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Class 12<sup>th</sup>

Subject Biology

Date 03.06.2021

## Sexual Reproduction in Flowering Plants

**4. Microsporogenesis** The formation of microspores from a pollen mother cell (each cell of sporogenous tissue) through meiosis is called microsporogenesis.

(i) Microspores are arranged as tetrad. As the anther mature and dehydrates they dissociate from each other and develop into pollen grains. Pollen grains or the male gametophytes are released by dehiscence of anther.

(ii) Pollen grains have the following characteristic features:

- Generally spherical, about 25-50 micrometers in diameter.
- Mature pollen grain comprises of two layers.

(a) Outer hard layer Exine made up of one of the most resistant organic material sporopollenin, that enables them to resist high temperatures and action of strong acids and alkali. Further no enzyme is yet known to degrade sporopollenin, because of which they are well preserved as fossils.

The region on exine where sporopollenin is absent are called germ pores. It helps in the formation of pollen tube, while the pollen grain germinates on stigma.

(b) Inner thin, continuous layer Intine made up of cellulose and pectin.

- A mature pollen grain contains two cells.

(a) Vegetative cell or tube cell It is larger as compared to other cell and possess vacuolated cytoplasm which is rich in reserve food, i.e. starch, protein, fat and cell organelles. The nucleus is large and irregular.

(b) Generative cell It is smaller cell usually spindle-shaped or spherical with thin dense cytoplasm and prominent nuclei. It divides mitotically to form two non-motile male gametes, prior to release of pollen grain.

(iii) In about 60% of angiosperms, pollen grains are shed at 2-celled stage.

(iv) In about 40% flowering plants, the generative cell divides mitotically to give rise to the two male gametes before pollen grains are shed at 3-celled stage.

(v) Pollen grains of many species (e.g. Parthenium) causes severe allergic, chronic respiratory disorders like asthma, bronchitis, etc.

(vi) Viability of pollen grains depends on temperature and humidity.

(vii) Pollen grains are richer in nutrients and are used as food supplements in form of pollen tablets and syrups. Its consumption has been claimed to increase the performance of athletes and race horses.

**4. Pistil/Gynoecium** It is the female unit of flower. A flower may be monocarpellary (having one pistil) or multicarpellary (having more than one pistils). Pistils may be syncarpous (fused together) or apocarpous (free).

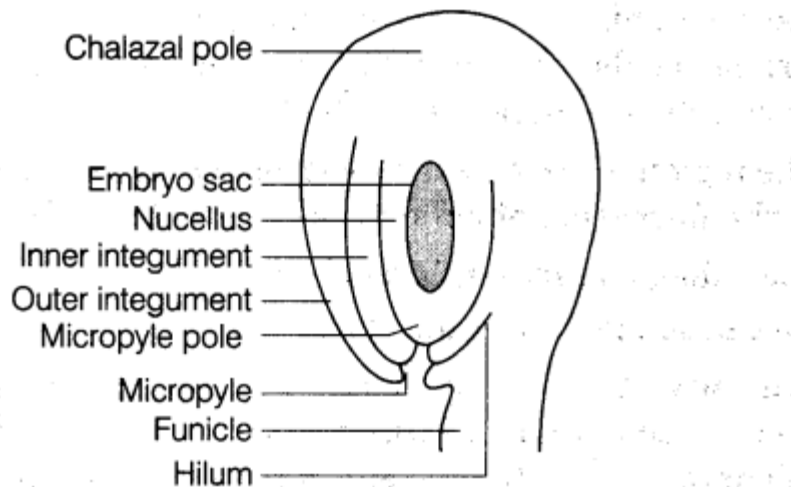
**The main parts of pistils are:**

- (i) Stigma receives pollen grains.
- (ii) Style is the elongated slender part beneath the stigma.
- (iii) Ovary the bulged part at the base of style.

Placenta is located inside the ovarian cavity or locule. Megasporangia, commonly called ovules arise from the placenta. Ovule is attached to the placenta by a stalk called funicle. The number of ovules in an ovary may be one (wheat, paddy and mango) to many (papaya, water melon and orchids).

The main parts of megasporangium (ovule) are:

- (i) Hilum is a junction between ovule and funicle.
- (ii) Each ovule has one or two protective envelopes called integuments.
- (iii) Micropyle is an opening present at the tip where integument is absent.
- (iv) Chalaza is opposite to the micropylar end representing the basal part of the ovule.
- (v) The integuments encloses a mass of cells called the nucellus which have food reserves.
- (vi) Embryo sac or female gametophyte is located in the nucellus (generally one formed from megaspores through reductional division)



**Diagrammatic view of a typical anatropous ovule**