

# Unit 2 World Of Living



## Chapter 7:

# How Do Organisms Reproduce?

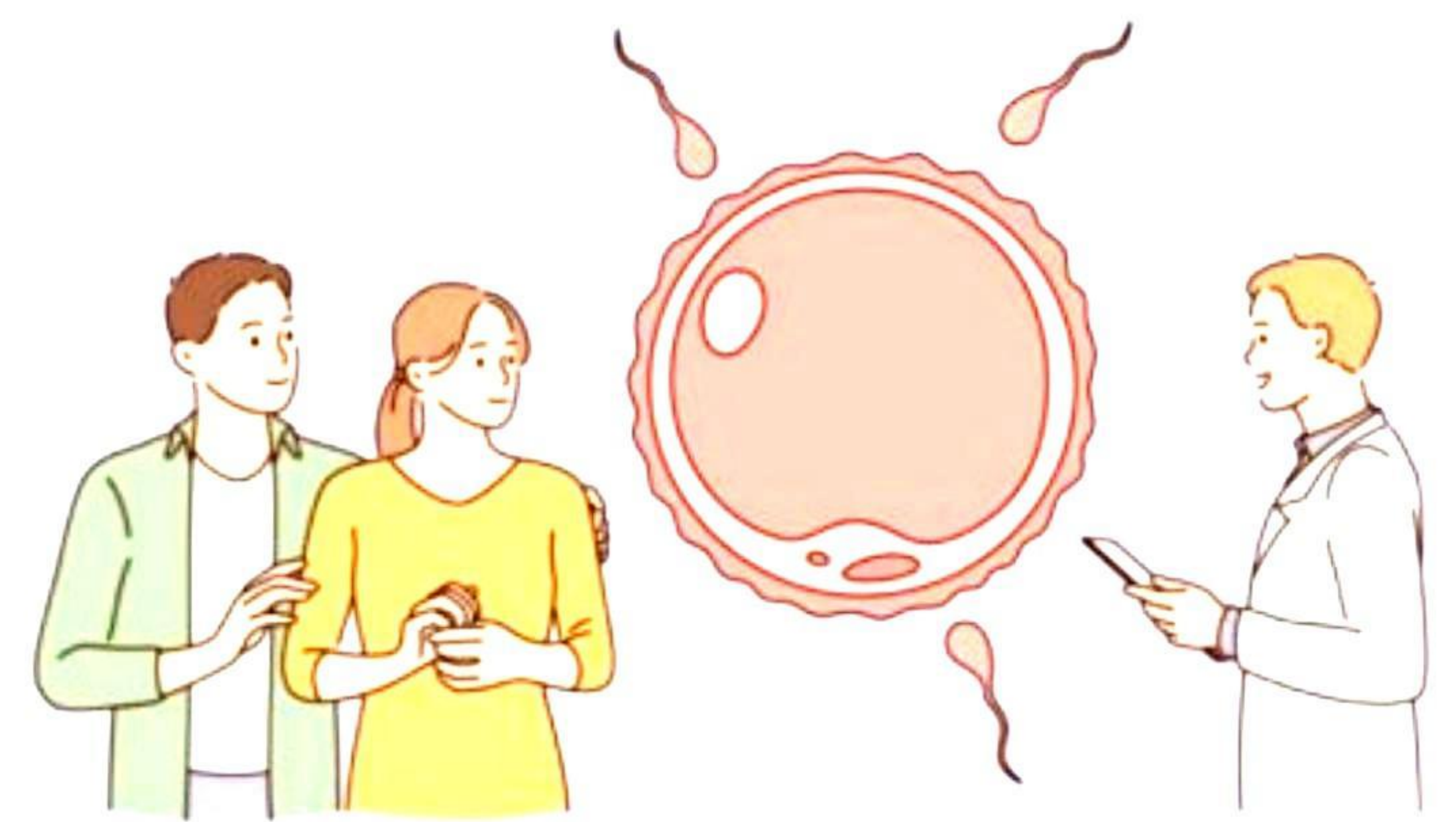
## → The Importance of Variation

DNA copying during reproduction is important for maintaining the body designs of different organisms to survive in the existing environment. But the environment is constantly changing due to change in temperature, climate, water levels etc. If the organisms cannot adjust themselves to the change in the environment then their species will become extinct.

If there are variations in some individuals of a species they may be able to survive the changes in the environment. So variations in species is necessary for the survival of different species and for the evolution of new species.

## → Reproduction

Reproduction is the process in which the production of offspring takes place and is also a biological process in which organisms give rise to offspring.



The organism reproduces in two ways those are

- Asexual Reproduction
- Sexual Reproduction

## → Asexual And Sexual Reproduction

✿ Asexual Reproduction involves the creation of offspring from a single parent, resulting in individuals that are genetically identical. This method does not involve the fusion of gametes, as gametes are not produced. It is commonly utilized for rapid multiplication, especially prevalent among lower animals and plants.

✿ Sexual Reproduction entails the participation of two individuals, typically one male and one female, who produce specialized sex cells or gametes. These gametes fuse during fertilization to

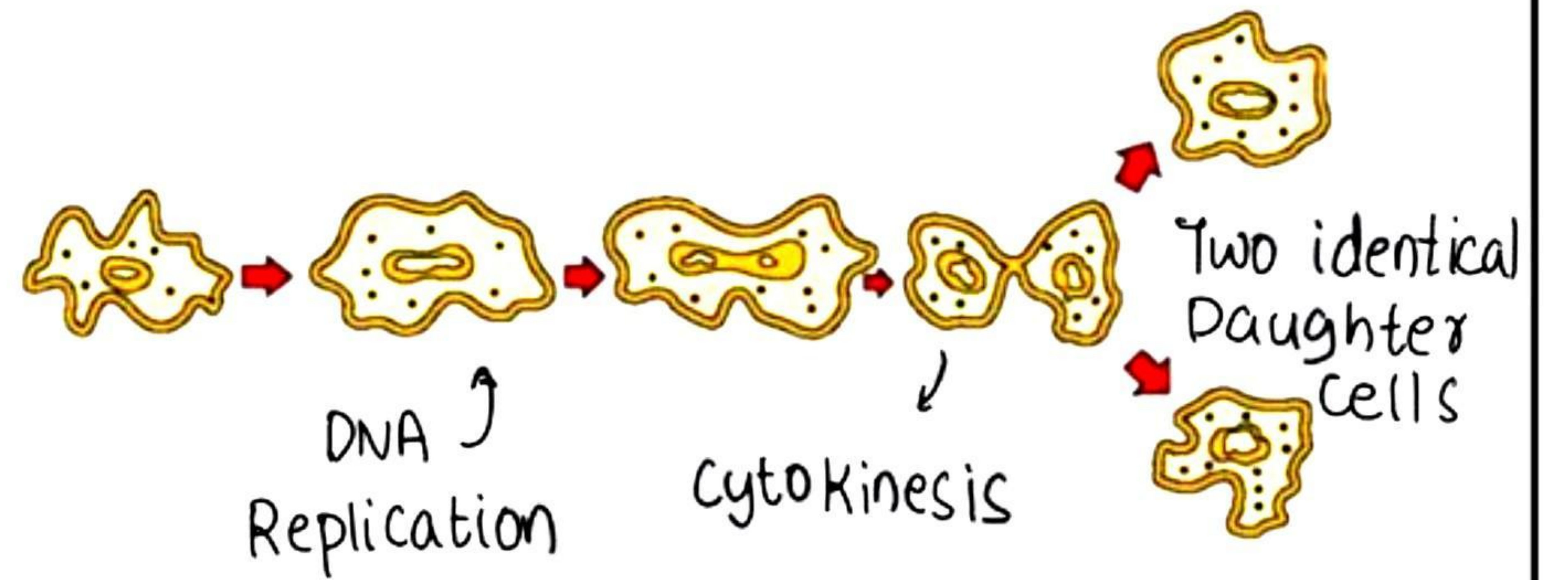
generate a new organism.

