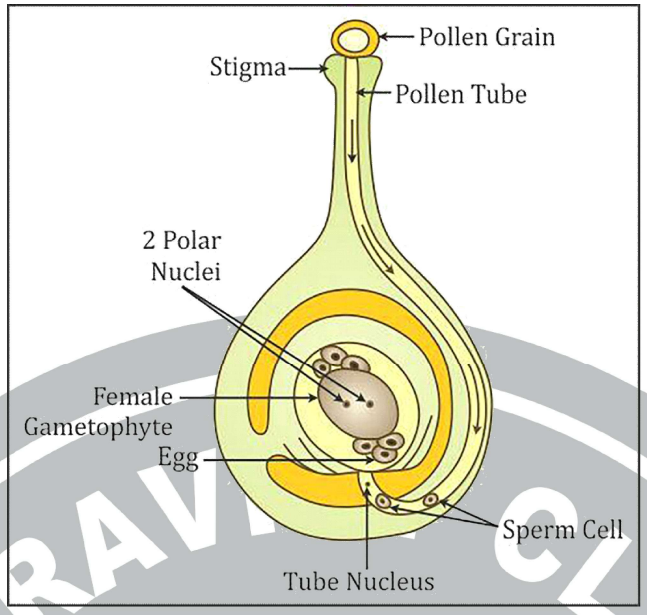
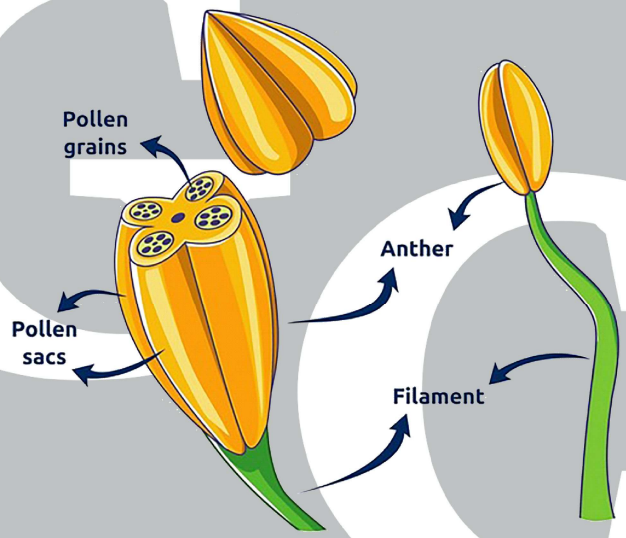
✳ The anther **produce Pollen GRAINS** which take part in **reproduction**.



(iv) Gynoecium:-

→ It is also known as **Gynoecium** or **Female Part** of the flower.

→ this is the indication of Female Part.



✳ The Male Gamate is present in stamen of Pollen Grain which is of hair type.

● **Pollination:-** The process of transfer of pollen grains from anther of a flower to the stigma of the same or another flower is known as pollination.

This is the 1st step of sexual reproduction in flowring plants.

Types of Pollination:-

(i) Self-Pollination:- Same Flower/Plant.

(ii) Cross-Pollination (By Bees):- One to another flower/plant.

Agents of Pollination:-

(a) Pollination by Wind.
(b) Pollination by Water.
(c) Pollination by Animals.
(d) Pollination by Insects.

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→ After reaching on the stigma, the pollen grains develop the pollen tube. Inside the pollen tube are produced two male gametes.

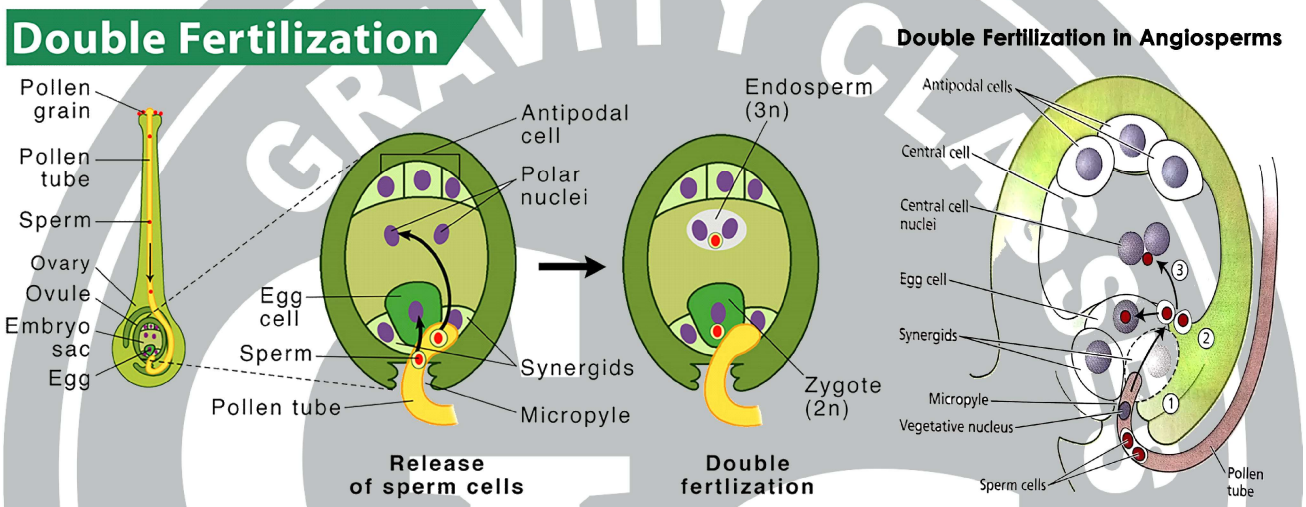
One of the male gametes reaches the egg or female gamete. The two gametes fuse together to form zygote. This fusion is known as **Fertilisation**.

