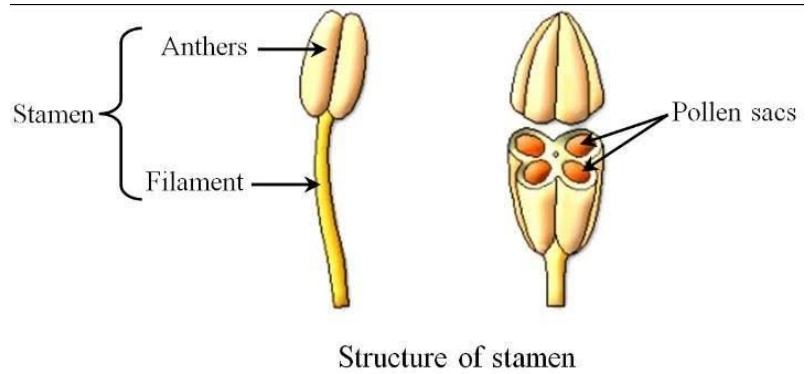


5th SEM MINOR

1. Structure of Anther

- **Part of the stamen (male reproductive organ in flowers).**
- **Bilobed and ditheous (each lobe has two thecae).**
- **Tetrasporangiate: Each anther has four pollen sacs (microsporangia).**



a. Anther Wall Layers (from outside to inside):

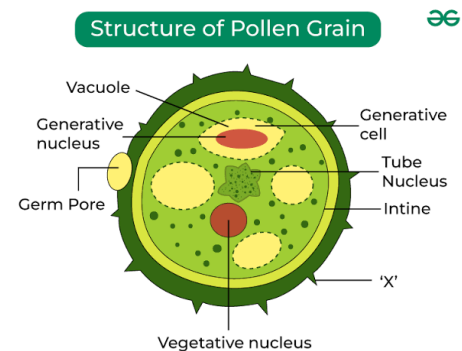
1. **Epidermis – Protective outer layer.**
2. **Endothecium – Helps in dehiscence (releasing of pollen).**
3. **Middle Layers – 1–3 layers; temporary.**
4. **Tapetum – Innermost layer; nourishes developing pollen; metabolically active.**

b. Microsporangium

- **Central fertile tissue = Sporogenous tissue (produces microspore mother cells).**
- **Microspore mother cells undergo meiosis → form tetrads of microspores.**

2. Structure of Pollen Grain

- **Haploid, formed by meiosis of microspore mother cells.**
- **Surrounded by:**
 - **Exine – Outer tough layer with sporopollenin (chemically inert).**
 - **Intine – Inner layer of cellulose and pectin.**
- **Contains:**
 - **Vegetative cell – Large, metabolically active.**
 - **Generative cell – Divides to form two male gametes.**

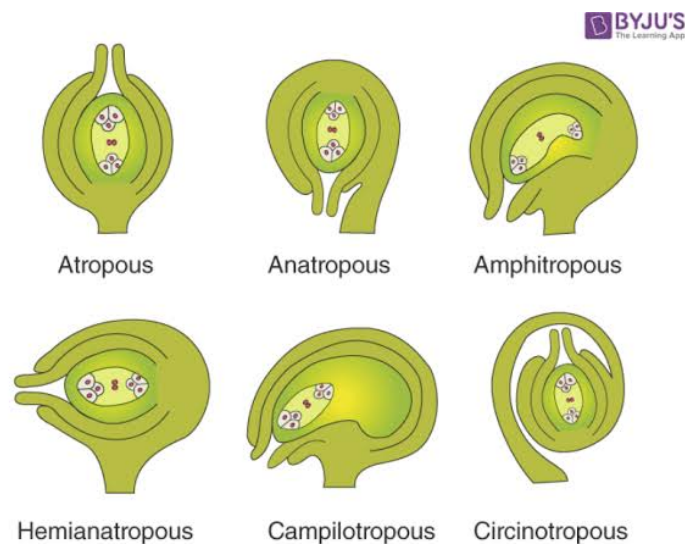


Structure and Types of Ovules

1. Structure of Ovule (Megasporangium)

- **Located inside the ovary of the carpel.**
- **Main parts:**
 - **Funicle** – Stalk attaching ovule to placenta.
 - **Hilum** – Junction between ovule and funicle.
 - **Integuments** – Protective layers (1 or 2) covering the ovule.
 - **Micropyle** – Opening in integuments for pollen tube entry.
 - **Nucellus** – Parenchymatous tissue that surrounds embryo sac.
 - **Embryo sac** – Female gametophyte.