## → Modes of Reproduction used by single Organisms

📌 **Fission** - Unicellular organisms like bacteria divide to produce two or more offspring. This process is mainly classified into two types: **Binary fission** and **multiple fission**.

### ★ Binary Fission

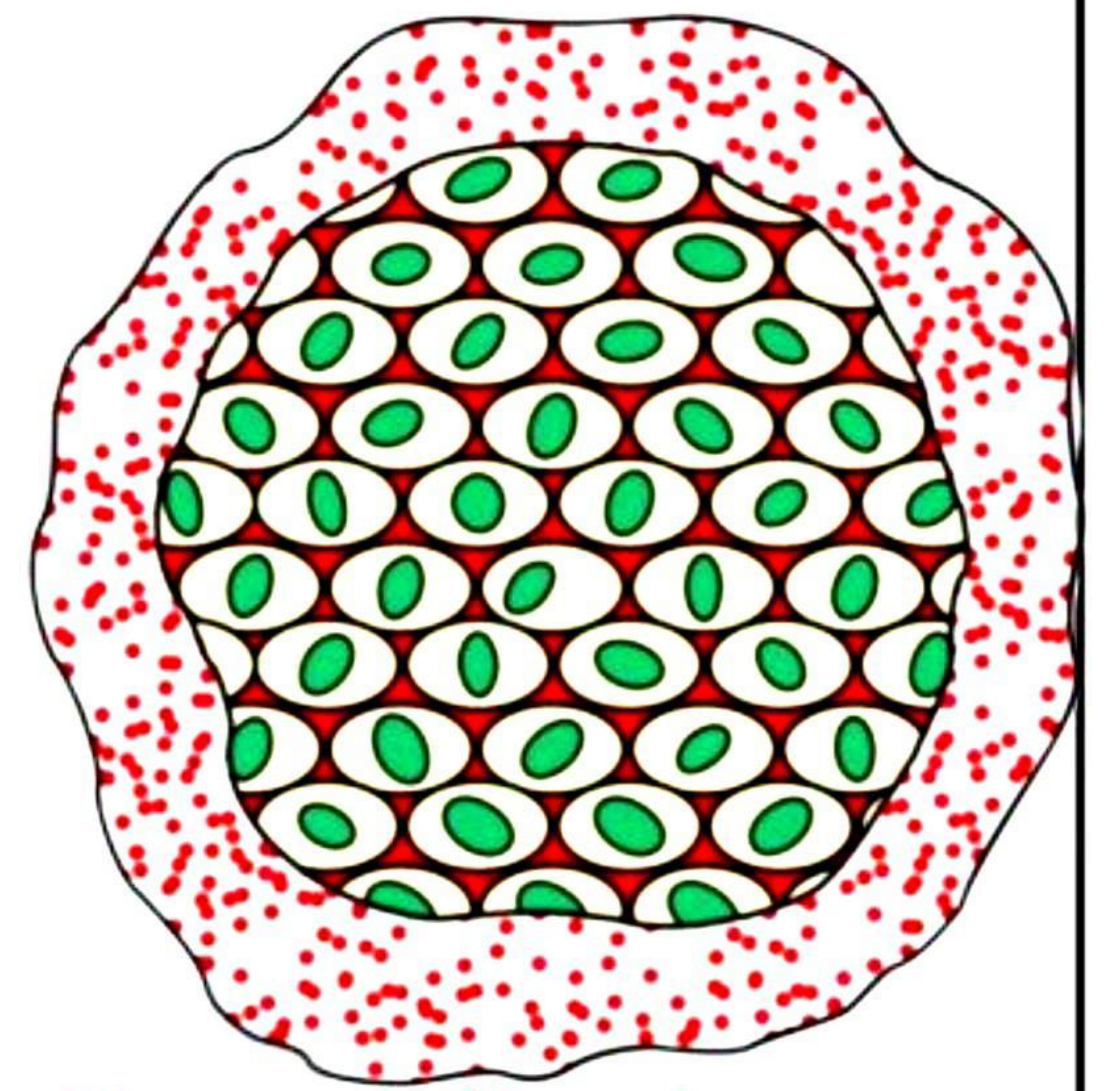
This type of fission entails the division of a single organism into new organisms under particular conditions. In binary fission in Amoeba, the process begins with the division of the nucleus into two parts. This is followed by the division of the cytoplasm. Ultimately, the parent cell splits into two daughter cells.



