

Flower & its Parts

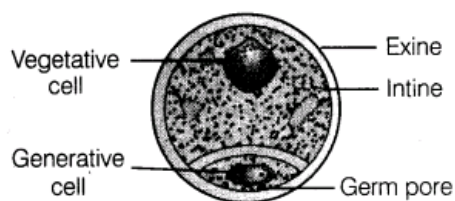
1 Mark Questions

1. Name the part of the flower which the tassels of corn cob represent. [All Indian 2014]

Ans. The part of the flower that represent the tassels of corn cob are stamens or male reproductive parts.

2. Draw a diagram of a matured microspore of an angiosperm. Label its cellular components only. [Foreign 2014]

Ans. The labelled diagram of a mature microspore of an angiosperm with its cellular components is given below:



3. State the function of filiform apparatus found in mature embryo sac of an angiosperm. [Foreign 2014]

Ans. The special cellular thickenings at the micropylar tip called filiform apparatus, found in mature embryo sac of an angiosperm helps in guiding the pollen tubes up to the synergids.

4. Abilobed, ditheous anther has 100 microspore mother cells per microsporangium. How many male gametophytes this anther can produce? [HOTS; Delhi 2010]

Ans. An anther is a four-sided (tetragonal) structure consisting of four microsporangia located at the corners, two in each lobe. Total microsporangium = $4 \times 100 = 400$. So, anther produces 400 male gametes

5. An anther with malfunctioning tapetum often fails to produce viable male gametophytes. Give one reason. [Delhi 2010]

Ans. The anther with malfunctioning tapetum cannot provide complete nutrition to the developing microspores or male gametophytes. So, it fails to produce viable male gametophyte.

2 Marks Questions

6. Name the organic materials of which exine and intine of an angiosperm pollen grains are made up of. Explain the role of exine. [Delhi 2014]

Ans. The angiosperm pollen grains comprise of outer exine made up of resistant organic material sporopollenin, while inner thin layer of intine is made up of cellulose and pectin. Since, the outer hard layer of exine is made up of sporopollenin which is one of the most resistant organic substance, it helps the pollen grains to resist high temperatures, strong acids and alkali and it also protects them from enzyme degradation.

7. Differentiate between the two cells enclosed in a mature male gametophyte of an angiosperm. [All India 2013]

Ans. Haploid pollen grain represents the male gametophyte. It contains two cells, i.e. vegetative cell and generative cell. The vegetative or tube cell is larger in size as with prominent nuclei that gives rise to two male gametes, while vegetative cell does not.

compare to generative cell and have vacuolated cytoplasm. The generative cell on the other hand have thin dense cytoplasm

8. Name all the haploid cells present in an unfertilised mature embryo sac of a flowering plant. Write the total number of cells in it. [HOTS; All India 2013]

or

How many haploid cells are present in mature female gametophyte of a flowering plant?

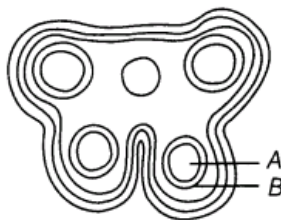
Name them. [Delhi 2013 C]

Ans. An unfertilised embryo sac of angiosperm is composed of 7 cells, i.e. 7-celled and 8-nucleated. Among 8-nuclei, 6 are enclosed by cell walls and organised into cells, which are haploid in number (3 antipodal, 2 synergids and 1 egg cell) and a large central cell with 2 pollen nuclei.

9. Where is sporopollenin present in plants? State its significance with reference to its chemical nature. [Delhi 2012]

Ans. Sporopollenin is present in exine of pollen grains in plants. It is one of the most resistant organic substances and can withstand high temperatures, strong acids and alkalis. It protects the pollen grains from enzymes and helps them to be well preserved.

10. In the TS of a mature anther given below, identify A and B and mention their functions. [Foreign 2009]



Ans. A-Sporogenous tissue

Function Its cells are potential mother cells and form pollen grains.

B-Tapetum

Function It nourishes the developing pollen grains.

11. (i) Draw a schematic diagram of TS of a mature anther. Label only the layers that help in dehiscence of the anther to release pollen grains.

