St.JOHN'S

RESIDENTIAL PUBLIC SCHOOL

SONAGOPALPUR,SAMPATCHAK,PATNA-7

AFFILIATED TO C.B.S.E

AFFILIATION NUMBER-----330407 SCHOOL CODE...65403

STD.....10 PREPARED BY.....DR.S.K.VERMA

HOW DO ORGANISMS REPRODUCE?

Introduction

Reproduction

Reproduction is the process by which all organisms multiply in number and increase their population.

Asexual reproduction

Asexual reproduction is a method of reproduction that involves only one organism.

A single organism reproduces two or multiple organisms on its own.

This is seen in all unicellular organisms, some multicellular organisms and a few plants.

Sexual reproduction

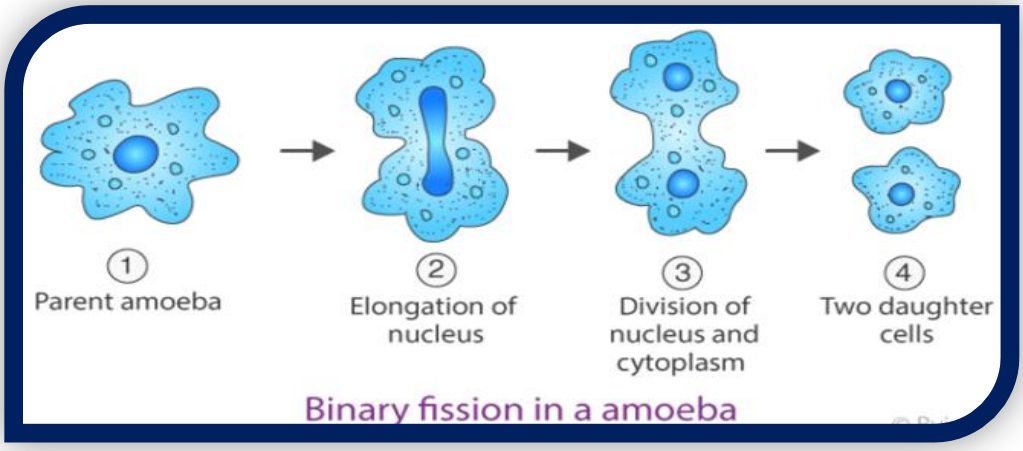
The mode of reproduction in which two individuals; one male and one female are involves.

They produce sex cells or gametes which fuse to form a new organism.

Type of Asexual Reproduction

Fission

- Fission is an asexual reproduction that is common in most of the unicellular organisms.
- When one parent cell divide into two daughter cells, it is **binary fission** (e.g. *Amoeba , Paramoecium), Leishmania cause KALA-AZAR).*
- When fission results in many daughter cells, it is called **multiple fission** *(e.g. Plasmodium Vivax or Malarial parasite cause MALARIA).*
- Planes of fission may be different for different organisms.



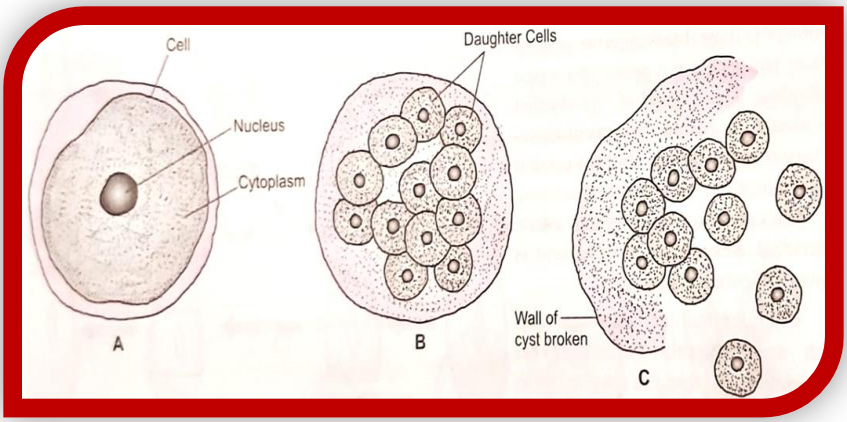
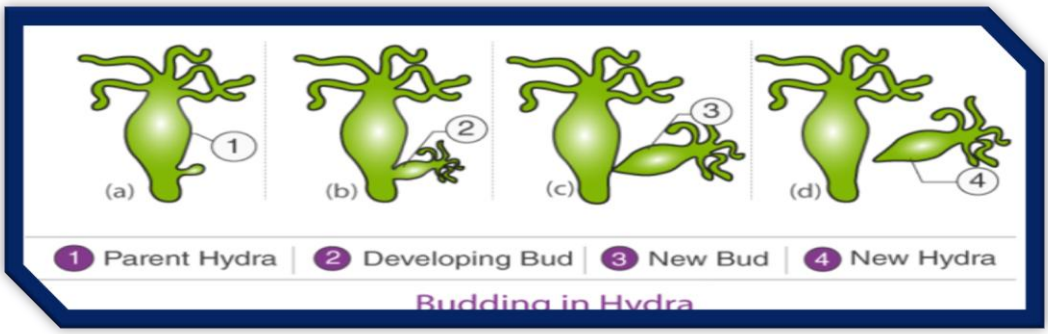