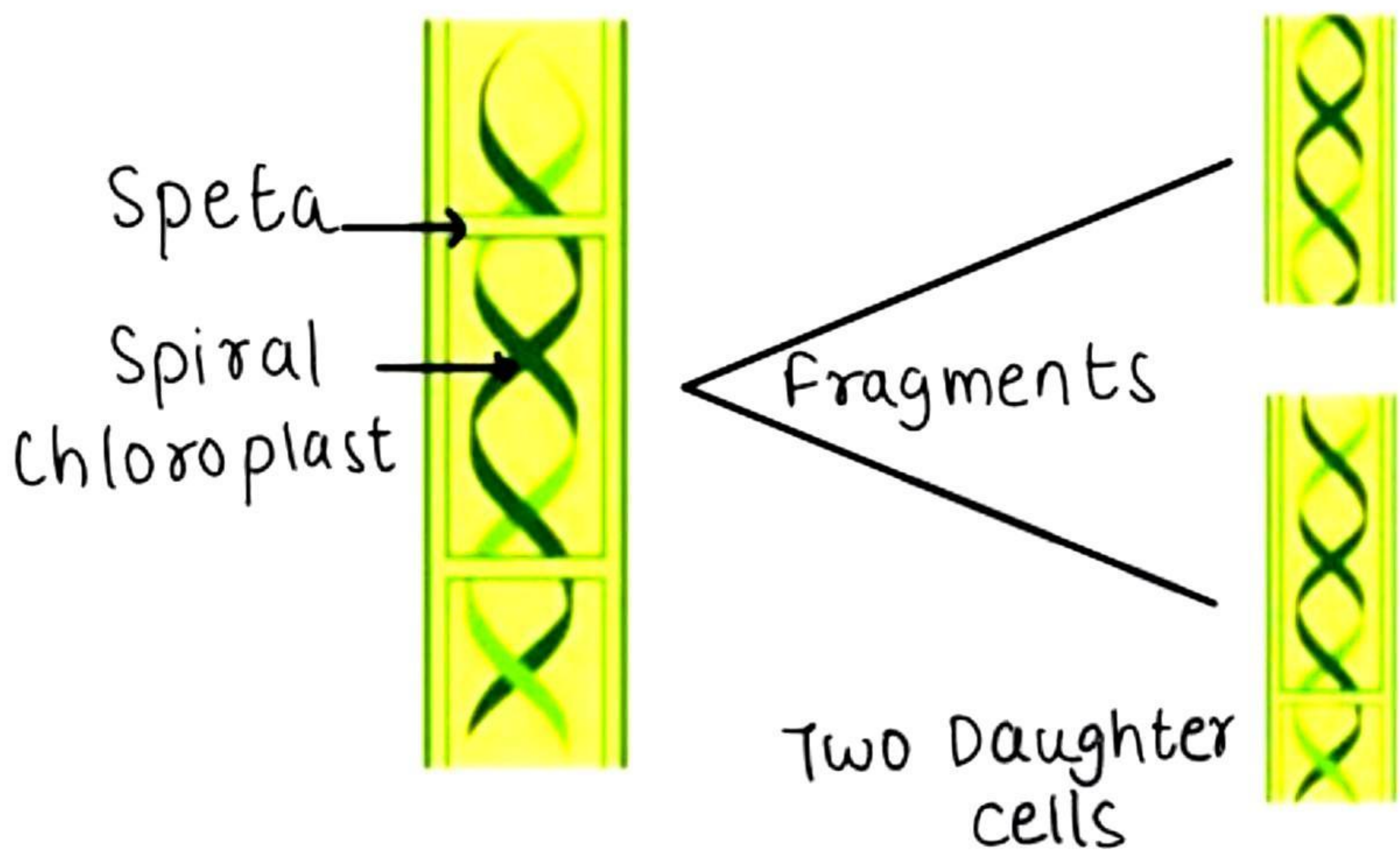
### Binary fission In Amoeba

### ★ Multiple fission

During Multiple fission, the parent organism divides into numerous identical daughter organisms simultaneously. This reproductive process is observed in specific organisms. Such as plasmodium, the malarial parasite.



### Multiple fission in Plasmodium



📌 **Fragmentation** - In fragmentation, the body of a simple multicellular organism breaks into two or more pieces as it matures. Each of these fragments then develops independently into a new organism. **Example - Algae like Spirogyra undergo maturation followed by fragmentation.**

### Fragmentation In Spirogyra

eventually matures into a new, distinct organisms.

The organisms splits into smaller fragments. Each fragment grows independently and

### ★ Regeneration

Simple animals like Hydra and planaria can be cut into any number of pieces and each piece grows into a complete organism. This is known as **Regeneration**. Regeneration is carried out by specialised



### Regeneration In planaria

cells. These cells proliferate and make large numbers of cells. From this mass of cells, different cells undergo changes to become various cell types and tissues. These changes take place in an organised sequence referred to as development. However, regeneration is not the same as reproduction, since most organisms would not normally depend on being cut up to be able to reproduce.

### ★ Budding

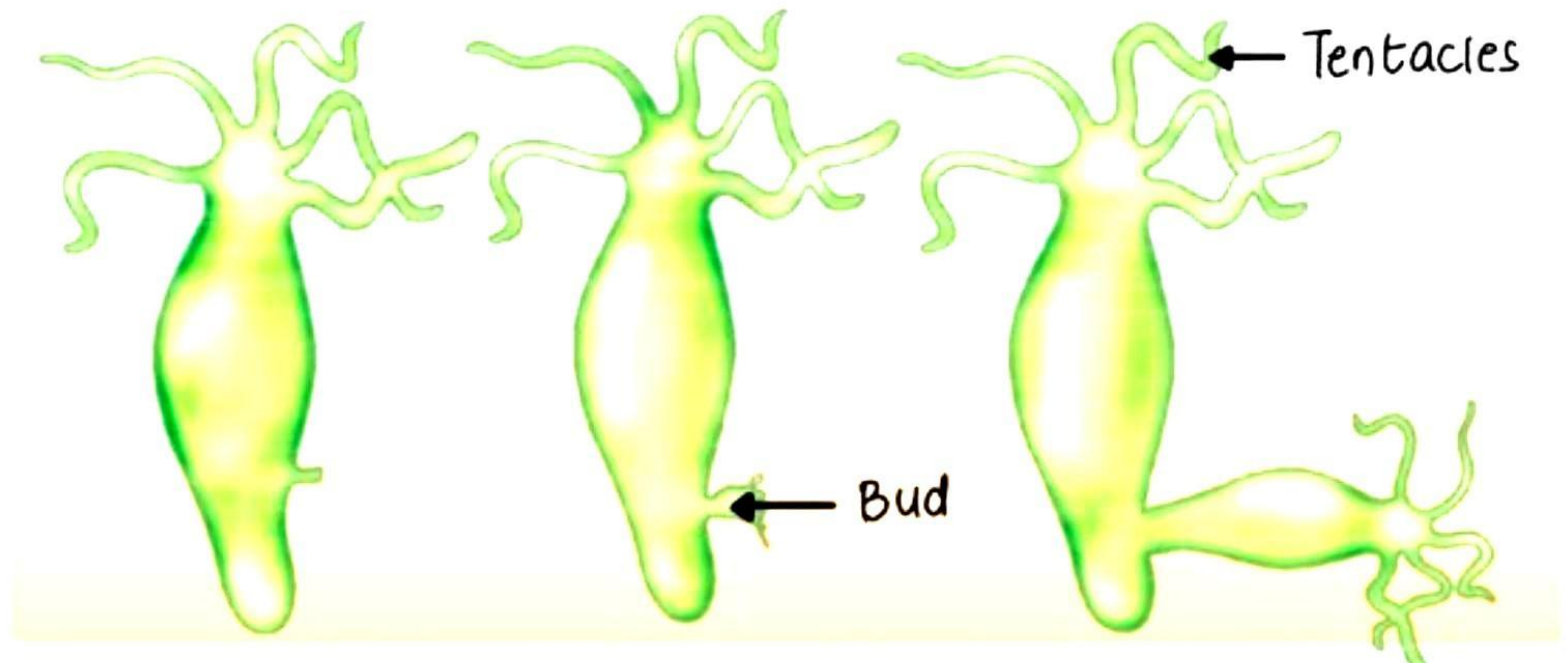
In Budding small outgrowths called "buds" form on the parent organism and eventually detach to become new organisms.