● **Fertilisation:-** The process of fusion of a male cell and a female cell in ovule to form zygote is called Fertilisation.

→ After fertilisation, most of the parts of the flower wither and significant changes occur inside the ovary.

→ Ultimately the ovule of the **flower** changes into **seeds** and the **ovary** changes into **fruits**.

The seeds can be seen inside the fruits, such as- Apple, Mango.



✳ Synergid cells are two specialized cells that lie adjacent to the egg cell in the female gametophyte of angiosperms and play an essential role in pollen to be guidance and function.

● **Double Fertilisation (2 Fusions):-**

(i) Syngamy

(ii) Triple Fusion.

→ One sperm cell fertilizes the egg cell to form the zygote, while the other fuses with the two polar nuclei that form the endosperm.

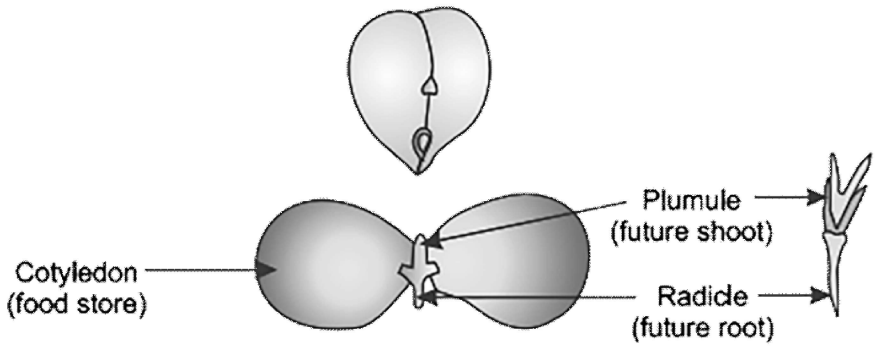
→ When pollen tube enters ovule, it strikes one of the **synergids** and burst open to release the two male gametes which fuses with two different structure in the same female gametophyte. The fusion with two (2) nuclei forms endosperm.

● **SEED GERMINATION**

→ Seed germination defined as the fundamental process by which different plant species grow from a single seed into a plant. This process is known as Seed Germination.

→ A seed contains a body plant and food for the new plant. Generally a seed consists of a seed coat.

It has many other parts such as cotyledons, radicle and plumule.



Germination of gram seed

- **Reproduction in Human Beings:-**

→ Reproduction resulting from the fusion of male gamete and female gamate is called sexual reproduction.

→ The human being are bisexual with two separate sexes-male and female.

→ The **testis (M)** and **Ovary (F)** are the **primary sexual characteristics**. It is not visible.

→ The individual of the two sexes show distinctive features called the **secondary sexual characteristics**.

It is visual from outside, high pitch sound, pelvis bone become wider it is totally appearance based and small baby.

→ Such distinguishing features are present in all the animals.

→ All these characters will arrive after **Puberty**.

- **Puberty:-**

→ The age at which the gametes and sex hormones to be produced and the boy and girl become sexually mature is called **Puberty**.

→ It is the age when the sexual harmone become active they start secreting into the blood and into the body and they develop the another character from the primary sexual character in the special type of character.

→ Generally female pubertal age is 10-12 years, male pubertal age is 13-14 years.

- **Pubertal Changes (Secondary Sexual Characters) in Female:-**

→ Widening of **Pelvic** and **Hips**.

→ High pitch voice.

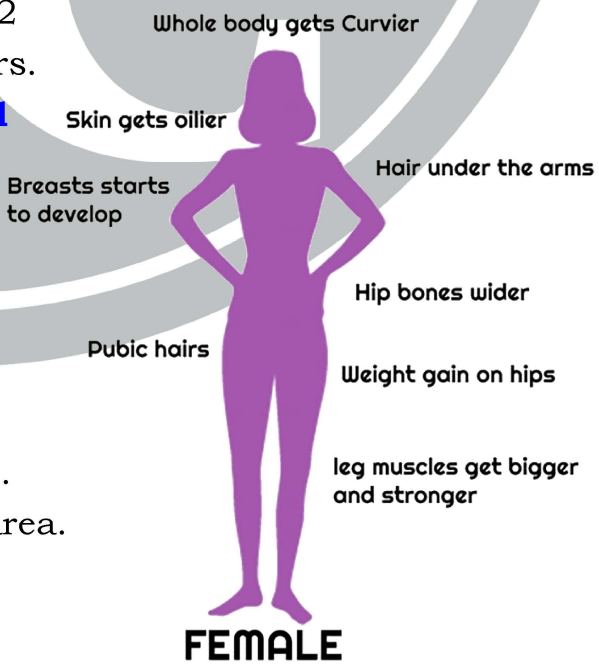
→ Growth of **hairs** under armpits and around **pubic** area.

→ Initiation of **menstrual cycle**.

→ Growth of **mammary glands (breasts)**.

→ Darkening the skin colour of **genital** area.

→ **Maturation** of secondary **sex organs** like **fallopian** tube, **uterus**.