Fig--- Multiple fission in(amoeba)

Budding

- Budding is a type of asexual reproduction in which a small cyst-like structure is formed on the parent's body, which gives rise to a new individual.

- Bud may remain attached to the parent *(yeast)* or may separate and become a new individual *(hydra).*

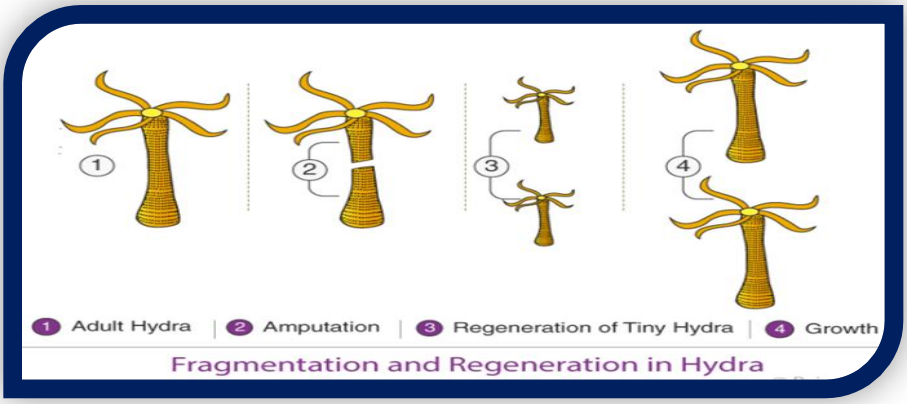


Regeneration and fragmentation

- **Regeneration** is the process of growing back the lost organ or body part by the organism *(e.g. Tail of lizard, Arm of Starfish).*

- **Fragmentation** is the process by which an organism gets fragmented into smaller pieces and each piece grows into a whole new organism.

(E.g. Planaria, Hydra, Spirogyra)



Spore formation

Organisms such as fungi make spores that can grow into complete new individuals when dispersed from their fruiting body.