Example - Hydra and yeast. Hydra

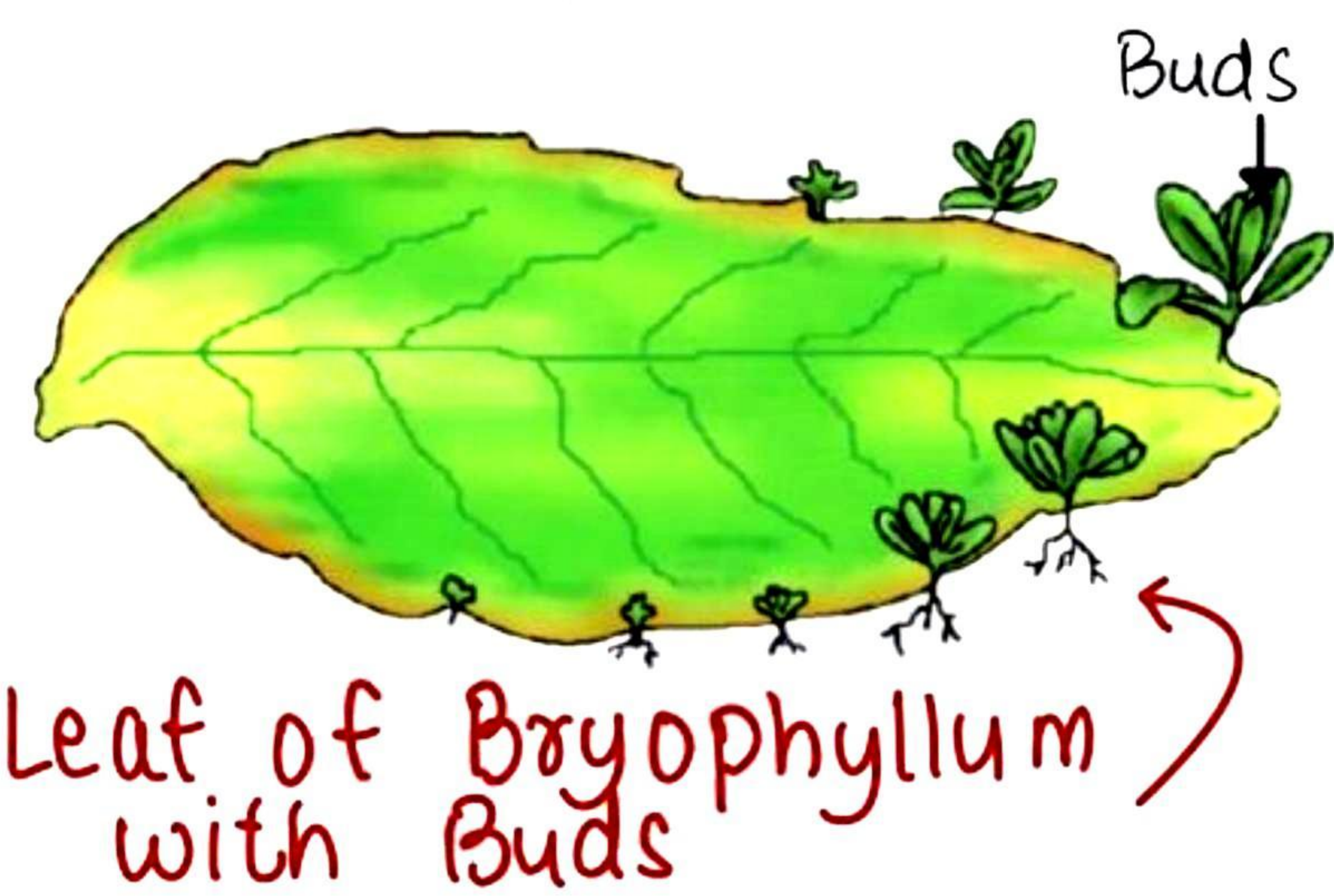
reproduce asexually through

budding where a bud forms via mitotic division, develops a

mouth and tentacles and then separates to live independently.



Budding In Hydra



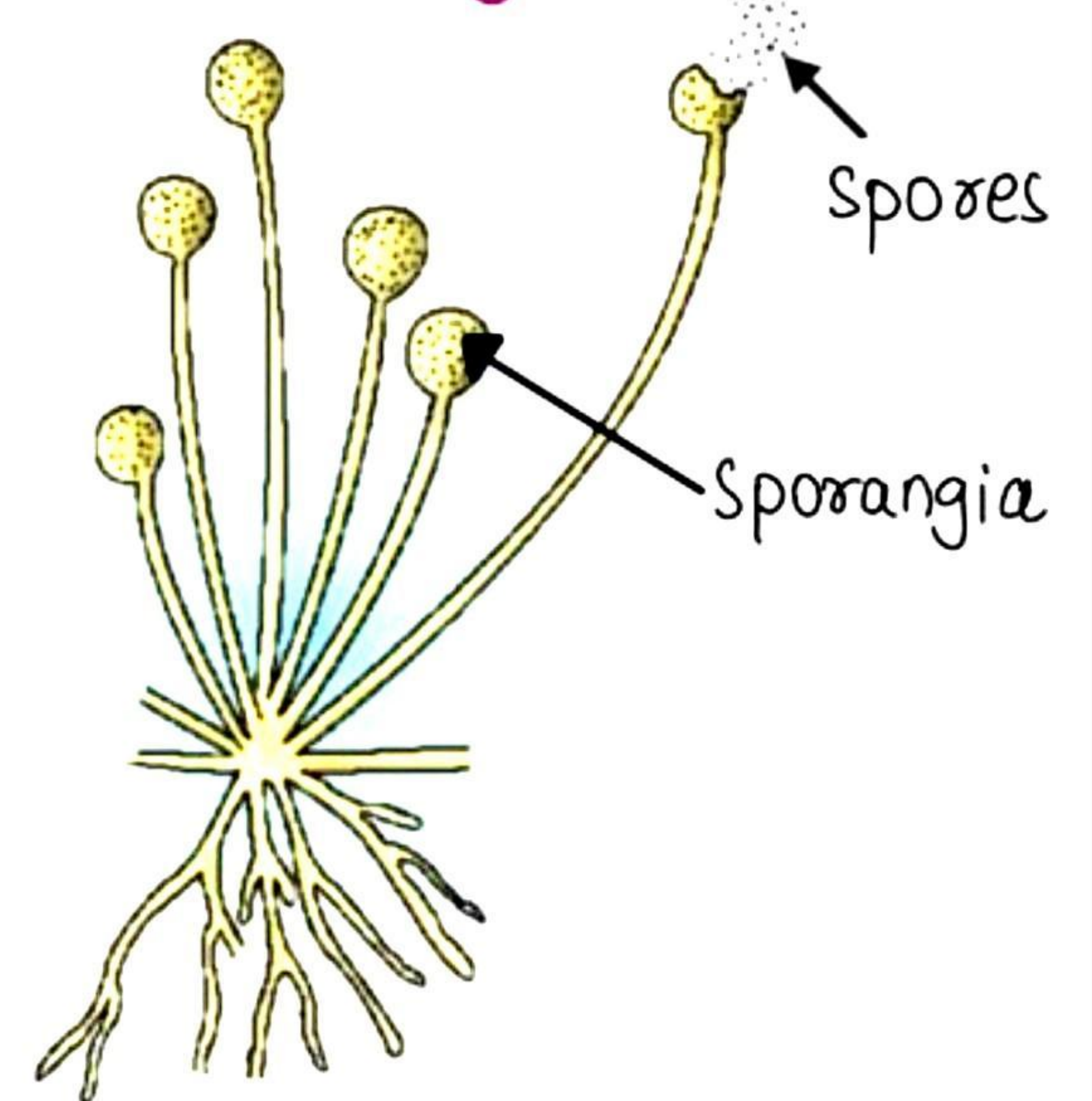
### ★ Vegetative Propagation

Vegetative propagation refers to the method of generating new plants from segments of an existing plant without the need for reproductive organs. Usually this process revolves around the growth and maturation of a single bud on a part of the parent plant, resulting in the formation of

a new plant. Example potato eyes, onion bulbs, leaf buds of Bougainvillea and Dahlia Roots. This technique represents a form of natural reproduction. In many plants, new parts develop from vegetative parts such as By Roots - sweet potato, By stem - potato, By leaves - podophyllum.

### ★ Spore Formation

Multicellular organisms like bread (Rhizopus), reproduction relies on specific structure called sporangia rather than thread-like hyphae. Sporangia situated on stalks, contain spores can develop into new organisms propagation and survival.



Spore formation In Rhizopus

### ➔ Sexual Reproduction

Sexual Reproduction combines gametes from two parents, fastening genetic diversity vital for species survival. DNA copying during this process introduces variations, aiding adaptation.