(ii) Why is exine of the pollen grain not a continuous layer? [Delhi 2009]

Ans. (i) Diagram of TS of a mature anther: Anther is a bilobed structure with each lobe having

two theca, therefore called dithecal. In a cross section, it is a four sided (tetragonal) structure consisting of four microsporangia, located at the corners, two in each lobe. Microsporangia develop and become pollen sacs. Pollen sacs contain pollen grains.

Structure of microsporangium contains following features in a transverse section:

- Appears nearly circular in outline.
- It is surrounded by four wall layers. The outer three layers are epidermis, endothecium and middle layers. Outer three wall layers are protective in function and help in dehiscence of anther to release the pollen. The fourth and innermost layer called the tapetum nourishes developing pollen grains. It contains cells with dense cytoplasm and more than one nuclei.
- A sporogenous tissue occupies the centre of each microsporangium in a young anther.
- Each cell of sporogenous tissue undergoes meiosis to form microspore tetrads. Each cell of the tetrad is known as microspore mother cell

(ii) The exine is absent or very thin at regions called apertures (germ pore) through which pollen tube emerges at the time of germination on stigma.

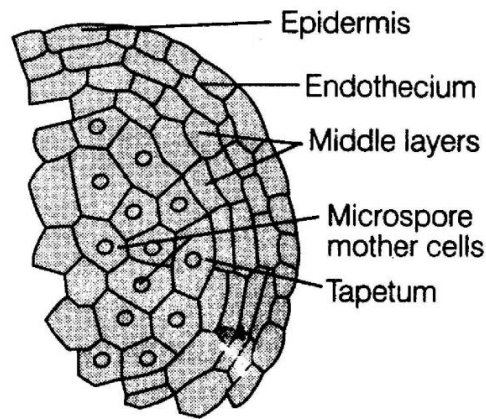
3 Marks Questions

12. Why are angiosperm anthers called dithecal? Describe the structure of its microsporangium. [Delhi 2014]

or

Describe the structure of a mature microsporangium of an angiosperm. [Delhi 2014]

Ans. Since, the angiosperm anthers are bilobed, each lobe bearing two theca, they are referred to as dithecal. The structure of a mature microsporangium can be described with the help of given alongside diagram. Microsporangium appears circular in outline and is usually surrounded by four wall layers. The outer three layers epidermis, endothecium and middle layers are protective in function. They also help in dispersal of pollens by dehiscing themselves. While, the innermost layer tapetum is nutritive in function and nourishes the developing pollen grains.



The centre of the microsporangium comprises of compact sporogenous tissue. These sporogenous tissue undergo meiotic divisions to form microspore tetrads, that further divide to form pollen grains.

13. Draw a labelled diagram of a typical anatropous ovule. [Delhi 2014]

Ans. The structure or labelled diagram of anatropous ovule

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).

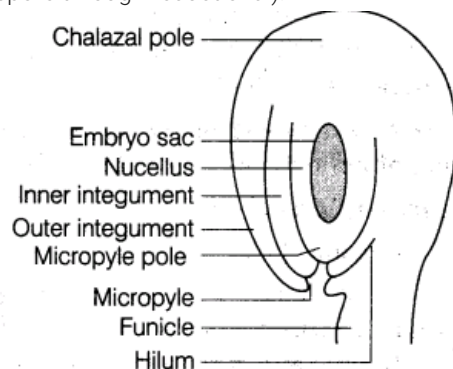
The main parts of pistils are:

- Stigma receives pollen grains.
- Style is the elongated slender part beneath the stigma.
- 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:

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

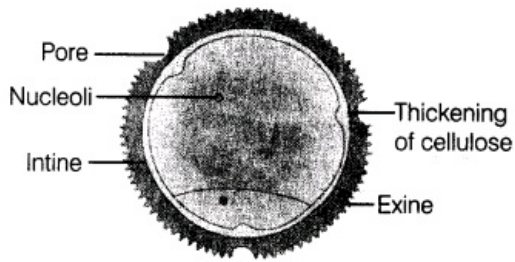


Diagrammatic view of a typical anatropous ovule

14. Draw a diagram of a male gametophyte of an angiosperm. Label any four parts. Why is

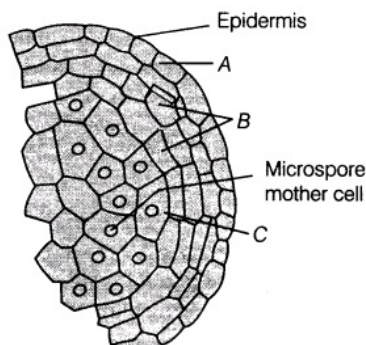
sporopollenin considered the most resistant organic material?[Delhi 2011]

Ans.(i) The structure of a male gametophyte of an angiosperm is:



(ii) Sporopollenin is one of the hardest or resistant organic material known. It can withstand high temperatures, strong acids and alkalis. No enzyme that degrades sporopollenin is so far known. That's why it is considered the most resistant organic material

15. Given below is an enlarged view of one microsporangium of a mature anther



(i) Name A, B and C wall layers.

(ii) Mention the characteristics and function of the cells forming wall layer C. [Delhi 2008 C]

Ans. (i) A-Endothecium, B-Middle layer, C-Tapetum

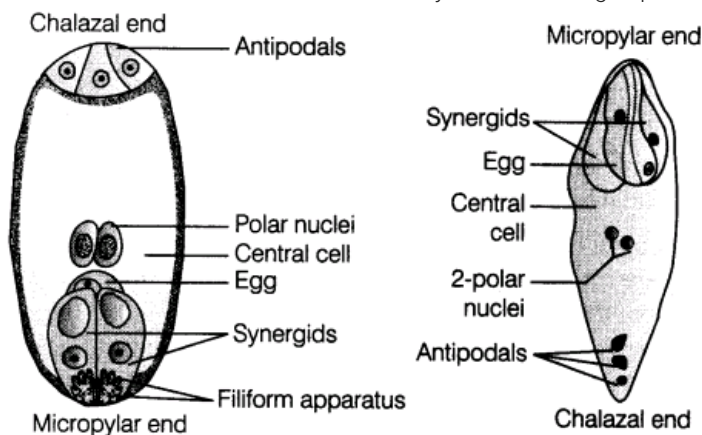
(ii) Wall layer C is tapetum. It is the innermost wall layer of microsporangium cell of the tapetum possess dense cytoplasm and generally have more than one nucleus. It nourishes the developing pollen grains.

5 Marks Questions

16. Draw a labelled diagram of sectional view of a mature embryo sac of an angiosperm.

[Delhi 2014]

Ans. The sectional view of a mature embryo sac in an angiosperm. Chalazal end Antipodals

