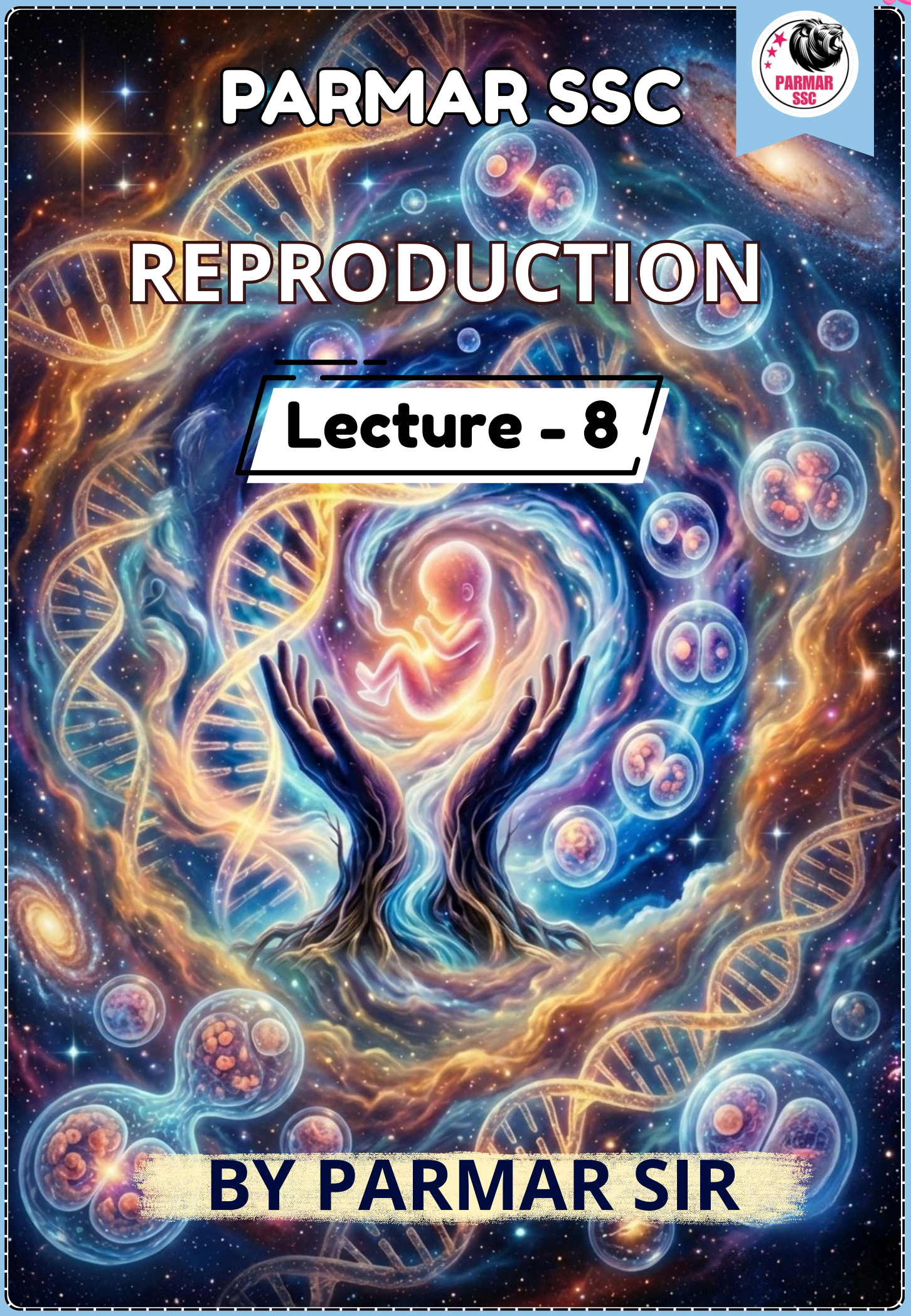
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REPRODUCTION