## Sexual Reproduction In Flowering Plants

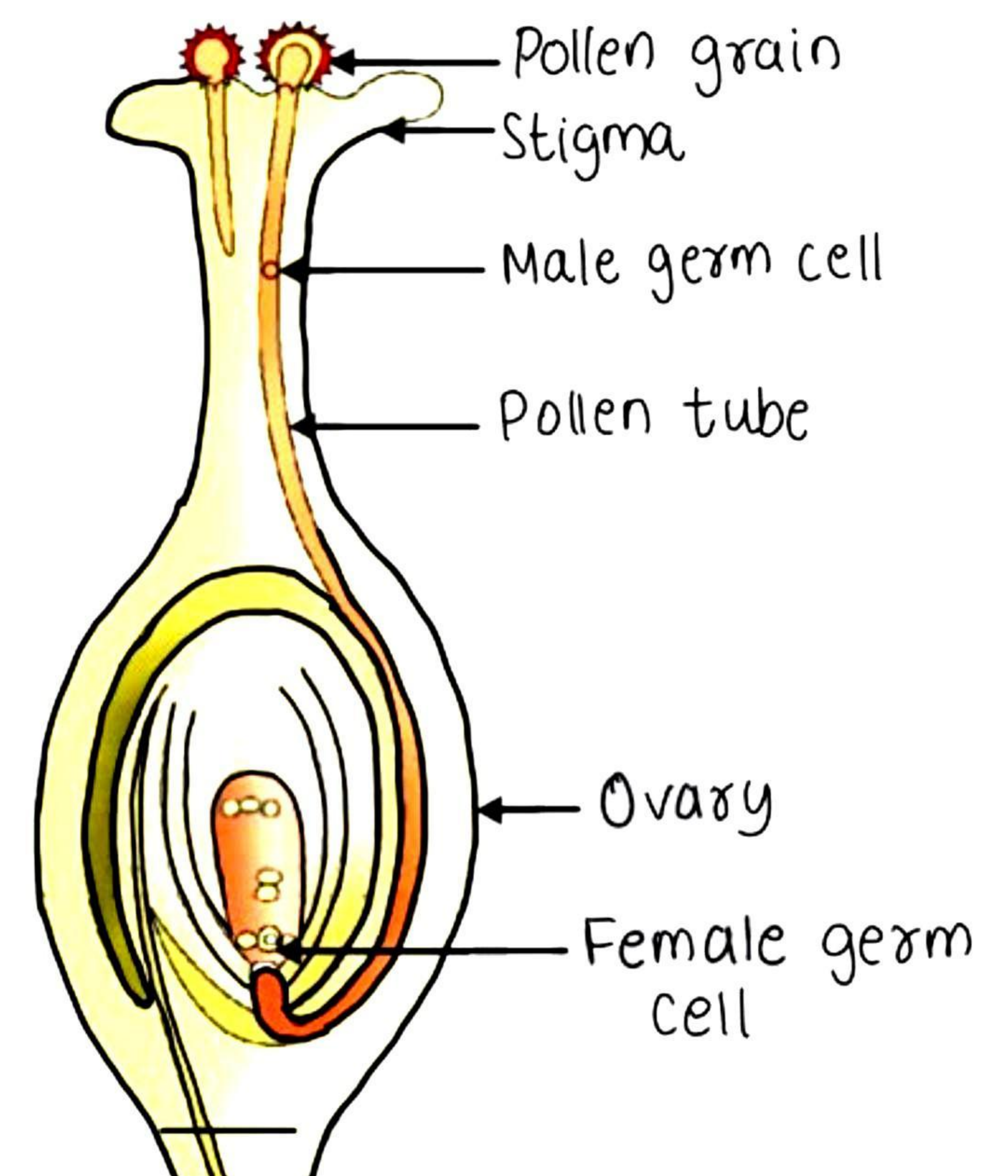
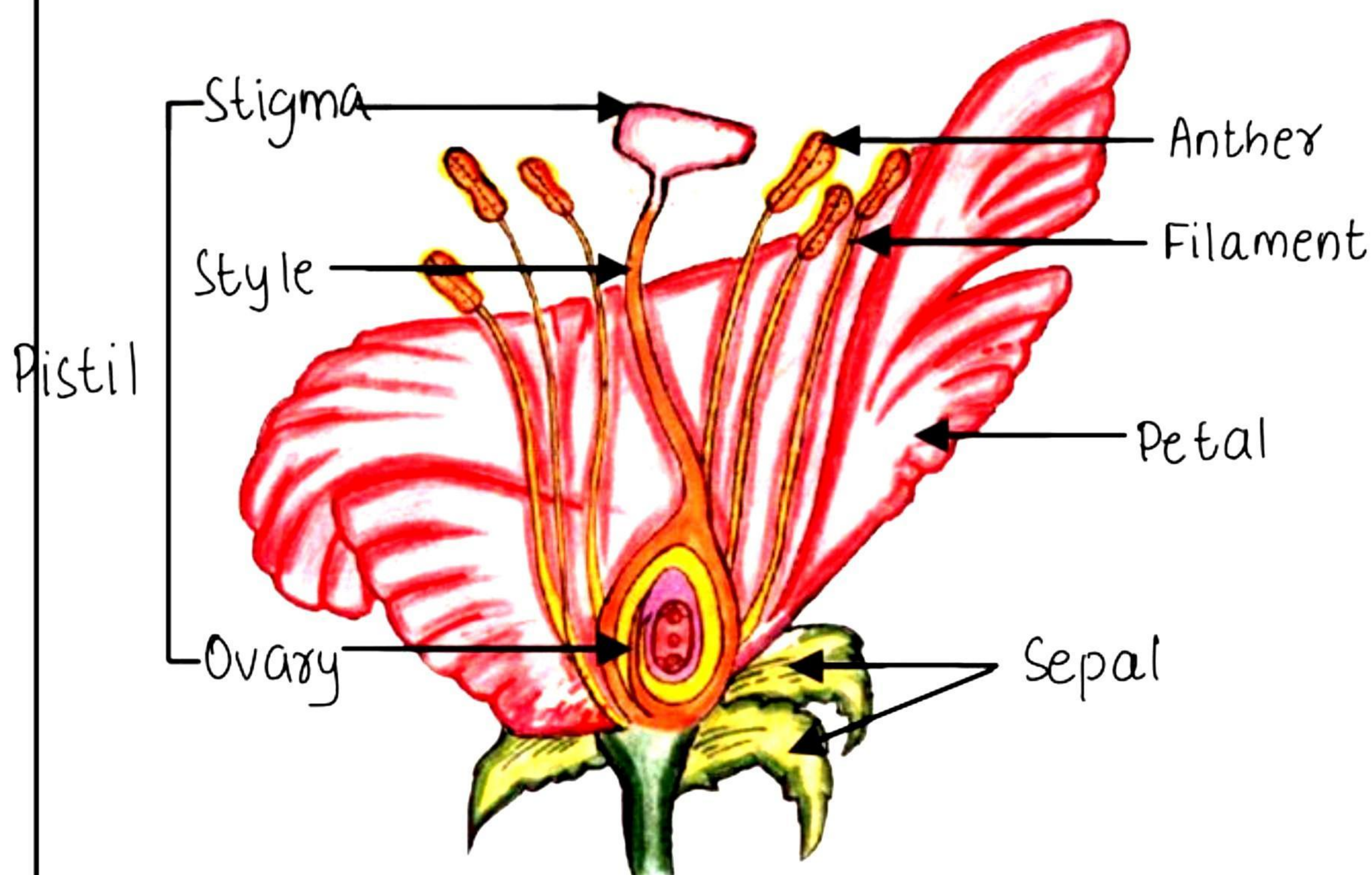
In plants, flowers function as reproductive structures, typically consisting of sepals, petals, stamens and pistils

### Types of flowers:

- **Bisexual Flowers** - This flower contains both male and female reproductive organs, known as **Stamen** (male) and **Carpels** (female). Examples include hibiscus, lily, mustard, rose and sunflower.
- **Unisexual Flowers** - These flowers possess either stamens or carpels, representing either the male or female reproductive organs. Examples include cucumber, papaya, pumpkin and bitter melon.