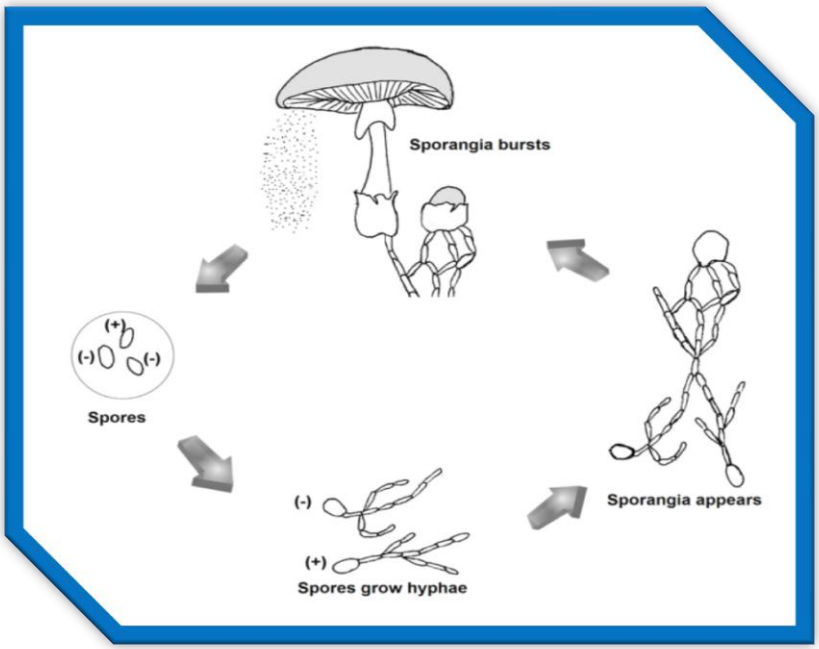


Fig---- spore formation in rhizopus

Vegetative propagation

- This is a type of asexual reproduction seen in plants.
- The vegetative part of the plant, *like leaves, stem, roots,* gives rise to a new plant.
- Vegetative propagation can be *artificial or natural*.
- Natural vegetative propagation happens through **leaves** *(e.g. bryophyllum*), **stem** *(e.g. turmeric, ginger***), runners/stolen** (*e.g. grass runners, strawberry*), **bulbs** *(e.g. onion, lily*), etc.

- Artificial methods include *cutting, grafting, layering and plant tissue culture.*
- *Cutting in Crotan,Rose.*
- *Grafting in Fruits plant.*
- *Layering in Crycenthemum.*
- ***Tissue Culture or Micro-Propagation****:*

  A biological method in which fragments of tissue from desired plants are transferred to an artificial medium in the Laboratories in which it grows an irregular mass called CALLUS.

  Again we take a tissue from it and kept into another medium where it grows into plantlets.

  This will be planted in the field.

  Thousands of healthy plants can grow in less time and little place.

Types of Cell division

Two types of cell division seen in eukaryotic organisms:

Mitosis

- Takes place in **somatic** (*all other cell except reproductive*)cells
- Maintains the chromosome number
- *Produces two, diploid daughter cells*
- Required for *asexual reproduction, development and growth, cell replace ment and regeneration*

Meiosis

- Takes place in sex cells
- Reduces the number of chromosomes by half
- *Produces four haploid daughter cells*
- Required for sexual reproduction, i.e gamete formation

Sexual Reproduction

The Reproductive System

Male reproductive system

- The main reproductive organ in males is *a pair of testes.*
- They produce the male sex cells called *sperms* and also produce male *sex hormone testosterone.*

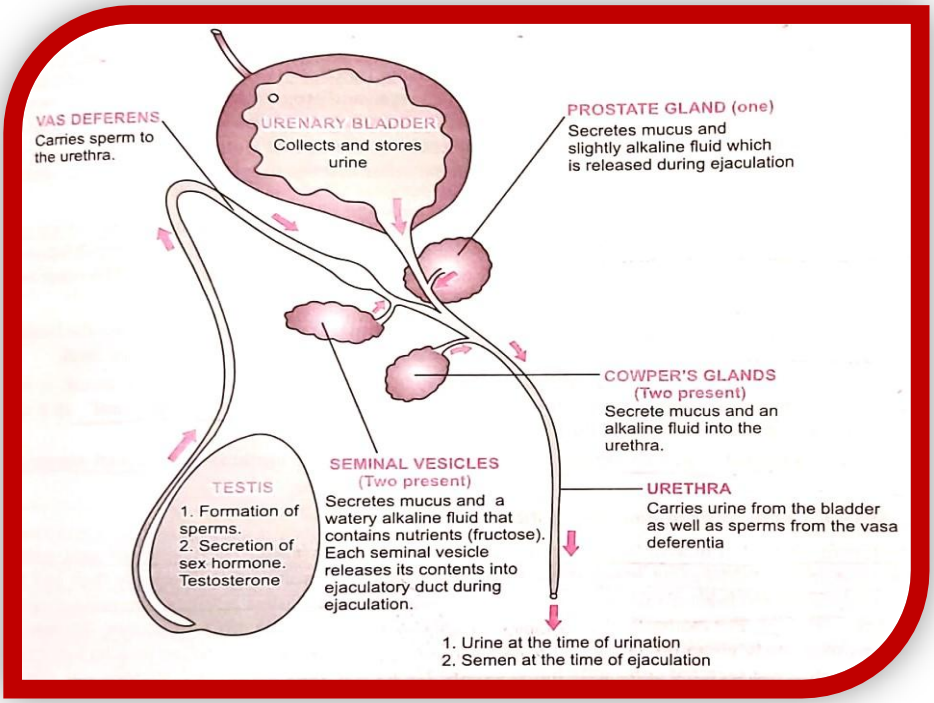


Fig---- A flow chart showing path of sperm and role of different glands in Male Reproductive system