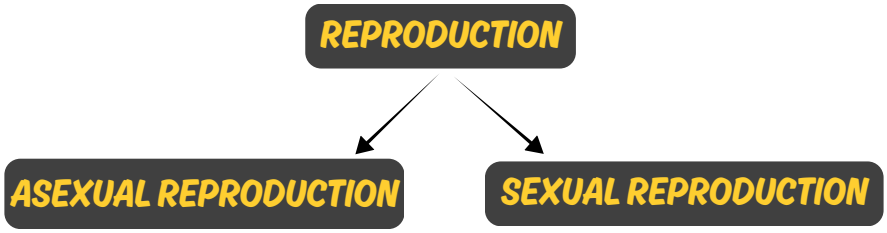
Lecture - 8



BY PARMAR SIR

REPRODUCTION

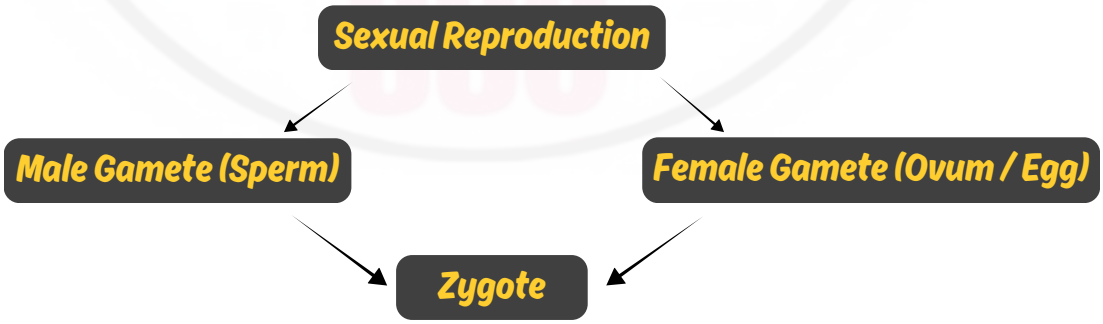
- Reproductions to the biological process by which living organisms produce offspring to continue their species. It is not essential for individual's survival, but is crucial for survival of a species.



Asexual Reproduction	Sexual Reproduction
Only one parent plant is involved	Both male and female parents are involved
Occurs in unisexual plants	Occurs in bisexual plants
Occurs in lower plants	Occur in higher plants
Genetic similarity is commonly seen here	Genetic diversity is commonly seen here. Higher chance of survival
Reproductive organs are not present	Fully developed reproductive parts are present

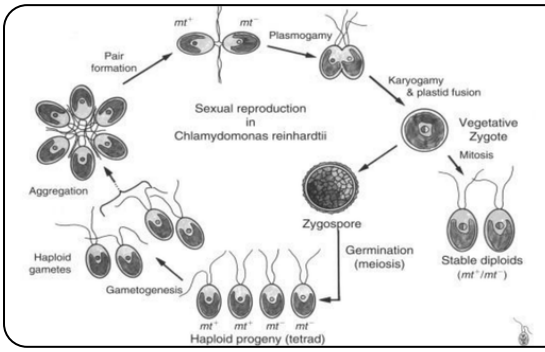
METAGENESIS

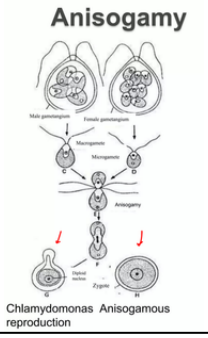
- A type of life cycle in which one generation of plants or animals reproduce asexually, followed by sexually reproducing generation i.e., some individual of species are diploid and some are haploid.
- **E.g.** Obelia.

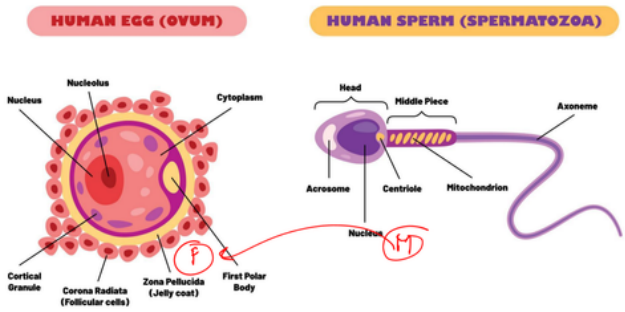


Types of Gametic Fusion

- **Isogamy**: Fusion of morphologically similar gametes (same size and shape).
  E.g. Chlamydomonas.
- **Anisogamy**: Fusion of morphologically dissimilar gametes (different size and shape).
  E.g. Some algae, fungi.
- **Oogamy**: A type of anisogamy where large, non-motile egg fuses with small, motile sperm.
  E.g. humans.