### Parts of the Flowers

- **Receptacle** - Base of a flower where all flower parts attach.
- **Sepals** - Green leaf-like part encircling a flower, collectively called **calyx**.
- **Petals** - Colorful parts of a flower; collectively called **corolla**, attract insects for pollination and protect reproductive organs.
- **Stamen** - Small stalks with swollen tops inside the petal ring; male reproductive organ of the plant.
- **Filament** - Stalk of the stamen
- **Anther** - Swollen top of the stamen
- **Pollen grain** - Yellow, powdery substance containing male gametes of the plants



- **Carpel** : Flask - shaped organ at the center of a flower, female reproductive organ.
- **Stigma** - Top part of the carpel
- **Style** - Middle part of the carpel
- **Ovary** - Swollen part at the bottom of a carpel; contains ovules, which harbor female gametes of the plant.

📌 **The Sexual Reproduction in plants take place in the following steps.**

- The **male organ (stamen)** make the male gametes of the plant. These male gametes are present in **pollen grain**.
- The **female organ (carpel)** makes the female gamete of the plant. These female gametes are present in ovules.
- The male gametes present in pollen grain fertilise the female gametes or egg cells present in ovules.
- The **Fertilised egg** cell grow with in ovules and become **seed**.
- The seeds produced new plant on germination under suitable condition of water, warmth, air and light etc.

📌 **Reproduction In Human Beings**

Sexual Reproduction in humans involves distinct reproductive system for males and females. In males, the Reproductive system includes **testes** which generate sperm and the **penis**, which delivers sperm during sexual intercourse. Conversely, the female reproductive system consists of the **Ovaries**, where eggs are produced and the **uterus**, where fertilization occurs and fetal development begins.

Puberty marks the onset of sexual maturation, triggering the body to produce germ cells - Ova in females and sperm in males.

Several changes occur during puberty.

- Common in both males and females
  - Increased thick hair growth in the armpits and genital area
  - Skin becomes oily, often leading to the development of pimples.
- In females
  - Breast size starts to increase
  - Onset of menstruation.

## • In males

- Thick hair growth on the face, typically manifesting as facial hair.
- Voice may begin to crack as it deepens.

## • Male Reproductive System

### • Male Reproductive System Components

- Testes, vas deferens and penis:  
Includes a pair of testes, vas deferens and penis

### • Location And Function of Testes

- Scrotum: Testes are in the scrotum outside the abdominal cavity for optimal sperm formation temperature.

### • Sperm production and Hormone Secretion

- Sperm production: Testes produce sperms
- Testosterone: Regulates sperm development and secondary sexual characteristics.

### • Sperm transportation

- Vas Deferens: Carries sperm from the testes.

### • Dual Function of Urethra

- Urethra: Common passage for sperm and urine, connecting the urinary bladder and vas deferens.

### • Role of Accessory Glands

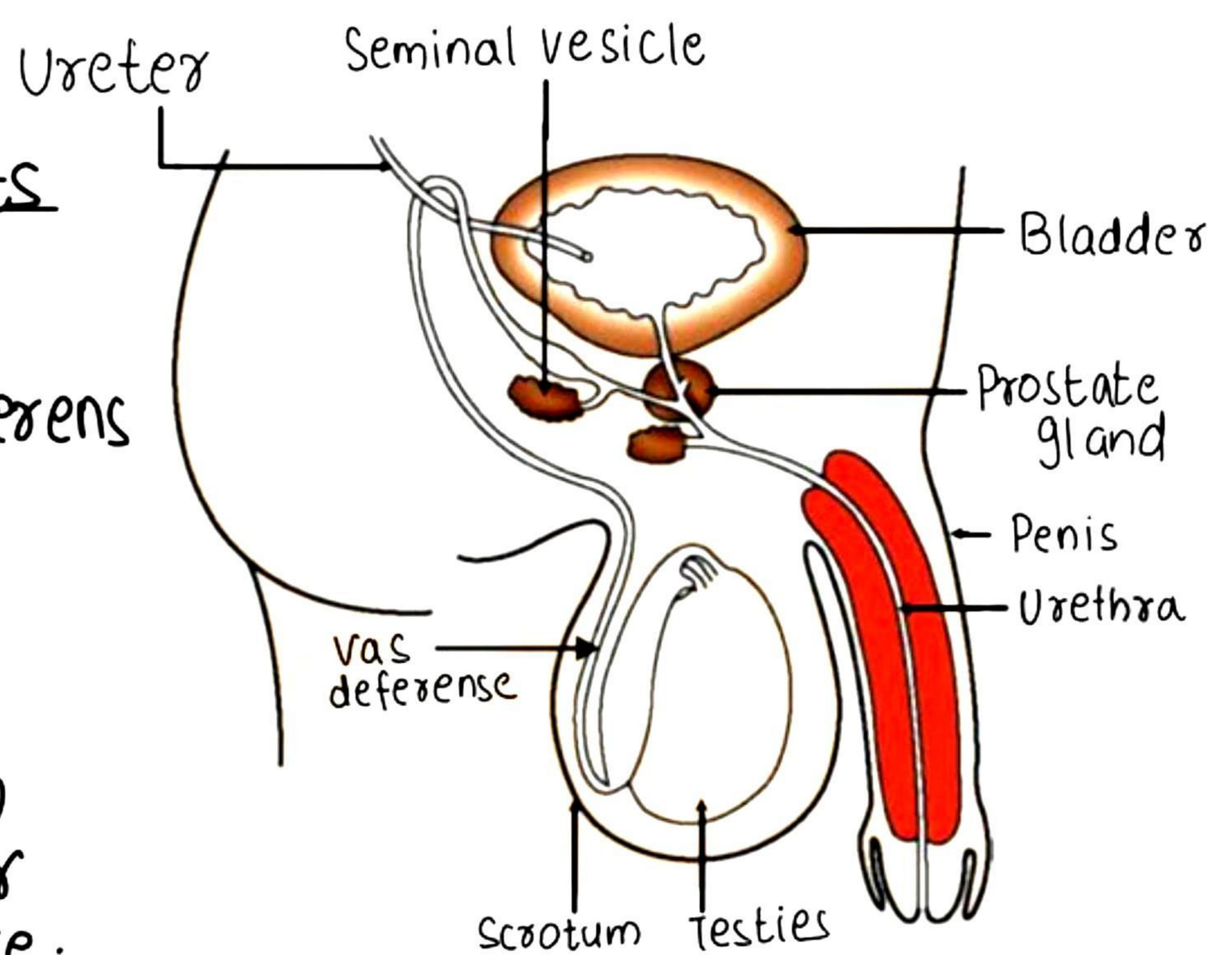
- Prostate gland and seminal vesicles: secrete semen to aid sperm movement and provide nutrition.

### • Structure of Sperm

- Sperm: tiny bodies with genetic material and a long tail for movement towards the female germ cell.