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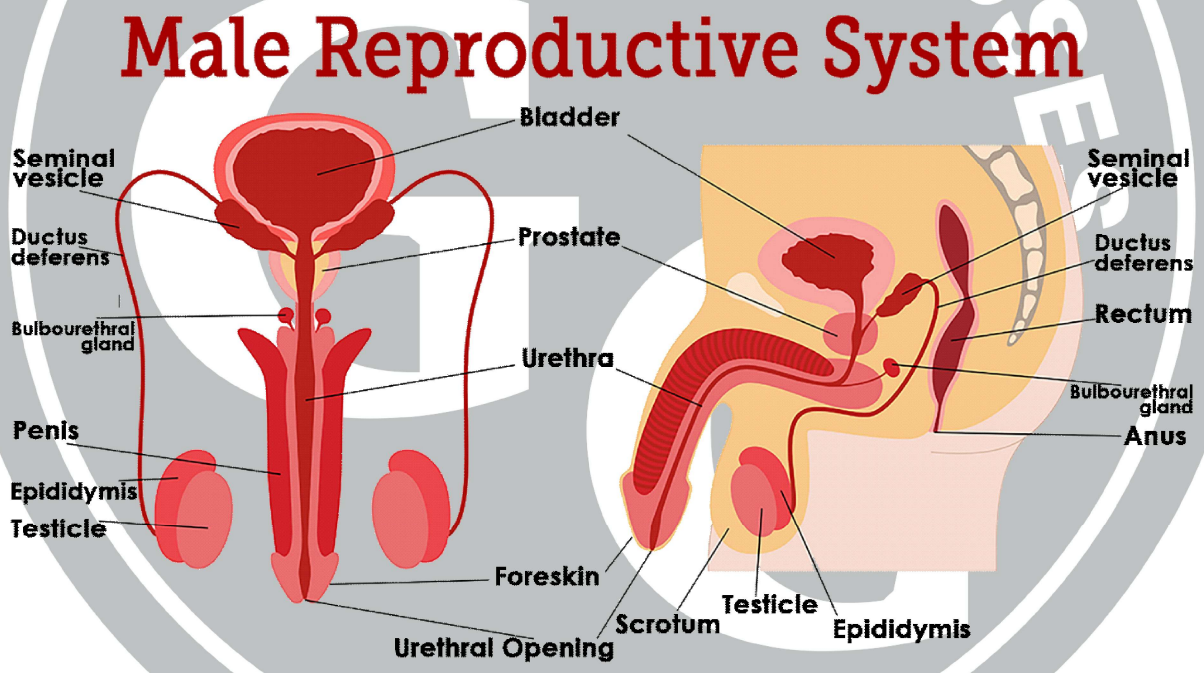
- **Pubertal Changes (Secondary Sexual Characters) in Male:-**

→ Widening of **shoulders**.
→ Deepning of voice.
→ Growth of **hairs**, under chest, armpits and around **pubic** area.
→ Appearance of **beard** and moustaches.
→ **Growth** of sex organs (**Testis and Penis)**.
→ Increased activity of sweat and **sebaceous** gland (which produce oil in body)
→ **Oily skin** and appearance of **pimples**.
→ **Darkening** in skin colour of the **genital** area.

The Reproductive system comprises of two different parts:-

(i) Primary Reproductive System:- Testis, Ovum.

(ii) Accessory Reproductive System:- Ducts (pipes) or gland. It support the primary part or testis or the ovary.



Male Reproductive System:-

- **Testis:-**

→ Below the abdominal cavity.
→ Paired, oval-shaped male sex organs.

- **Lobules:-**

→ Testis have the chambers and these chambers is known as **Lobules (15-20)**.
→ Testis consist of **seminiferous tubules**, where the sperms are produced.
→ Produce a male sex hormone called **testosterone**. This hormone produced by the **leydig cells** which bring about changes in a apperance of boys at puberty.

→ **Testis** is present in the **Abdominal cavavity** before **birth** as soon as the birth happened this **descendown** from abdominal into **scrotum** (pouch like structure) this will provide the perfect **environment** for the **development** of **Sperm**.

→ Testosterone is responsible for the form action of sperm is also known as **Spermatogenesis**.

This is a continues process.

- **Scrotum:-**

→ Small pouch like structure that contain testis.

→ Present outside the abdominal cavity. As sperms are formed here, this requires a lower temperature that the normal body temperature by 2-3° C. Otherwise sperm will not form.

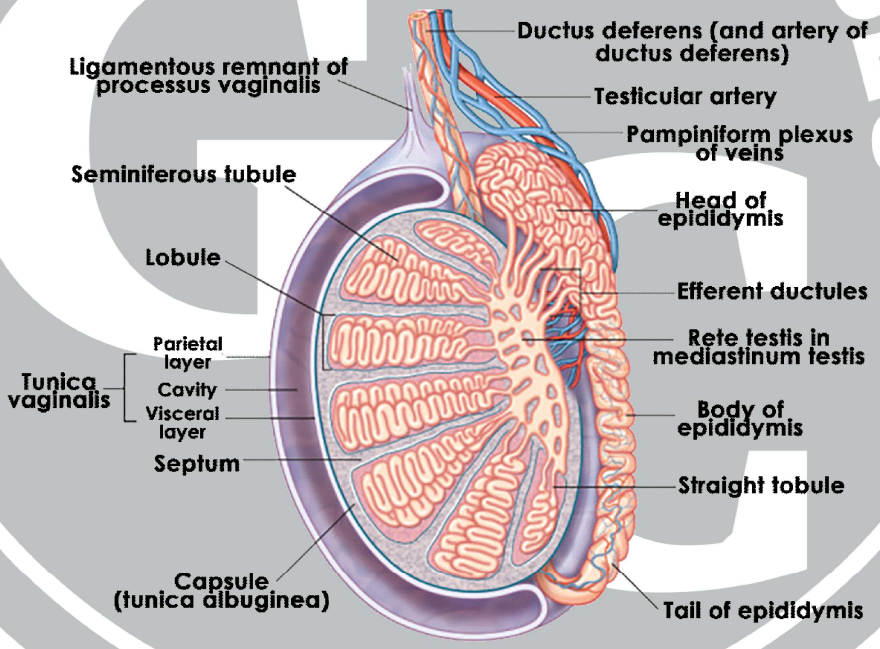
→ It will shrink in the cold and expand during the summer.

- **Vasa Efferentia:-**

→ It is joining of all the **Seminiferoustubole** into **4-5 Vasa Efferentia**.