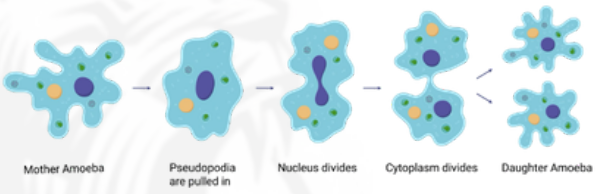




ASEXUAL REPRODUCTION

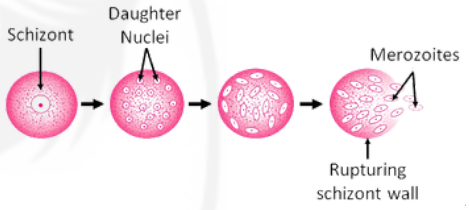
Binary Fission

- It is a process of asexual reproduction in which a unicellular organism divides two equal, genetically identical daughter cells.
- It is common only in unicellular organisms.
- **E.g.** Amoeba, Leishmania.



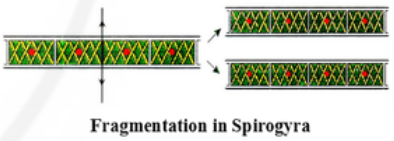
Multiple Fission

- It is a process of asexual reproduction in which the nucleus divides multiple times, and the cytoplasm divides later to form many new daughter cells.
- Many offsprings are produced.
- **E.g.** Plasmodium (malarial parasite).



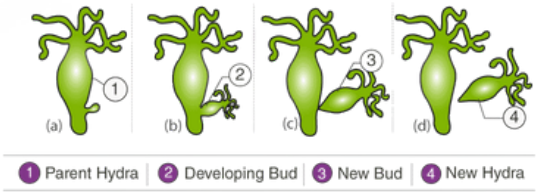
Fragmentation

- It is a process of asexual reproduction in which the body breaks into pieces, and each fragment grows into a new organism.
- It occurs in simple multicellular organisms.
- **E.g.** Spirogyra (green algae), Rhodophyte (red algae) and sea anemone.


Fragmentation in Spirogyra

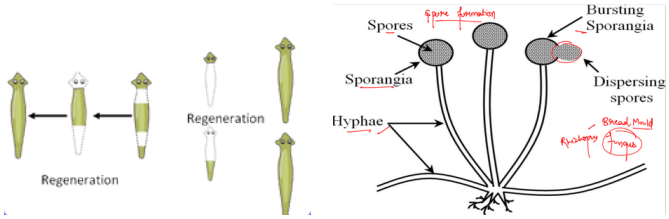
Budding

- It is a process of asexual reproduction in which a new organism develops from a bud or outgrowth on the parent organism.
- A small bud forms on the parent body due to cell division.
- It grows and detaches to form a new organism.
- It occurs in simple multicellular and unicellular organisms.
- **E.g.** Hydra (multicellular) and Yeast (unicellular).



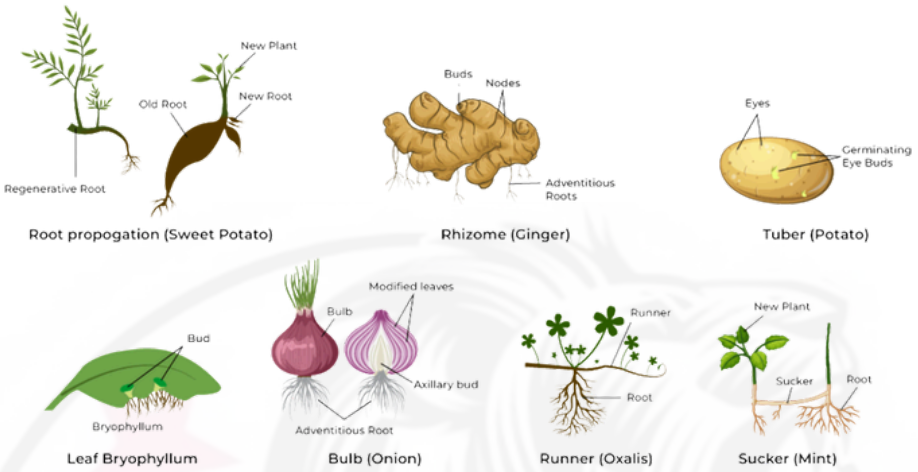
Regeneration

- It is a process of asexual reproduction in which a new organism develops from a part of the original organism.
- **E.g.** Planaria, Hydra.



Vegetative Propagation

- It is a process of asexual reproduction in which a new plant grows from the vegetative parts of the parent plant, such as the root, stem, or leaf.
- It can also occur through cutting or grafting parts of the plant.
- This method does not involve seeds, and the new plant is genetically identical to the parent.