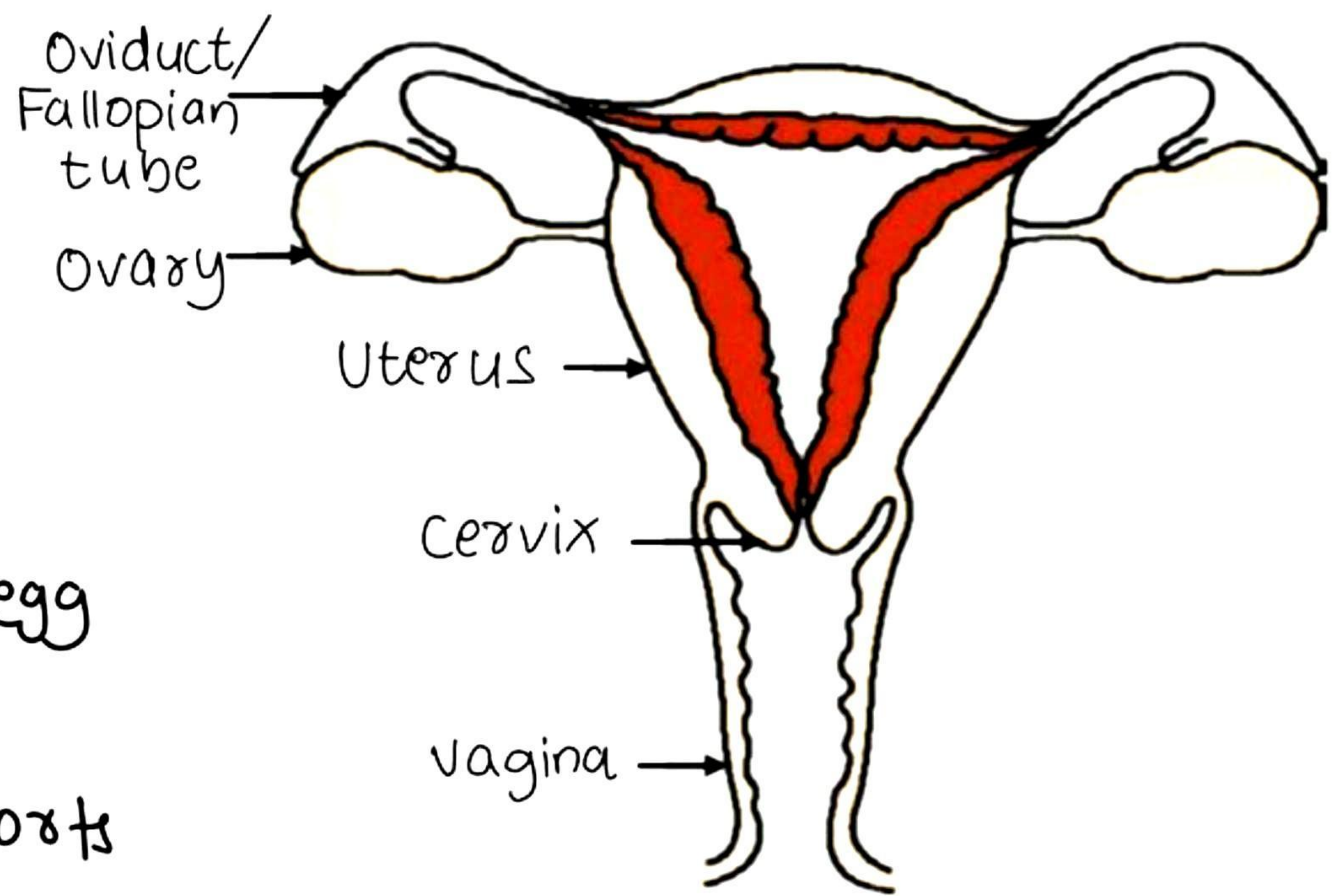
## • Female Reproductive System

The paired oval-shaped organs located in the abdominal cavity near the kidney produce thousands of egg cells known as **Ova**. They also secrete female sex hormones like estrogen and progesterone.



Male Reproductive System

- **Components** - Ovaries, oviduct (fallopian tubes), uterus, vagina
- **Ovary Function** - Egg production, hormone secretion (oestrogen, progesterone).
- **Egg transport** - Oviduct carries egg to uterus.
- **Uterus** - Opens into vagina, supports fetus.
- **Fertilization** - Sperm enter vagina, travel to fallopian tube, fertilize egg in Uterus
- **Placenta** - Connects fetus to mother, facilitates nutrient exchange
- **Childbirth** - Uterine muscle contractions lead to childbirth after 9 months.



**Female Reproductive System**

### 1. Oviduct (Fallopian Tube)

- This tube transports eggs from the ovary to the uterus, serving as the site for fertilization.
- It features a funnel-shaped opening near the ovary and additional openings connecting to the uterus on both sides.

### 2. Uterus (Womb)

- A hollow, pear-shaped bag like structure where the growth and development of fetus occur.

### 3. Vagina

- This canal receives the male partner's organ during intercourse and serves as the birth canal during childbirth.

### 4. Cervix

- The lower and narrower portion of the uterus that opens into the vagina.

## ➔ Fertilization or Sexual Reproduction In Animals

- **Sperm and Ovum production**
  - The male parent produces sperm
  - The female parent produces ovum

- **Fertilization process**

- During copulation, sperm penetrates the ovum
- This leads to fertilization and the formation of the zygote, the first cell.

- **Embryo Formation**

- The zygote undergoes multiple divisions to form an embryo.

- **Implantation**

- The embryo implants itself into the soft and thick lining of the uterus.

- **Placenta Development**

- During pregnancy, the placenta develops into a disc between the uterine wall and the embryo.
- Finger-like projections called **villi** extend toward the embryo, facilitating nutrient and waste exchange

- **Child development**

- The development of the child within the mother's body typically spans approximately nine months in humans.

- **Childbirth Process**

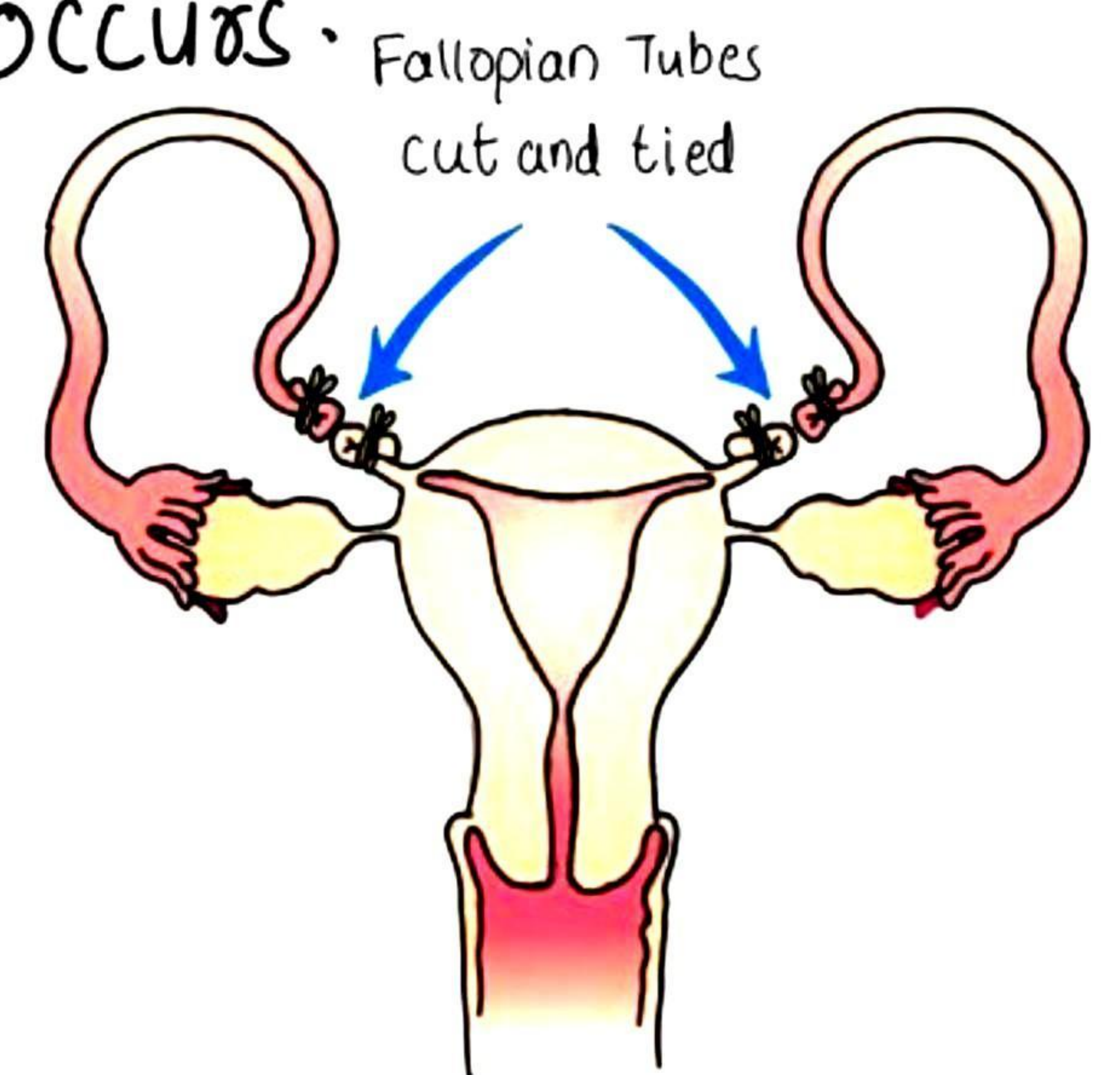
- Strong rhythmic muscular contractions in uterus trigger childbirth if the egg is fertilized.