→ Now 4-5 or 4-6 **Vasa Efferentia collect all the sperm** form testis and goes outside.

→ From the seminiferous tubules, the sperm are passed into a network of **10-12 ducts** called the **efferent ducts** or the **Vasa Efferentia**.



- **Epididymis:-**

→ They are then passed into a highly coiled tubular part called the **epididymis**.

→ Epididymis is an organ that extends from the top of the testis along its side to its back.

→ It has three parts.

(i) Head (upper).
(ii) Body (middle).
(iii) Tail (hind).

→ It temporarily **stores the sperm** to maintain the **perfect temperature** here.

- **Vas Deferens:-**

→ The sperm from the epididymis passes into the tube called as **vas deferens**, it is also called as **sperm duct**.

- **Penis:-**

→ Penis is a muscular organ containing **erectile** (highly rich blood supply) **tissue**.

→ The tissue is richly supplied with blood vessels.

→ Common passage for both the sperms and urine. It never carries both of them at the same time.

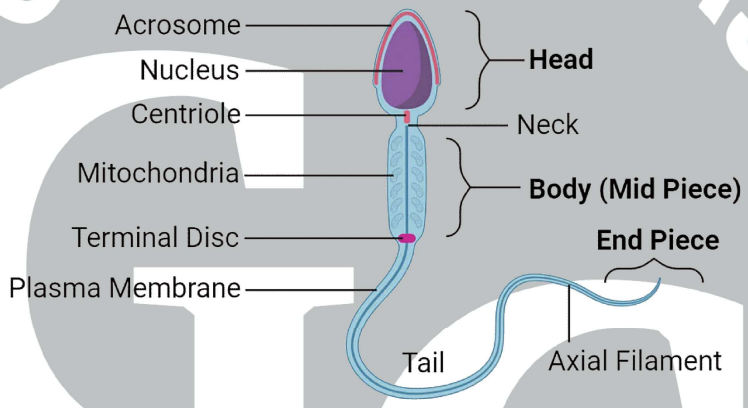
→ Secretes seminal fluid and nutrients.

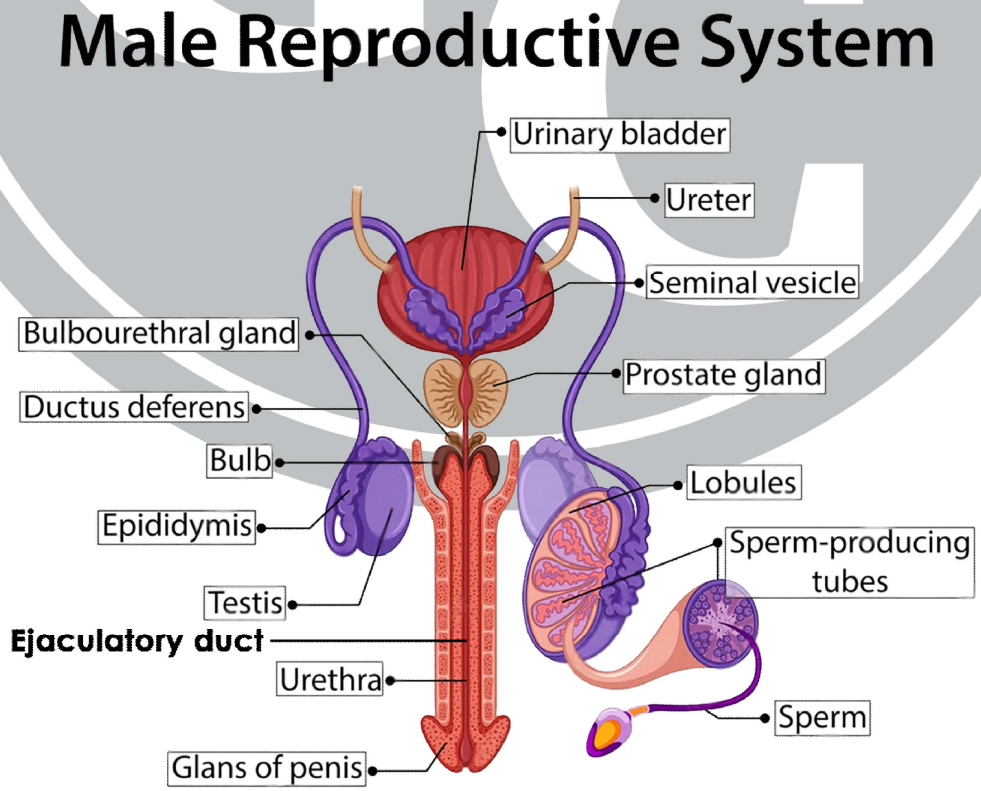
→ They have **rich blood supply** once the blood vessels are **vacant** then it means the male reproductive organ/urethra will **lose**.

Once the **blood** will **filled** into these tissue then it will **erectile** and it is ready for **sexual activity**.

- **Sperm:-**

→ Tiny and **motile** bodies that use their long **tail to move** through the female reproductive tract.





- **Glands:-** The various glands associated with the male reproductive system are as follows:-

Seminal Vesicle Gland:-

→ A pair of seminal vesicles are glands that are present behind the urinary bladders.

→ Each sperm duct has the seminal vesicle of its side secreting a fluid into the common **ejaculatory duct**.

→ This fluid along with the sperm is called the **semen (a milky fluid)**.

→ It has various **nutrients** such as **sugar, amino acid, minerals** etc which give **motality** to the **sperm to move** faster till the ovum or **ova**.

Because sperm **don't have** much energy **to flow** or travel that distance till ova because **sperm** very very **small cell**.

- **Prostate Gland:-**

→ It is a **bilobed** (Butterfly Shape) gland near the opening of the urethra.

→ The **prostate gland** also **pours its secretion** into the uretha.