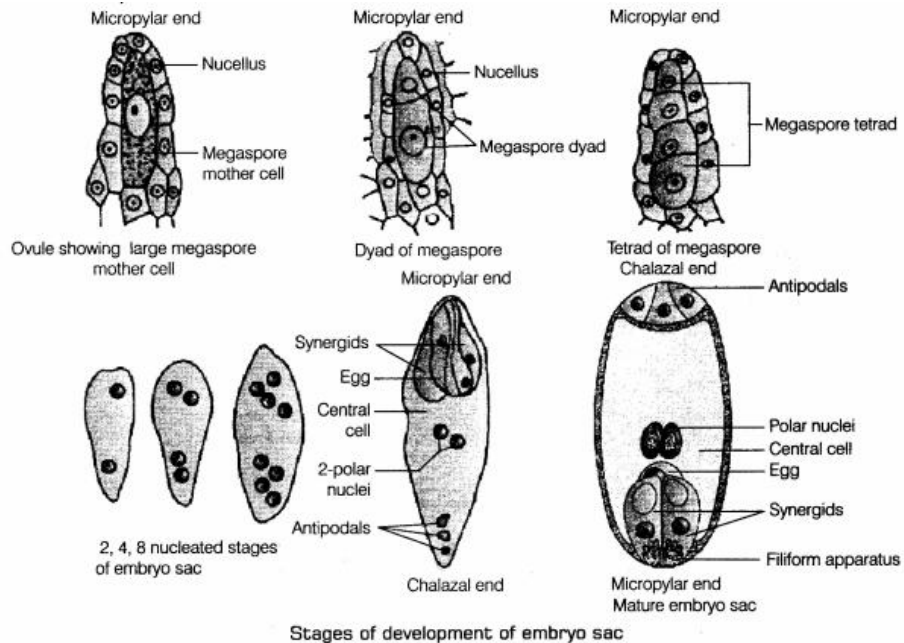


17.(i) Describe the formation of mature female gametophyte within an ovule in angiosperms.

(ii) Describe the structure of cell that guides the pollen tube to enter the embryo sac. [All India 2014]

Ans.(i) The functional megaspore undergoes mitosis to form two nuclei, which migrate to opposite poles, forming a 2-nucleate embryo sac. Further, mitotic divisions lead to the

formation of 4-nucleate and 8-nucleate stages of the embryo sac. In these mitotic divisions, nuclear division is not followed by cell division. After the 8-nucleate stage, cell walls are laid down and a typical female gametophyte or embryo sac is formed.



Among the eight nuclei, six are enclosed by cell walls and organised into cells, while the remaining two nuclei (polar nuclei) are situated above the egg apparatus in a large central cell. Out of the six cells, three are grouped at the micropylar end and constitute the egg apparatus made up of two synergids and one egg cell.

The other three cells are located at the chalazal end and are called antipodals. Thus, a typical angiosperm embryo sac after maturity is 8-nucleate and 7-celled.

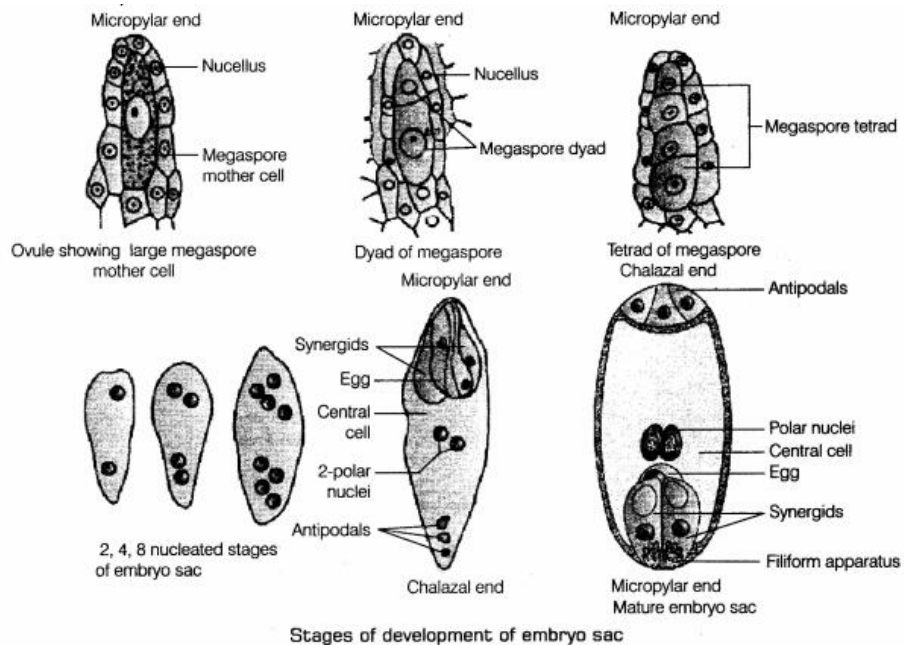
(ii) The egg apparatus present towards the micropylar end, comprises of two synergids and an egg cell. These synergids possess special cellular thickenings at their micropylar tip which is called filiform apparatus. This filiform apparatus guides the pollen tube to enter embryo sac.