- **Unfertilized Egg outcome**

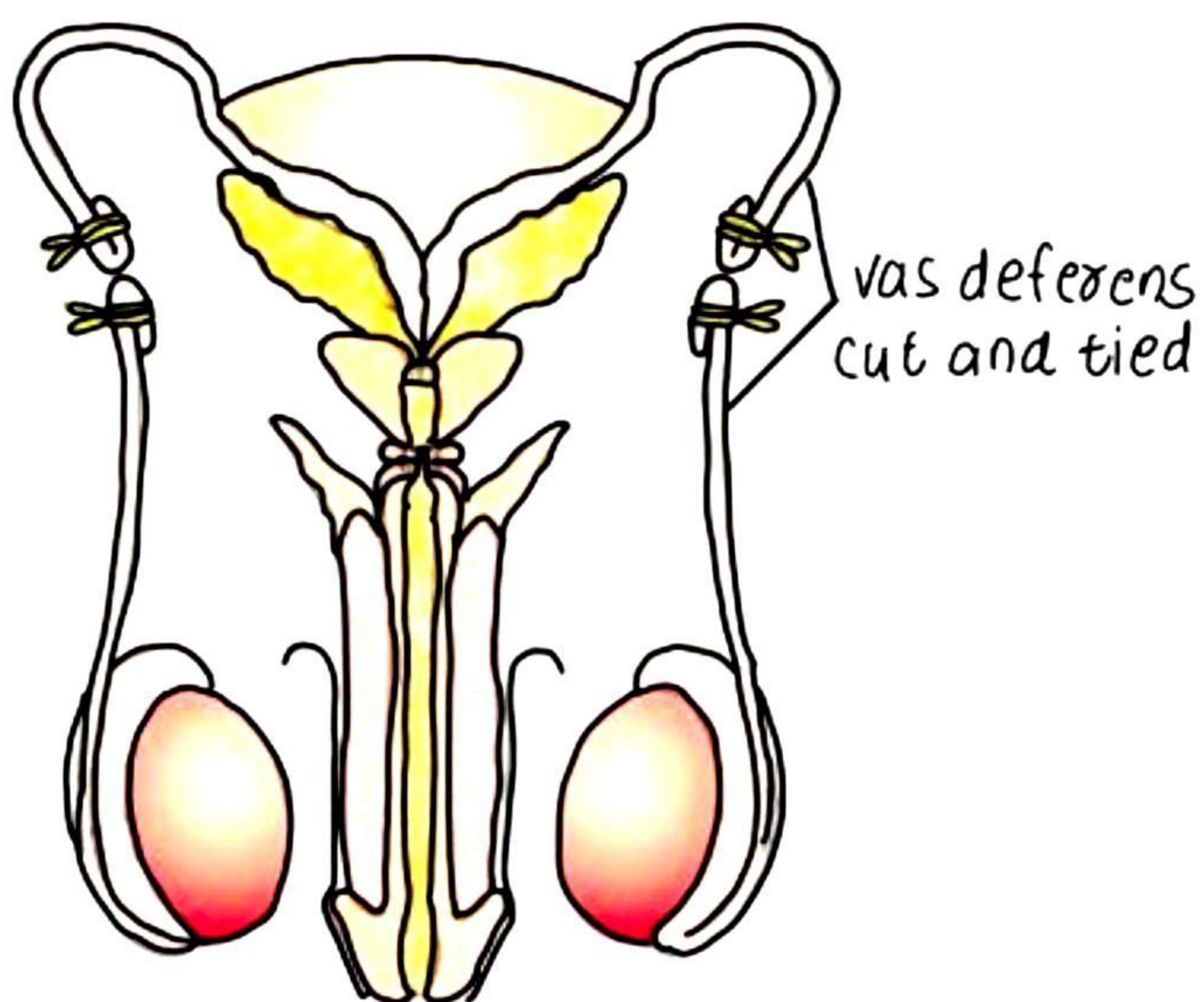
- If the egg remains unfertilized, menstruation occurs.

## → Tubectomy

Tubectomy or tubal ligation is a surgical procedure for female sterilization. It involves cutting, tying or sealing the fallopian tubes to prevent eggs from reaching the uterus, thereby permanently preventing pregnancy. It is a common method of contraception.



Tubectomy



Vasectomy

## → Vasectomy

Vasectomy is a surgical procedure for male sterilization. It involves cutting and sealing the vas deferens, the tubes that carry sperm from the testicles to the urethra, preventing sperm from mixing with semen. This permanently prevents pregnancy.

## → **Mensuration**

- Each month an ovary release a single egg promoting the uterus to thicken and become spongy in preparation for a potential fertilized egg.
- If the egg remains unfertilized, it lives for about one day, and the thickened uterine lining becomes unnecessary.
- The lining disintegrates and is discharged through the vagina as a mixture of blood and mucus.
- This natural process is known as menstruation, repeats approximately every month and typically last about two to eight days.

## → **Reproductive health**

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

### • **Transmission of STDs**

- Sexual intercourse can transmit diseases like gonorrhoea, syphilis, warts and HIV.

### • **Contraceptive Devices**

- Block sperm entry into oviduct, preventing fertilization and reducing infection risk.

### Examples

- UCD (Copper device) : Placed in uterus
- Oral pills : Prevent pregnancy
- Condoms : Used on penis or in the vagina

### • **Surgical Methods**

- Vasectomy (Males) : Block sperm transfer
- Tubectomy (Females) : Block fallopia tubes.
- Safe Longterm contraceptive methods.

### • **Abortion and legal Issues:**

- Surgical methods can abort unwanted pregnancies
- Misuse for female feticide is illegal
- Parental sex determination is prohibited by law

### ! **NOTE**

- Reproduction, unlike other life process is not essential to maintain the life of an individual organism.
- Reproduction involves creation of a DNA copy and additional cellular apparatus by the cell involved in the process.

- Various organisms use different modes of reproduction depending on their body design.
- These are examples of asexual reproduction where new generations are created from a single individual.
- Sexual reproduction involves two individuals for the creation of new individual
- DNA copying mechanisms creates variations which are useful for ensuring the survival of the species. Modes of sexual reproduction allow for greater variation to be generated.
- Changes in the body at puberty, such as increase in breast size and new facial hair growth in boys, are sign of sexual maturation.