→ It is **alkaline** (pH more than 7) and **mixes with the semen**.

- **Cowper's Gland/Bulbourethral Gland:-** (Transparent **whitist fluid**).

→ They are a pair of small **ovoid** (oval shape) glands that secrete **lubricating fluid into** (**fructose**, **calcium**, certain **enzyme**) the **urethra just before** it **enters** the female vagina.

→ The secretion of those glands make the **sluggish (active) sperm more active** and **help** in the **passage** of **sperm** through the duct system and then in the ejaculation.

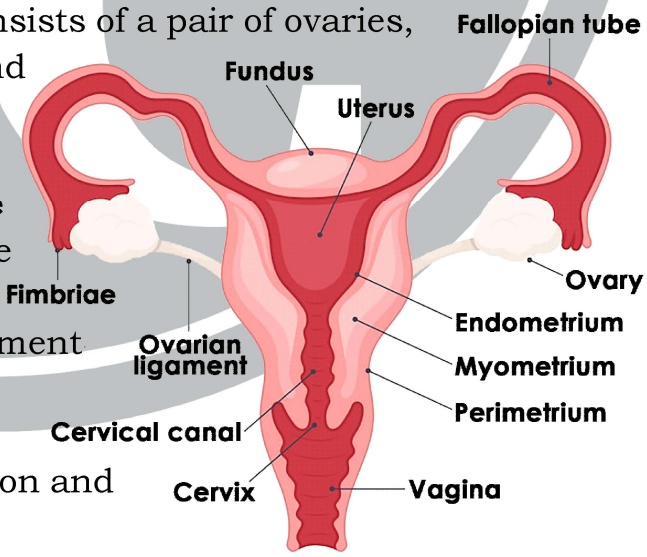
→ Located beneath the prostate gland at the beginning of the internal portion of the penis.

FEMALE REPRODUCTIVE SYSTEM

(i) Necessary Reproductive System:- Ovaries.

(ii) Accessory Reproductive System:- Pair of oviduts uterus, vagina and vulva.

→ The female reproductive system consists of a pair of ovaries, a pair of oviducts, uterus, vagina and vulva.



→ The main function of the female reproductive system are to **produce egg**, receive the sperms, provide the site for **fertilization**, **implantation** of the growing **embryo** and development of the **foetus**.

→ It also **produces hormones** that control the various stages of ovulation and maintenance of pregnancy.

→ For **puberti** there is **seperate harmone (oestrogen)** to maintain baby during **9 month** there is **seperate harmone**.

If this harmone **(progesterone)** is not release during this period then mother got **aborted** that **child**.

- **Ovaries:-**

→ Paired, **oval shaped** organs located in the abdominal cavity **near the kidney**.

→ Produce thousands of ova or egg cells.

→ The ovary matures **one egg at a time** in every **alternate month**.

→ Secrete female sex hormones like **oestrogen (puberty change)** and **progesterone (pregnancy)**.

→ There is **millions of ovary** during the birth but continues death of the egg is occuring into your ovary till the puberty period.

Now we have less eggs till puberty **approx 1000 eggs** we can't add extra/ new egg from outside during this period.

→ At some age the after releasing egg at alternate interval of month time and finally got exhausted.

And female can't release egg and finally can't become pregnant.

- **Oviduct (Fallopian Tube):-**

→ Oviduct are a pair of tubes of about **12 cm in Length**.

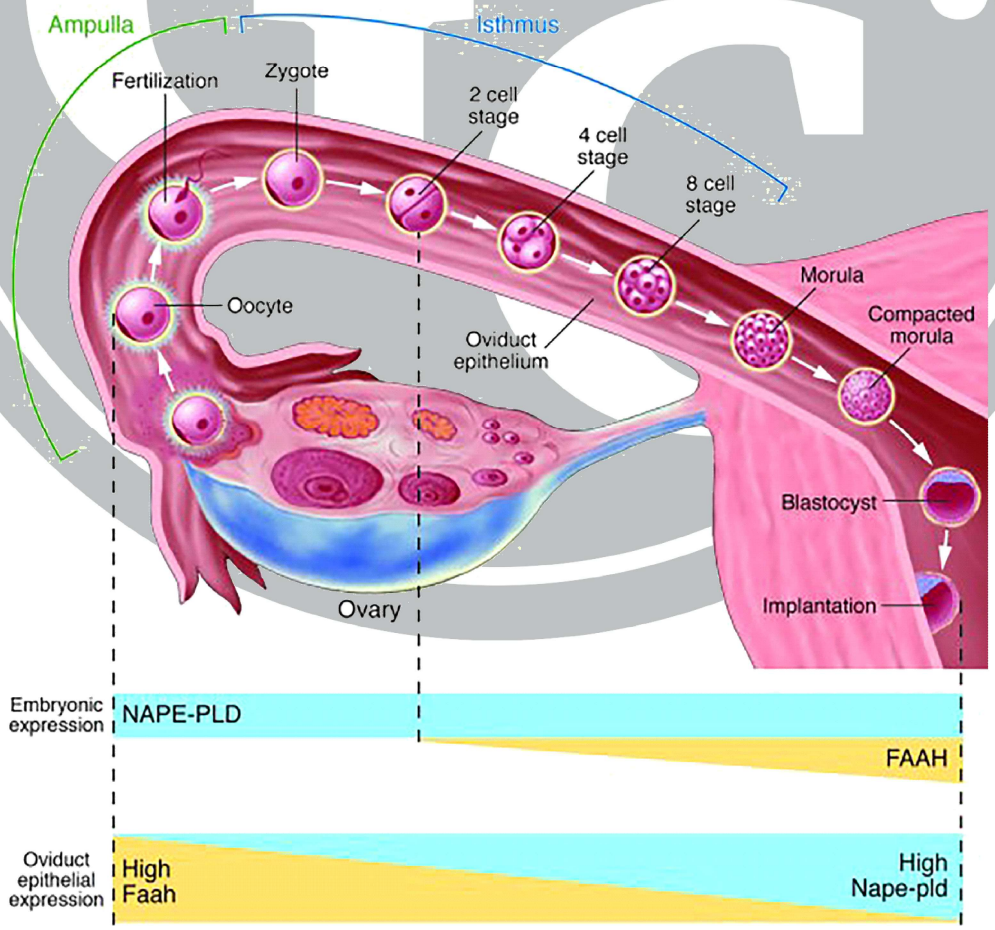
→ It has a funnel-shaped opening near te ovary.