18. How does the megaspore mother cell develop into 7-celled and 8-nucleate embryo sac in an angiosperm? Draw a labelled diagram of a mature embryo sac. [Delhi 2012]

or

Explain with the help of diagram the development of mature embryo sac from a mega spore mother cell in angiosperm. [Foreign 2012; All India 2010 C; Delhi 2009]

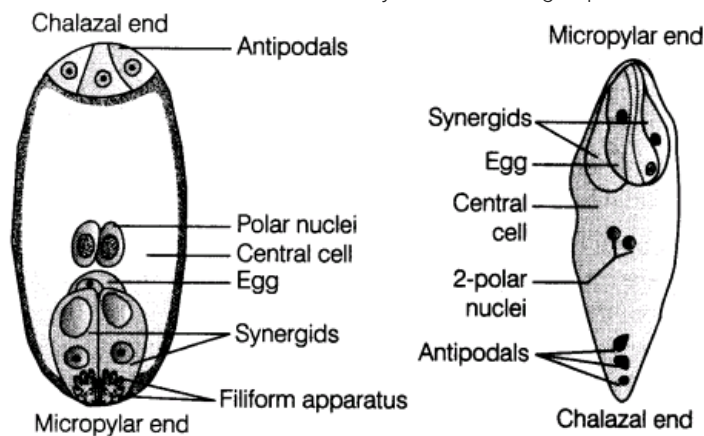
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The sectional view of a mature embryo sac in an angiosperm is shown below.



19.(i) Draw a diagram of an enlarged

(i) view of TS of one microsporangium of an angiosperm and label the following parts.

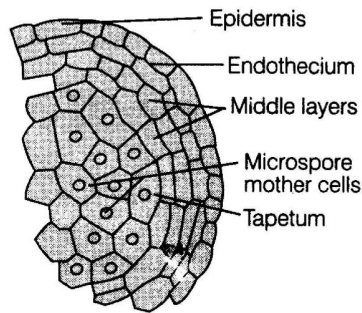
- Tapetum
- Middle layers
- Endothecium
- Microspore mother cell

(ii) Mention the characteristic features and function of tapetum.

(iii) Explain the following giving reasons

- Pollen grains are well preserved as fossils.
- Pollen tablets are in use of people these days. [Foreign 2011]

Ans.(i) Diagram



(ii) Tapetum is the inner nourishing layer of microsporangial wall. The cells of tapetum have dense

cytoplasm and more than one nucleus.

(iii) (a) Since, the outer exine layer of pollen grain is highly resistant because of sporopollenin. It is an organic material which can withstand harsh conditions, action of alkalis and acids. No enzymes can degrade sporopollenin. Thus, pollen grains are well preserved as fossils.

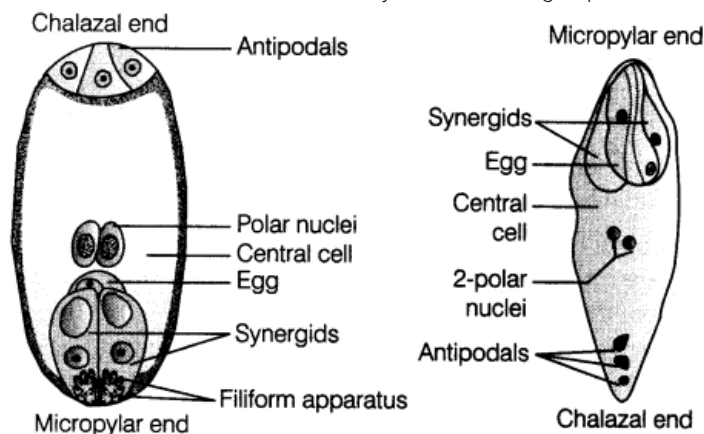
(b) Pollen grains are rich in nutrients. So, used by people as health tablets or food supplements

20.(i) Draw a labelled diagram of a mature embryo sac.

(ii) Why does a pollen grain possess two male gametes? Explain. [Delhi 2009]

Ans. For diagram of mature embryo sac

The sectional view of a mature embryo sac in an angiosperm. Chalazal end Antipodals



(ii) In flowering plants, double fertilisation occurs. It involves two fusions during fertilisation of an ovule. A pollen grain contains two male gametes. One of the male gamete fuses with female gamete to form zygote and the other one fuses with the polar nuclei to form the primary endosperm nucleus.