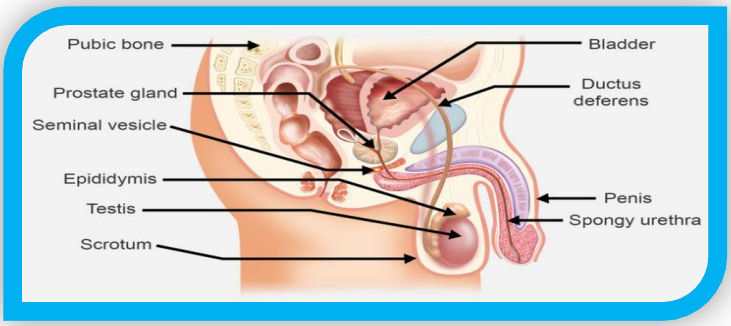


Fig--Male reproductive organs

- The main reproductive organ in males is a pair of *testes.*
- They are present in *scrotal sacs or scrotum* outside the body and contain *seminiferous tubules* as the structural and functional unit.
- Male sex cells, sperms, are produced by *seminiferous tubules* and mature in the *epididymis.*
- *Leydig cells or interstitial cells* present in between the seminiferous tubules secrete hormone *testosterone.*

Male accessory reproductive organs

- Several accessory reproductive organs that aid in the reproductive process.
- *The prostate gland* and the *seminal vesicles* are glands of reproductive system which *make semen and nourish the sperms.*
- *Penis*, having *urethra* passing through it, is called *copulatory organ.*

Male Ducts

- In males, the *vas deferens* and the *urethra* are the main ducts.
- A single vas deferens carries sperms from respective testis up to urethra.
- *Urethra* acts as a common passage for *semen and urine.*

Female reproductive system

The human female reproductive system consists of *a pair of ovaries, a pair of fallopian tubes/oviducts and the accessory organs* such as the *uterus and the vagina.*

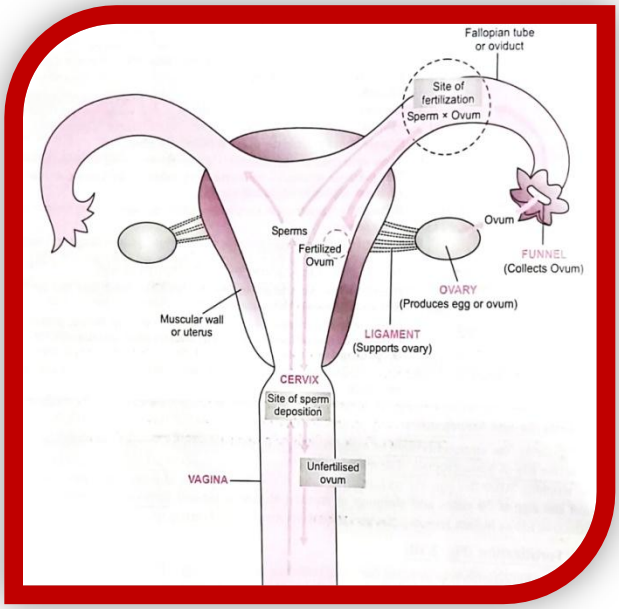
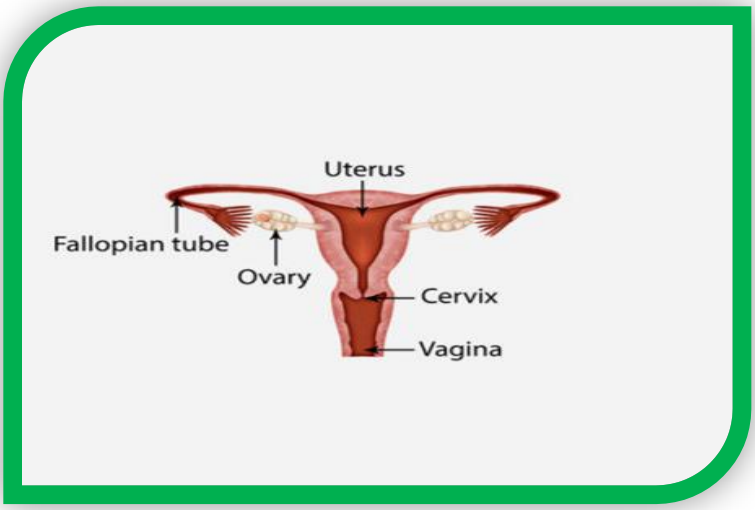