- The buds in potato are called "eyes", they are axillary buds located at the nodes of stem.
- These eyes can grow into a new potato plant.

Types of Vegetative Propagation

1. Cutting

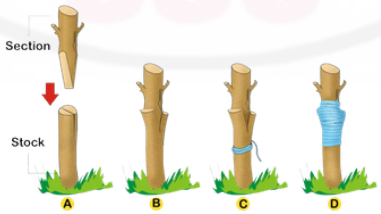
- A part of plant (stem or leaf) is cut and planted into the soil. E.g. Rose plant, money plant, banana plant, sugarcane plant.

2. Layering

- The stem of the plant is bent to the ground and covered with soil. E.g. Lemon, strawberry.

3. Grafting

- Cutting from some other plant attached to the stem of the plant and planted into the soil.
- **E.g.** Rose plant.



Tissue Culture

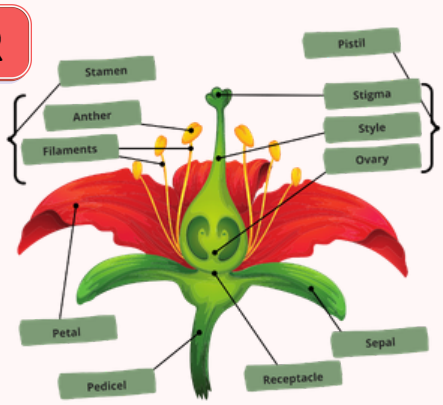
- Tissue culture is a modern method of asexual reproduction used to grow new plants from a small group of cells or tissues in a laboratory under sterile conditions.
- **E.g.** Tissue culture is widely used in ornamental plant like snake plant. Cost of such plants are very high.



SEXUAL REPRODUCTION IN PLANTS

- Sexual reproduction in plants involves the fusion of male and female gametes (pollen and ovule) to form a zygote, which develops into a seed that grows into a new plant.
- This process occurs through flowers, the reproductive organs of plants.

ANATOMY OF A FLOWER



- Male reproductive part (collectively called Stamen) consists of:
  - **Filament:** Supports anther.
  - **Anther:** Produces pollen (yellow colour).
- Female reproductive part (collectively called Pistil) consists of:
  - **Stigma:** Sticky bulb that catches pollen.
  - **Style:** Passageway for pollen.
  - **Ovary:** The part of pistil that holds the eggs awaiting fertilization and later becomes the fruit.

Types of Flowers

Bisexual Flowers (Hermaphrodite Flowers)

- These flowers contain both male (stamens) and female (pistil) reproductive organs in the same flower.
- They are capable of self-pollination as well as cross-pollination.
- **E.g.** Hibiscus, mustard, lily, sunflower.

Unisexual Flowers

- These flowers contain only one reproductive organ either stamens or pistil, but not both.
- They are capable of cross-pollination.
- **E.g.** Male flower that only has stamens Corn, Cucumber; Female flower that only has carpels Papaya, watermelon.

Monoecious Plants

- Male and female reproductive parts are present on the same plant.
- **E.g.** Maize, cucumber

Dioecious Plants

- Male and female reproductive parts are present on separate plants.
- **E.g.** Papaya, date palm.

Pollination

- Pollination is the process where pollen, containing a plant's male reproductive cells, is transferred to the female part of a plant (stigma).
- This transfer is essential for plant reproduction, leading to fertilization and the development of seed.

Types of Pollination

1. Self-Pollination (Autogamy)

- Pollen from anther is transferred to the stigma of the same flower or another flower on the same plant.
- No genetic variation.
- **E.g.** Pea, tomato.

2.Cross-Pollination (Allogamy)

- Pollen is transferred from the anther of one flower to the stigma of another flower on a different plant of the same species.
- Promotes genetic diversity.
- **E.g.** Apple, sunflower.

Agent	Type of Pollination	Examples
Insect	Entomophily	Rose, Lotus
Wind	Anemophily	Maize, Grass
Water	Hydrophily	Vallisneria

Specific Terms Associated

False Fruit

- A fruit that develops from other parts of a flower, in addition to ovary, and does not require fertilisation. In this type of fertilization, thallus is also involved.
- **E.g.** Apple, cashew nut.