2. Types of Ovules (based on orientation of micropyle, chalaza, and funicle):



Type	Description	Diagram orientation
Orthotropous	Micropyle, chalaza, and funicle in straight line	Straight
Anatropous	Ovule inverted; micropyle close to funicle (most common)	Curved downward
Campylotropous	Body of ovule curved; embryo sac slightly curved	Bean-shaped
Amphitropous	Both ovule and embryo sac curved	Horse-shoe shaped
Hemianatropous	Ovule is at right angle to funicle	Horizontal
Circinotropous	Ovule turns 360° during development	Spiral



Types of Embryo Sacs (Female Gametophyte)

1. Monosporic Type (most common – e.g., *Polygonum* type):

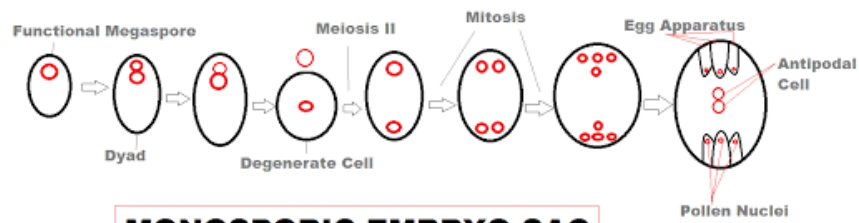
- Only one megaspore (from a tetrad) develops into embryo sac.
- Undergoes three mitotic divisions → 8 nuclei.
- Arrangement:
 - 3 antipodals at chalazal end.
 - 2 synergids + 1 egg cell at micropyle (forms egg apparatus).
 - 2 polar nuclei in center → fuse to form secondary nucleus.

2. Bisporic Type:

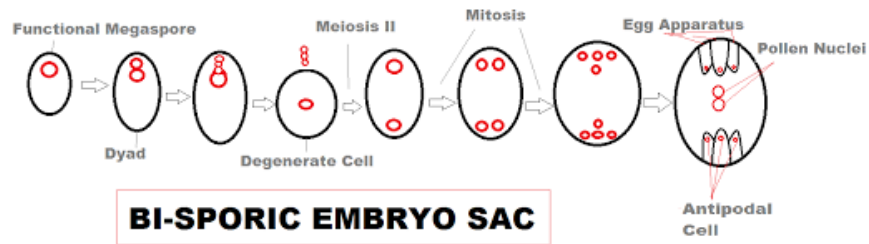
- Two nuclei participate in embryo sac formation (e.g., *Allium* type).
- One mitotic division less than monosporic type.
- Example: Only 2 of the 4 megaspores fuse and develop.

3. Tetrasporic Type:

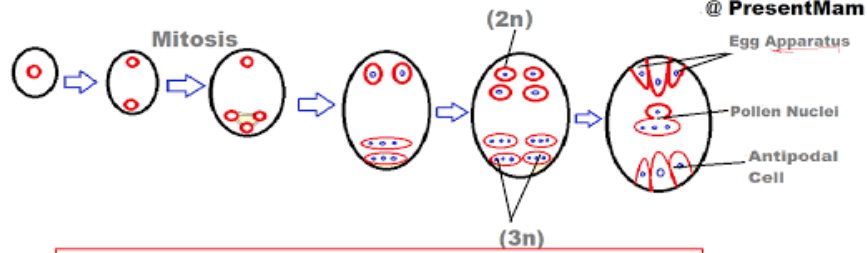
- All four megaspore nuclei contribute.
- No wall formation between megaspores → multinucleate cell.
- Example: *Adoxa*, *Peperomia*.
- Many variations depending on fusion and arrangement of nuclei (e.g., *Fritillaria* type).



MONOSPORIC EMBRYO SAC



BI-SPORIC EMBRYO SAC



Fritillaria Type (Tetraspore)

@ PresentMam