→ Carries ova or egg from ovary to the uterus.

→ It is the **site of fertilisation** when the sperm and ovum mixed together and become **zygote**.

→ These open into the uterus from both the side.

→ Single sperm and ovum cell become **zygote**. Zygote cell makes tissue and is known as **Embryo**. **Attached on placenta** and process is **implantation**.



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- **Uterus (Womb):-**

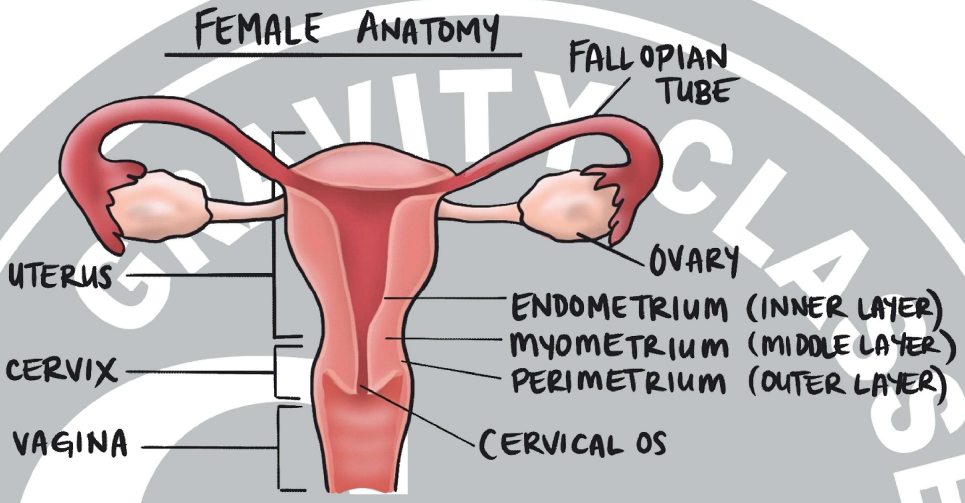
→ Uterus is inverted pear shaped structure, broad on the upper end and narrower on the lower end.

→ The **upper end** is called the **body** of the uterus and the **lower** end is called the **cervix**. Cervix is very very **sensitive** and can catch easy **infected**.

→ At the upper end, it receives the oviducts of either side whereas the lower end the cervix opens into the vaginal canal that opens to the outside.

→ It is the **main site** of the **implantation**. It holds the baby during pregnancy.

→ It has **3 layers**.



1st Layer reponsible for implantation and **Embryo hold (Endometrium)**.

2nd Layer is muscular and **expand** itself and **adjust (Myometrium)**.

3rd Layer provide **protection** and **support (Perimetruim)**.

- **Cervix:-**

→ It is the lower and the narrower portion of uterus which opens into the vagina.

→ Muscles of cervix control the opening and closing of uterus.

→ It is closed when the mother is pregnant and as soon as the cervix muscles get relaxed the baby can be delivered outside.

→ It is **very very sensitive** (catch infection easy).

- **Vagina:-**

→ It is **9cm** long.

→ Receives the sperms from the male partner.

→ **Environment** of vagina is **acidic**.

→ Serves as a birth canal.

→ Vagina environment is highly acidic **[pH 3.8 to 4.5]** (to **Lactobacillus**) Lactic Acid **protect it from infection** because it is highly sensitive. So during ejaculation of semen deliver into vagina so **firstly Cowper gland secrete** and **then the sperm**.

Because **Cowper gland** hold **alkaline (pH 7.1-7.2)** fluid which **neutralise** the acid present in the vagina. So finally sperm can easily entered with **lubricated** without death.

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- **Fertilization and Post Fertilization:-**

→ The fusion of nucleus of the sperm (male gamete) and ovum (female gamete) is known as Fertilization.

(i) Copulation.
(ii) Sperm Movement.
(iii) Penetration.
(iv) Fertilization.
(v) Cell division.
(vi) Implantation.