Drupe Fruit

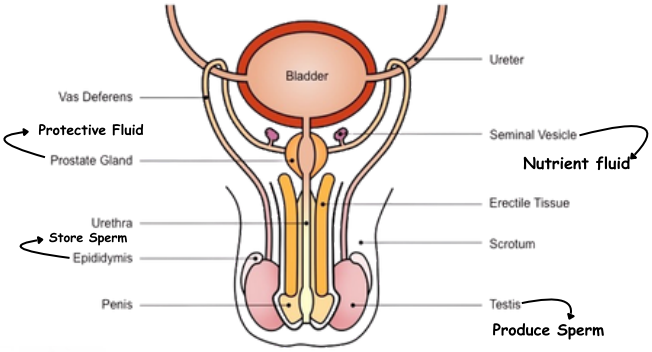
- It is a type of fruit with a hard shell that includes a seed and has an inner flesh.
- **E.g.** Coconut.

Parthenocarpic Fruits

- They are seedless fruits, that develops without fertilisation of an ovule.
- **E.g.** Banana, grape, cucumber.

HUMAN REPRODUCTION SYSTEM

Male Reproductive Part



Testes

- Located in the scrotum. It produces sperm and testosterone.
- Sperm production typically begins around age 10-12 yrs.

Vas Deferens (Sperm Duct)

- Tube that transports mature sperm from epididymis to urethra.

Seminal Vesicles and Prostate Gland

- Adds seminal fluid to sperm to form semen. Semen provides nutrients and a medium for sperm to swim.

Urethra

- Carries semen and urine, but never at the same time. It passes through the penis.

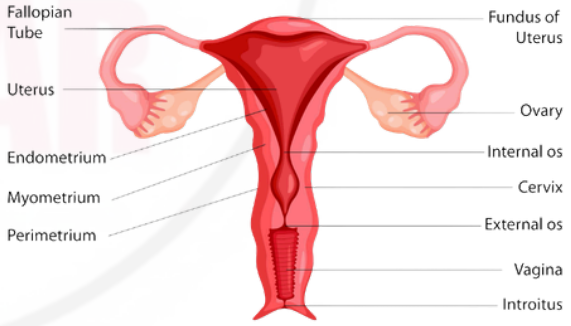
Female Reproductive Part

Fallopian Tubes (Oviducts)

- Site where sperm meet egg and fertilization occurs.
- Cilia push the egg towards the uterus.

Uterus (Womb)

- Muscular organ where a fertilized egg implants and develops into a foetus.
- The innermost lining is the endometrium.



Cervix

- Lower part of the uterus connecting to the vagina.
- Must open during childbirth.

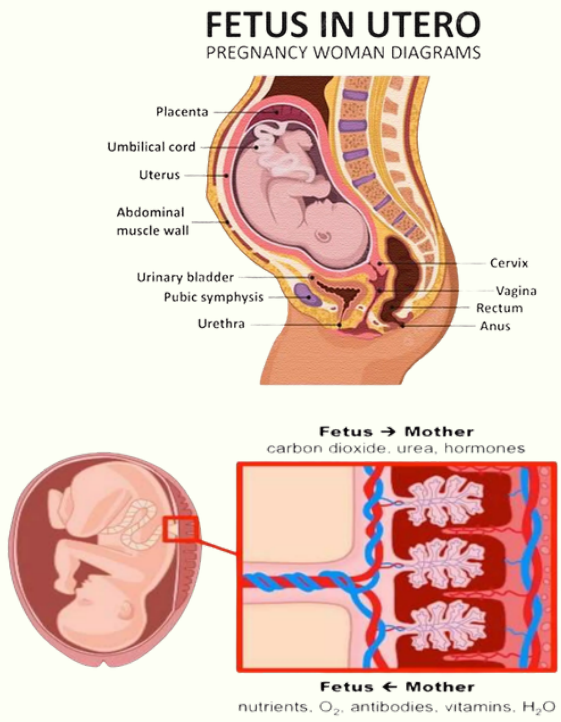
Cervical cancer is caused by the Human Papillomavirus (HPV)

- Thickening of uterine wall for preparation for potential implantation of fertilised egg during pregnancy.
- When pregnancy does not occur after the uterine lining thickens, the lining is shed through menstruation.

Menopause

- Menopause is the permanent cessation of menstruation in women, marking the end of their reproductive years.
- It typically occurs in the late 40s to early 50s, with the average age being around 51.
- This stage is characterized by the ovaries no longer releasing eggs and a decrease in the production of estrogen and progesterone.