21. Draw a labelled diagram of an anther lobe at microspore mother cell stage. Mention the roles of different wall layers of anther. [Delhi 2009 C]

Ans. (i) Structure of an anther lobe at microspore mother cell stage

Anther is a bilobed structure with each lobe having two theca, therefore called dithecous. In a cross section, it is a four sided (tetragonal) structure consisting of four microsporangia, located at the corners, two in each lobe. Microsporangia develop and becomes pollen sacs. Pollen sacs contain pollen grains.

Structure of microsporangium contains following features in a transverse section:

- Appears nearly circular in outline.
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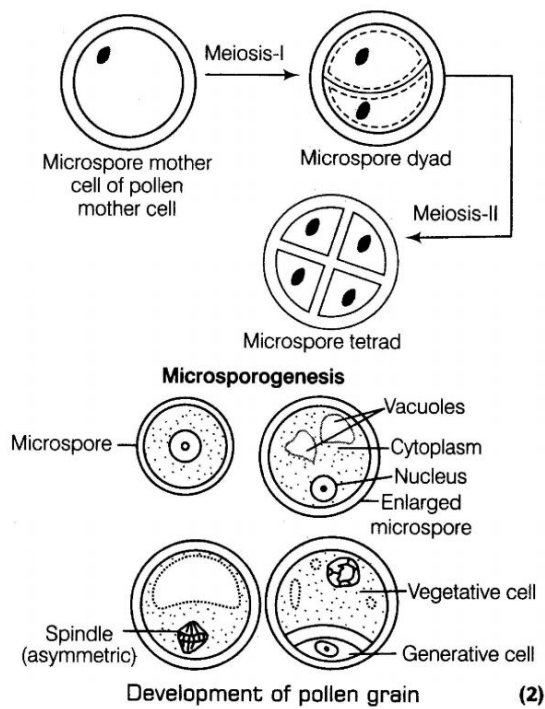
- A sporogenous tissue occupies the centre of each microsporangium in a young anther.
- Each cell of sporogenous tissue undergoes meiosis to form microspore tetrads. Each cell of the tetrad is known as microspore mother cell

(ii) Role of wall layers of anther An anther is surrounded by four wall layers. These are epidermis, endothecium, middle layers and the tapetum. The outer three wall layers perform the function of protection and help in dehiscence of anther to release pollen. The innermost layer tapetum, nourishes the developing pollen grain cells.

22. How does the pollen mother cell develop into a mature pollen grain? Illustrate the stages with labelled diagram. [All India 2009]

Ans. Development of pollen grain from pollen mother cell:

- (i) Pollen mother cell or microspore mother cell undergoes meiosis to form microspore tetrad or haploid microspores.
- (ii) As the anther matures, the microspores dissociate from the tetrad and develop into pollen grains.
- (iii) Nucleus of the microspores undergoes mitosis to form a large vegetative cell and small spindle-shaped generative cell.
- (iv) They develop a two layered wall, the outer exine made of sporopollenin and the inner intine made of cellulose and pectin.
- (v) Usually the pollen grains are liberated at this 2 celled stage. In certain species, the generative cell divides mitotically to form two male gametes and the pollen grains are 3 celled during liberation.

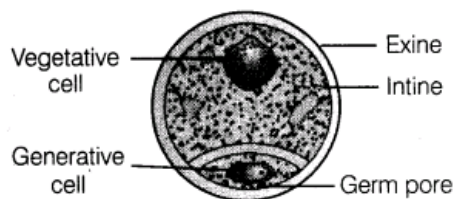


23. Draw a labelled diagram of the sectional view of a mature pollen grain in angiosperm.

Explain the functions of its two different parts. [Delhi 2008]

Ans.(i) Sectional view of mature pollen grain

The labelled diagram of a mature microspore of an angiosperm with its cellular components is given below:



(ii) Functions of layers are:

- Exine provides protection.
- Intine grows out as pollen tube through one of the germ pores on the exine.

Functions of two cells

- Vegetative cell contain food reserves, i.e. starch, protein, fat.
- Generative cell divides mitotically to produce two male gametes