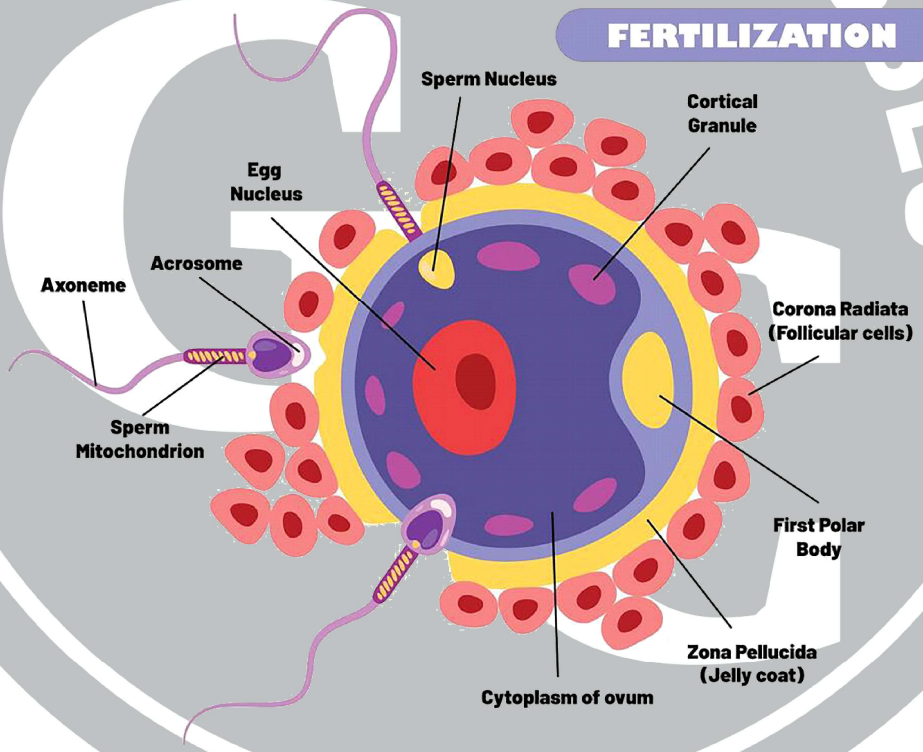
- **Copulation:-**

→ Copulation is the insertion of male reproductive part into the female reproductive part (vagina) so that he can release sperm to the female vagina.

- **Sperm Movement:-**

→ Lashing movement of sperm in upward of vagina ejaculated millions **(5.5 M)** of sperm in one ejaculation uterus get contracted to create more pressure at innerside so that sperm can easily go to the upward.

- **Penetration:-**



→ Sperm pentrate the ova and head (Nucleus) entered into ova and tail remain outside and outerlayer get **freezed** as soon as the sperm (1) get entered.

- **Fertilisation:-**

→ Both nucleus diffuses and formed **zygote**.

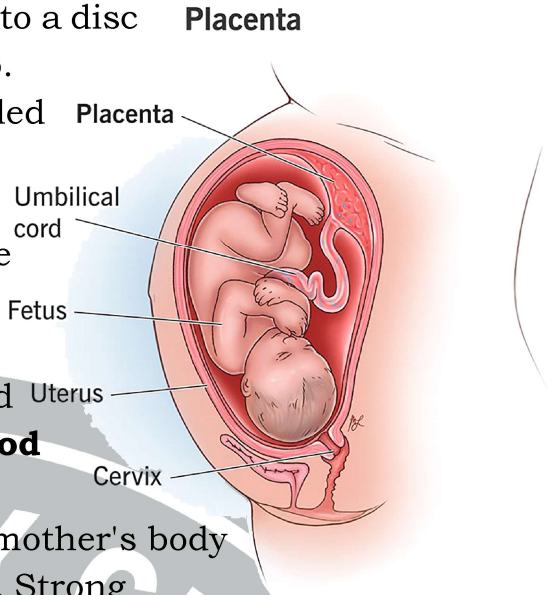
- **Cell Division:-**

→ Zygote get divide into cells and make Embryo.

- **Implantation:-**

→ It is the stage of pregnancy at which the embryo adheres to the wall of the uterus and **receiving nutrients** continuesly.

→ During pregnancy the **placenta grows** into a disc between the uterine wall and the embryo.



→ Placenta forms finger like projections called villi towards embryo. This create large surface area for the exchange of glucose and oxygen beteween the mother and the embryo.

→ The developing embryo also generates waste substances. These can be removed by transfering them into the mother's **blood through** the placenta.

→ The development of the child inside the mother's body takes approximately 9 months in human. Strong rhythmic muscular contractions in the uterus cause childbirth to take place if the egg is not fertilised.

✳ **What happened when egg is not Fertilized/Menstrual Cycle:-**

→ If females, ovaries release ovum or egg once every 28 days from the age of puberty.

→ The uterus prepares itself every month to receive a fertilised egg. Thus its lining becomes thick and spongy. If the egg is not fertilised it lives for about a day.

→ If the egg is not fertilised it will removed out from your body in the form of blood is called as **Menstruation Cycle**.

→ Afterwards this lining of uterus is no longer required and menstruation occurs. Menstruation is the time of uterine bleeding in which an infertilised egg and the thick uterine lining will shed out from your body.

→ It occurs through the vagina as blood and mucus (slippery aqueous secretion produced by mucous membrane). Menstruation lasts for about 2-8 days.

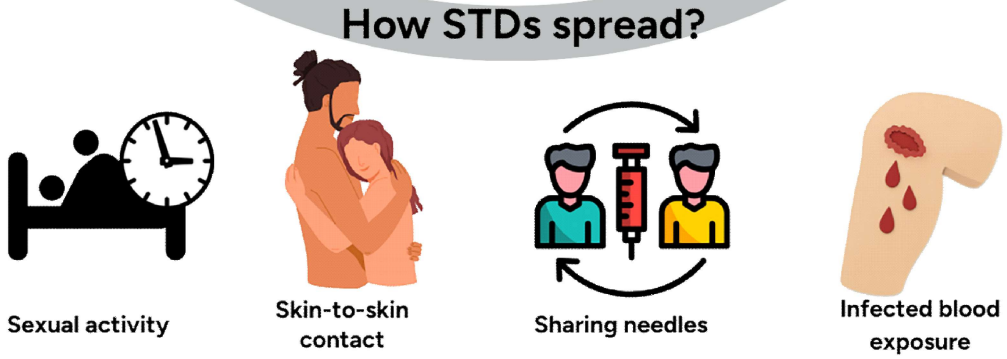
→ Start of menstruation cycle at the age of 11 to 13 called **Menarche**.

→ Menstruation will stop at the age of 45-50 called as **Menopause**.

● **Reproductive Health:-**

→ Reproductive health means a total well-being in all aspects of reproduction i.e, physical, social, emotional and behavioral.

