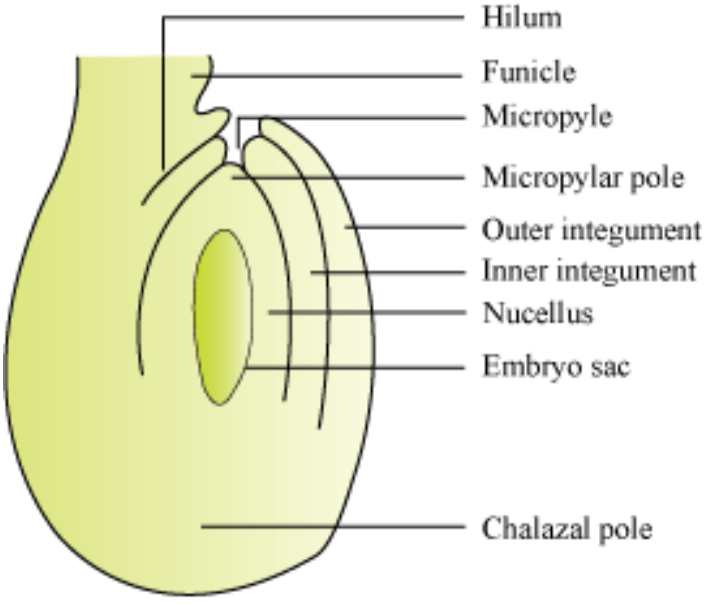
Pollination and Fertilisation

Gynoecium and Formation of Female Gametophyte

- Female reproductive part of a flower is called gynoecium.
- Each pistil consists of three parts viz.
    - Stigma: receives pollen grains
    - Style: part below stigma
    - Ovary: basal part that contains placenta

Structure of Megasporangium and Megasporogenesis

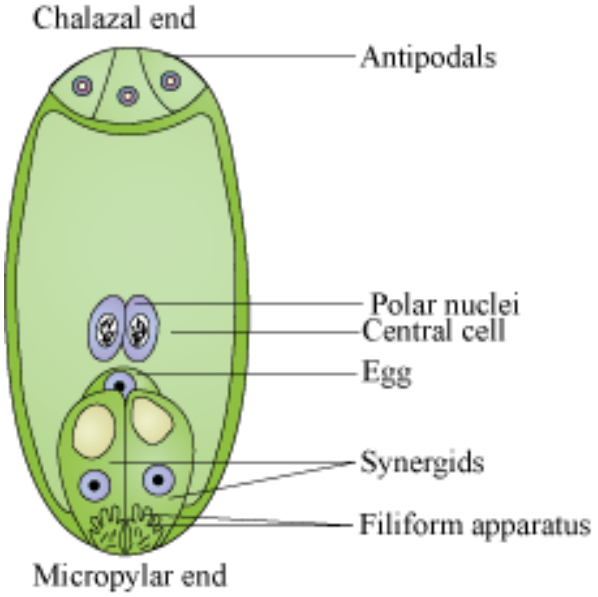
- **Megasporangium**
    - It is commonly known as ovule.
    - Structure of a typical megasporangium



A typical anatropous ovule

    - Nucellus is a nutritive tissue; micropyle is the opening of the ovule from where the pollen tube enters
    - **Embryo sac** is located inside the nucellus. It is also known as the female gametophyte.

- **Megasporogenesis** is the process of formation of the megaspore from the megaspore mother cell by the process of meiosis.
- After megasporogenesis, four haploid megaspores are formed. Out of the four megaspores, one functional megaspore develops into the female gametophyte or embryo sac.
- A typical megaspore embryo sac is a 7-celled and an 8-nucleate structure, as shown below:



Pollination

- It is the process of transfer of pollen grains from the anther to the stigma of the pistil.
- Pollination is divided into three types:
    - **Autogamy:** Pollination that occurs within the same flower
    - **Geitonogamy:** Pollination that occurs between two flowers of the same plant
    - **Xenogamy:** Pollination that occurs between the flowers of different plants. Xenogamy brings genetic variation.
- **Self pollination**
- Homogamy and cleistogamy are two contrivances for self pollination.

- **Cleistogamy–** Flowers are closed; therefore, the stigma and the anther are not exposed to be pollinated by pollens from different flower.
- **Homogamy-** Anther and stigma of the bisexual flower mature at same time
- Self pollination is necessary to ensure the continuity of the race and to preserve parental characteristics. But repeated self pollination leads to loss of vigour in plants.

- **Cross pollination**
    - Unisexuality, self sterility, dichogamy, herkogamy, heterostyly are some of the contrivances for cross pollination to take place.
    - **Dichogamy** means that stamens and carpels mature at different times. Protogyny means gynoecium maturing earlier and protoandry means androecium maturing earlier.
    - **Herkogamy** means some sort of barrier is introduced between stamen and pistil in bisexual flower so that self pollination is prevented.
    - **Heterostyly** means that flowers are borne in different styles or forms.
    - Cross pollination leads to a healthier and viable offspring and positive variations are introduced in the progeny. Disadvantages of the process include wastage of pollen in course of transfer from one flower to other, and dependence on pollinators.
- **Agents of cross pollination**
    - **Wind:** Flowers pollinated are small and lack bright colour; pollen grains are small, dry and light in weight and occur in abundance; example, grass. Pollination by wind is called anemophily.
    - **Water:** Flowers pollinated are not colourful and emerge above the water level; example, Vallisneria, Hydrilla. Pollination by water is called hydrophily.
    - **Animals:** Flowers pollinated are brightly coloured and contain large amounts of nectar to attract the pollinators; example, Yucca .Pollination by insects is called entomophily

- Pollen–pistil interaction leads to the acceptance or the rejection of a pollen by the stigma.

- **Fertilisation**

- The fertilisation in an angiosperm is called **double fertilisation** as it involves two steps.
    - **Syngamy:** Fusion of one male gamete with an egg cell to form a zygote
    - **Triple fusion:** Fusion of another male gamete with two polar nuclei located inside the central cell of the embryo sac to form a triploid primary endosperm nucleus

After Fertilization,

- Fertilized ovule forms seed.
- Floral parts such as sepals, petals, stamens, style, and stigma fall off.
- Ovary grows, enlarges, and ripens to become fruit.
- Fruits can be fleshy and juicy (examples – apples, mangoes) or dry and hard (example − nuts or peas).

Fruit – Fruit is the mature ovary.

- It has two main parts pericarp (It further contains outer hard epicarp, fleshy, edible mesocarp and innermost endocarp).

- Endocarp is the part that covers the seed.

- Fruit helps to protect the plant from animals or extreme climatic conditions.
- It also helps in seed dispersal and performs the function of storage of food.

Seed – Seed is the mature ovule.

- Outer covering of seed is called seed coat.

- A seed is made up of one or two cotyledons and a seed axis.
- Plumule of the axis develops into shoot and radicle into root.
- Under proper conditions seed germinates to form a new plant.