Fig---A flowchart showing path of sperm and ovum in female reproductive system



Fig…Female reproductive organ

Female reproductive organs

- The main reproductive organ in a female is *a pair of ovaries*.
- They produce the female sex cells called *eggs or ova* and also produce female sex hormones called *estrogen and progesterone.*

Female accessory reproductive organs

- *Uterus and vagina* are the accessory reproductive organs in human females.
- The uterus is the site of *foetus development* and *vagina receives sperms* from the male.

Menstrual Cycle

Menstruation

- **Menstruation is the *cyclic event* of the release of the *ovum* from the *ovary* and its removal from the body when *fertilization* does not happen.**
- During *menstruation*, the blood-rich endometrium of the uterus also breaks down while the ovum is being removed from the body.
- Two pituitary hormones, *LH and FSH* and two ovarian hormones, *estrogen and progesterone*, all have their roles in menstruation.
- In humans, the cycle repeats every 28 days.

Human reproduction

Humans reproduce sexually. The male produces *sperms* and the female produces *eggs.*

When the sperm fuses with the egg, it forms a *zygote* ,the process is called *Fertilization*.

It gives rise to a new *progeny.*

Reproductive health

Reproductive health deals with the prevention of ***STDs (Sexually Transmitted diseases)*** **and unwanted pregnancy**.

Understanding the reproductive system is also a part of reproductive health awareness.

Contraceptives

- ***Contraceptives are devices that prevent unwanted pregnancy and help avoid STDs.***
- Contraceptives can be of various types such as *mechanical barriers, hormonal/chemical methods, surgical methods, etc.*

Coitus Interruptus

- It is a very unreliable contraceptive method where the coitus is stopped before the male ejaculates the sperm inside the female reproductive tracts.

Rhythm Method

- Another unreliable method of contraception where coitus is avoided when the female is fertile and the chances of fertilization are very high.

Condoms

- One of the most effective methods of contraception.
- A mechanical barrier that stops the semen from entering the female tract preventing pregnancy.
- It also avoids the possibility of contracting STDs.

Diaphragms

- Diaphragms are barriers that can be added inside the female reproductive tracts.
- They stop the entry of semen inside the female tract and thus prevent pregnancy.

Contraceptive Pills

- Contraceptive pills are chemical methods of contraception.
- They change the level of hormones in the body that prevents the release of the ovum from the ovaries.

Emergency Pill or OCs(Oral contraceptives)

- Emergency pills are those pills which can be taken after coitus to avoid pregnancy.
- They quickly change the level of hormones in the body and prevent a successful implantation even if the egg gets fertilized.
- *Implantation* means the successful entry of Zygote inside the Uterus.

IUD

- *IUD* stands for *Intrauterine Device.*
- They can be used for a couple of years.
- It is a device that is inserted into the uterus, changing its shape and preventing successful implantation of the zygote.

Sterilization

- Sterilization is a surgical method of going permanently sterile.
- This can be done in both males and females.
- In males, it is called ***vasectomy*** and in females, it is called ***tubectomy.***
- In the ***vasectomy*** *vas deferens* is removed and in the ***tubectomy***

  Fallopian tube is removed.

Reproduction in Plants

Sexual reproduction in flowering plants

- Sexual reproduction in plants happens through flowers.
- Essential whorls of the flowers such as *androecium and the gynoecium*

  help in the sexual reproduction of plants.