→ Sexually Transmitted Diseases **(STDs)**:- Many diseases can be sexually transmitted such as



Bacterial : Gonorrhoea (transfer → Placenta - Foetus) and Syphilis (Painless)

Viral : Warts and HIV-AIDS (Human Immuno-Deficiency Virus), AIDS (Acquired Immune Deficiency Syndrome).

→ Use of condom (balloon structure) prevents these infections to some extent.

→ **Contraception:-** It is the avoidance of pregnancy can be achieved by preventing the fertilization of ova.

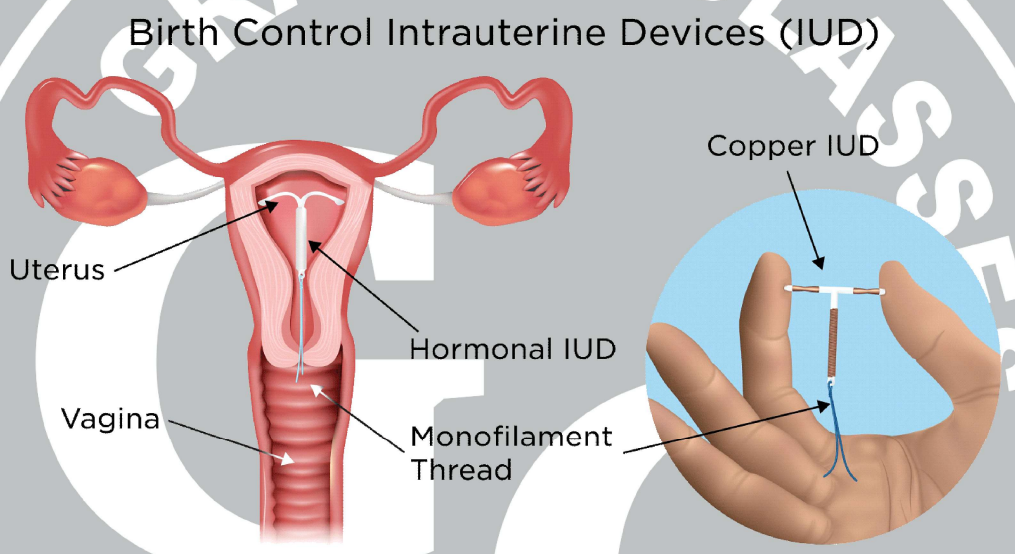
- **Methods of Contraception:-**

(i) Physical Barrier:- To prevent union of egg and sperm. Use of condoms, cervical caps and diaphragm.

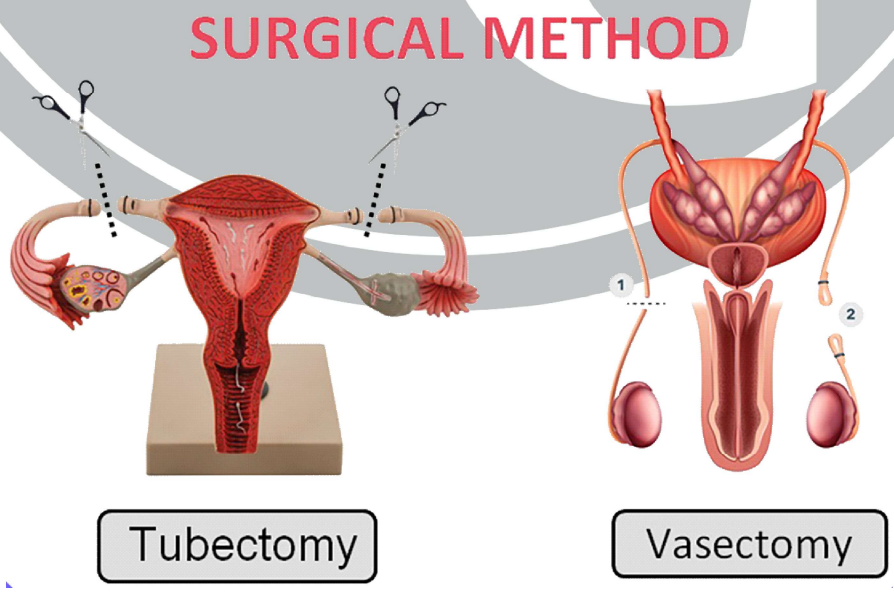
(ii) Chemical Methods:- Use of oral pills. These changes hormonal balance of body so that eggs are not released. May have side effects.

(iii) Intrauterine Contraceptive Device (IUCD) (Cu-T):- Copper-T or Loop is placed in uterus to prevent pregnancy.

Cu^{2+} → Sperm (Motility ↓) [Sperm (××) + Seminal Fluid (Disease)]



(iv) Surgical Methods:- In males the **vas deferens** is **blocked** to prevent sperm transfer called **Vasectomy**. In female the **fallopian tube** is **blocked** to prevent egg transfer called **Tubectomy**.



- **Syphilis Treponema Pallidum (STDs):-** I.P - 3 weeks, shape: Spiral shape. Symptoms : 3 Stages.

  1st Stage:- Chancre (painless lechen) at point of entry Genitals (Vagina).

  2nd Stage:- Organism enters blood → skin rash, hair fall, fever, flu like symptom, swollen joints, persist several years.

  3rd Stage:- Brain damage, heart disease, blindness upto 40 years after exposure.

✳ STD can pass through placenta ⇒
- Blood transfusion
- Poor hygiene

Gonorrhoea disease : Niesseria Gonorrhoea.
Incubation Period (IP) → 2-5 days.

- **Infection by :-** Non-sexual intimacy with affected bathroom, fixtures, bed lines → (45 min-24 hr)
- **Symptoms:-** Discharge of pus from penis or excess vaginal secretion, burning pain on urination, Pain around genitals, irregular menstrution.
- In syphilis there is pain less ulcers.
- Mens affected more easily and have intense symptoms.

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