- **Placenta:** It is a link between the mother and the baby.
- From the placenta arises a cord called the umbilical cord, which carries substances to and from the foetus.
- **The umbilical cord contains three blood vessels:**
  - **One umbilical vein** – carries oxygen and nutrients from the mother to the foetus.
  - **Two umbilical arteries** – carry carbon dioxide and waste materials from the foetus to the mother.



Fertilization

- Process where a male gamete (sperm) and a female gamete (egg) fuse to form a zygote.

Internal Fertilisation

- Fusing inside the female body.
- **E.g.** humans.

External Fertilisation

- Fertilising outside the body.
- **E.g.** Frog, earthworms, crab.

Viviparous

- Give birth to live offspring.
- **E.g.** Cats, dogs, humans.

Ovoviviparous

- Eggs develop inside mother's body.
- **E.g.** Sharks, snakes

Oviparous

- Lay eggs that develop outside.
- **E.g.** Birds, frogs. (Exception: Platypus is a mammal that lays eggs).

Feature	Oviparous	Ovoviviparous	Viviparous
Egg laying	Yes	Eggs kept inside	No
Development	Outside body	Inside egg (inside mother)	Inside uterus
Nourishment	Yolk	Yolk	Placenta
Birth	Hatch outside	Live birth	Live birth
Example	Hen	Snake	Human

Process of Fertilization

Process involved:

1. **Gametogenesis:** This is the process of forming gametes Sperm in males and eggs in females, essential for reproduction.
2. **Insemination:** It involves the transfer of sperm into the female reproductive tract during intercourse.
3. **Fertilisation:** The sperm meets and fuses with the egg, forming a zygote (the first cell of the new baby).
4. **Implantation:** The zygote develops into a blastocyst and attaches itself to the uterine wall, beginning pregnancy.
5. **Gestation:** This is the period of development where the embryo grows and forms into a foetus inside the uterus.
6. **Parturition:** The final stage, where the baby is delivered through childbirth.

In-Vitro Fertilisation (IVF)

- Egg combined with sperm outside the mother's body in a laboratory.

Totipotency

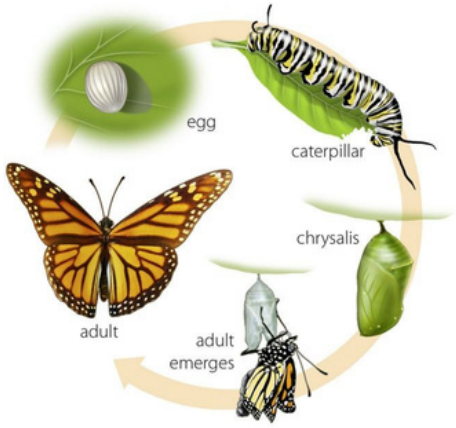
- It is the ability of a single cell to produce a fertile, adult individual.

Parthenogenesis

- A type of asexual reproduction, where an organism develops from an unfertilised egg, without the need for sperm. The unfertilised egg completely develops into a new organism.
- **E.g.** Honey bees, lizards.

Metamorphosis in Butterfly

- **Metamorphosis of a Larva into an Adult:** Butterfly metamorphosis is a complete transformation involving four distinct stages: Egg, larva (caterpillar), pupa (chrysalis), and adult butterfly."



Types	Culture
Vegetable farming	Horticulture
Silk rearing	Sericulture
Bee keeping	Apiculture
Fish farming	Pisciculture
Flower framing	Floriculture
Rearing aquatic plants and animals	Aquaculture
Cultivation of grapevines	Viticulture/Viniculture
Bird farming	Aviculture



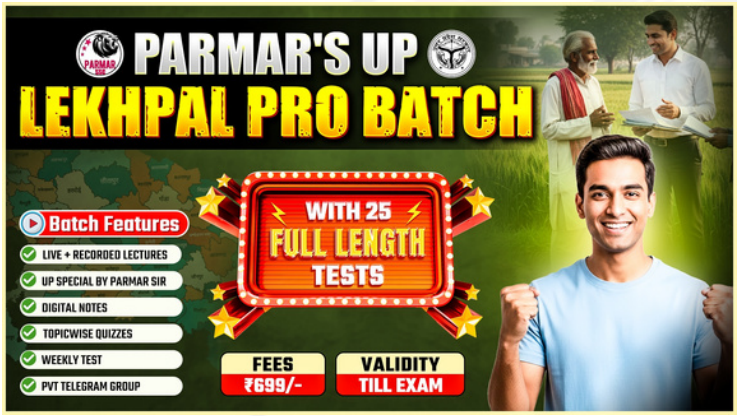


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