Non-essential parts of flowers

- The typical structure of flower contains essential whorls and non-essential whorls.
- *Sepals and Petals* are called non-essential whorls as they do not directly take part in reproduction.
- *Sepals* protect the inner delicate whorl during bud condition and also perform photosynthesis if they are green in colour.
- *Petals*, when they are coloured, attract insects for *pollination.*

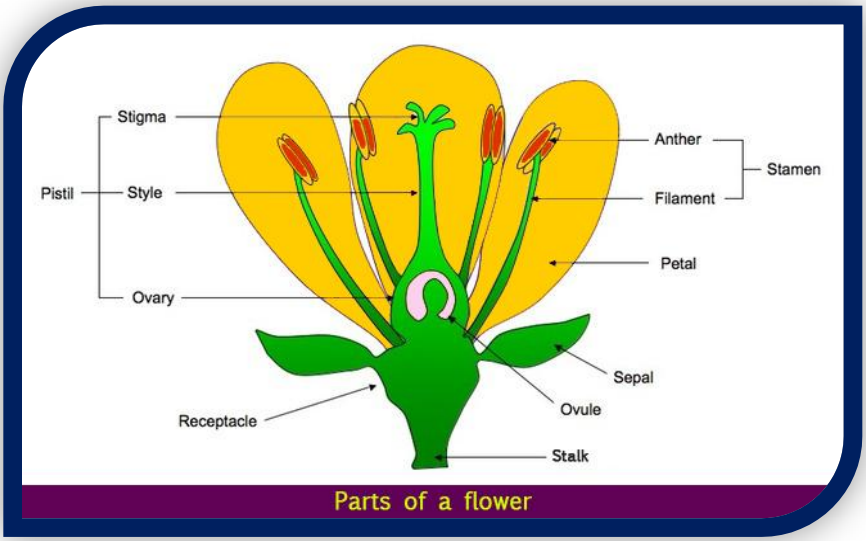
Essential whorls of flowers

- *Androecium* produces *pollen grains* containing male gametes and *gynoecium* produces *ovules* which are female gametes.

- ***Bisexual flowers*** (China rose- *Hibiscus rosa sinensis,* Mustard)contain both the whorls while ***Unisexual flowers*** (Papaya,Watermelon)contain either of them.

- Each individual member of androecium is called a ***stamen*** and consists of ***anther and filament***.

- Anther produces haploid pollen grains.Each individual member of gynoecium is called ***pistil*** and consists of ***stigma, style and ovary.***



Pollination

The process of transfer of pollen grains from anthers to the stigma of a flower is known as pollination.

- It is required for fertilization.

- Pollination has two types,

  self-pollination (autogamy) and

cross-pollination (allogamy).

- In self-pollination, transfer of pollen grains takes place from anthers to the stigma of the *same flower or another flower of the same plant.*
- In cross-pollination, pollens are transferred from *anthers to the stigma of another flower.*
- Many pollinating agents play their roles in cross-pollination. Examples: *water, wind, insects, birds, bats, elephant (in Rafflesia Largest Flower) etc.*

Fertilization

Fusion of male and female gametes is known as fertilization.

- In flowering plants after pollination, the pollens germinate on the stigma surface of pistil and generate two *male nuclei.Many pollen tube also generate but only one tube enters into the ovary through the small opening called MICROPYLE*
- *Ovule has egg cell* and *two polar nuclei.*
- One male gamete nucleus fuses with two polar nuclei and forms triploid endosperm. This is called *TRIPLE FUSION*
- Another male nucleus fuses with the egg cell and forms the *zygote* that gives rise to the *embryo and future plant.*
- After fertilization, *ovary becomes fruit and ovules turn into seeds*. All other parts wither away.
- The mechanism involves two acts of Fertilization in an Embryosac is called ***DOUBLE FERTILIZATION.***

(One male gamete fuses with the egg to form **Zygote** *and finally develops into* **Embryo** *and the other male gamete fuses with the two polar nuclei).*

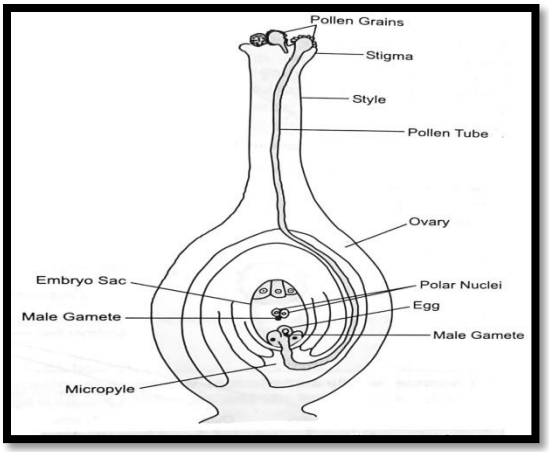
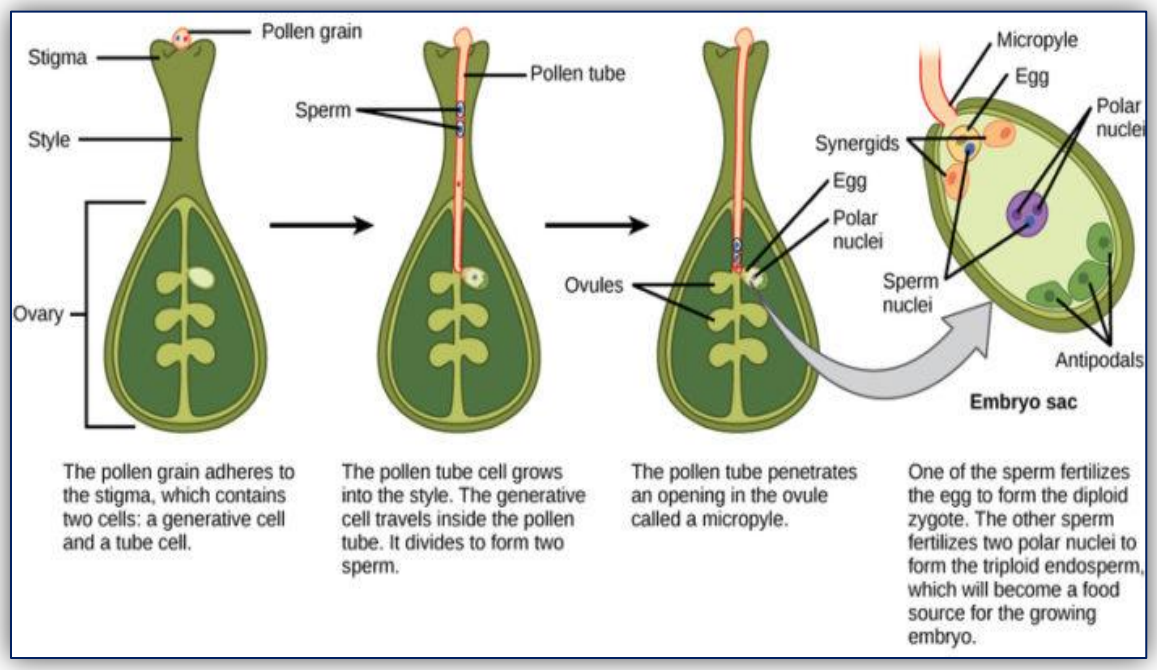


Fig----- Fertilization in Flowering plant



- *The complete development of foetus,from the initial stage of conception till the birth of the young one, is called GESTATION.*
- *GESTATION is completed in about 280 days.*
- The birth of fully matured baby (weighs about 3.5 kg) is called *PARTURITION.*
- The regulation of conception by preventive measures or devices to control the number of offsprings is called *BIRTH CONTROL .*
- *GONORRHEA, SYPHILIS*,(bacterial diseases) *AIDS*(viral disease) are some dangerous STDs.
- *PUBERTY* is the age at which the human males and females become sexually mature.
- The age of Puberty in female is *10 to 12 years* and in male is *13 to 14 years.*
- Release of *ovum* from the *Ovary* is called *OVULATION.*
- Male reproductive system consists…*TESTES,VAS DEFERENS, URETHRA and PENIS* whereas Female consists…..*OVARIES, FALLOPIAN TUBES (OVIDUCTS), UTERUS* and *VAGINA.*
- First menstrual cycle in human Female is called *MENARCHE* and last is called *MENOPAUSE.*
- The developing Zygote is called *Embryo.*
- The Embryo gets nutrition from the mother's blood with the help of a special tissue called *PLACENTA.*This is disc which is embedded in the uterine wall.