



**Topic:**

**Ovule -**

**A. Structure**

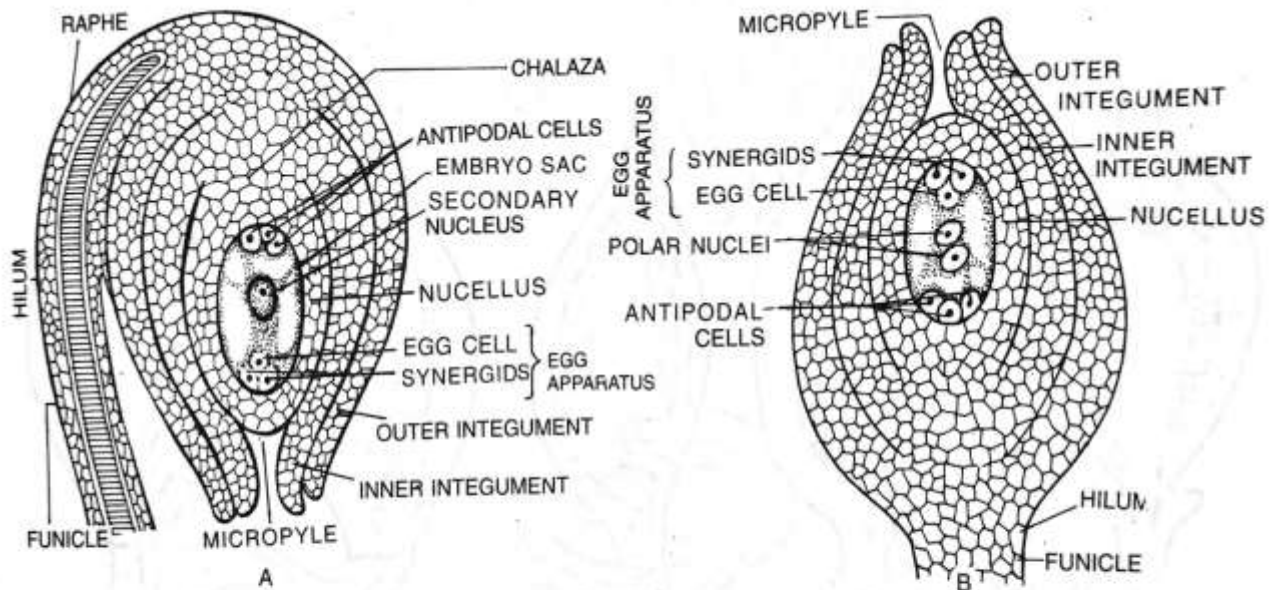
**B. Types**

**A. STRUCTURE OF AN OVULE:**

The ovule may be defined as an immature seed or an unripened integumented megasporangium. It may also be designated simply as “the egg containing organ within ovary.” After fertilization the ovule develops into seed. In angiosperms, ovules are protected by megasporophyll which forms a closed structure (ovary), that is why seeds remain enclosed. In gymnosperms, ovules are not protected but exposed on megasporophyll i.e. carpel resulting into the formation of naked seeds.

**STRUCTURE:**

1. The stalk with which the ovule remains attached to the placenta is called funicle or funiculus.
2. The point of attachment of the funicle to the body of the ovule is called hilum.
3. The basal part of the ovule from where the integument or integuments arise is known as chalaza.
4. The extension of the funicle beyond the hilum alongside the body of the ovule is known as raphe. A raphe may be ventral or dorsal in an ovule, and may extend up to the base i.e. chalaza of the ovule.



**Fig:** -Longitudinal section of an ovule of angiosperm; A—Anatropous ovule, B—Orthotropous ovule.

5. The main body of the ovule consists of a central mass of tissue—the nucellus which is surrounded by one or two envelopes called integuments; the integuments enclose the nucellus except at the apex, where a small opening is left called micropyle.
6. Near the micropylar end, a sac-like structure known as embryo sac (female gametophyte), lies embedded into the nucellus. Within the embryo sac towards the micropyle there are three naked cells. The middle one is the largest and is known as oosphere or ovum i. e. egg cell; two lateral ones are the synergids. Oosphere and the synergids constitute what is known as egg-apparatus. At the centre of the embryo sac lies a composite nucleus, formed by the union of two polar (one nucleus from each pole of the embryo sac) nuclei— this is known as secondary or definitive nucleus. Towards the chalazal end of the embryo sac there are three walled-cells known as antipodal cells.

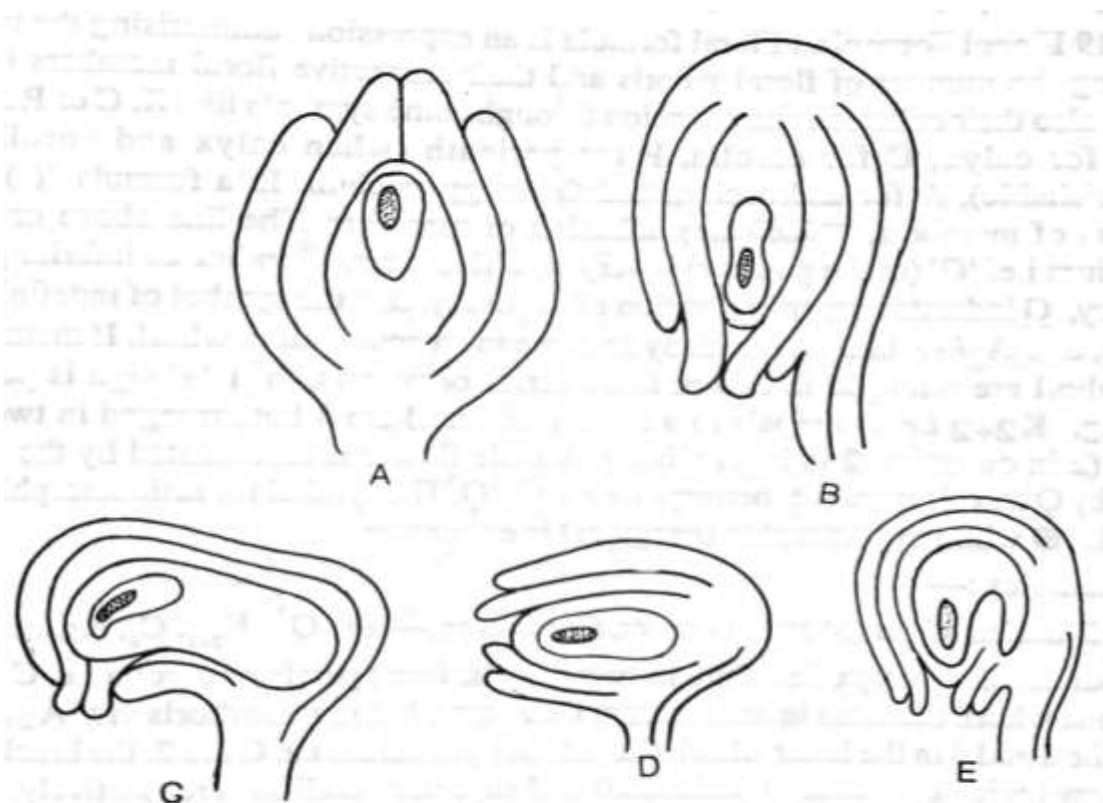


## B. TYPES OR FORMS OF OVULES:

Mature ovules i.e. megasporangia in angiosperms are mainly of five types. The principle of classification is based on the position of the micropyle, chalaza and hilum with regard to one another and also to the placenta.

### 1. Orthotropous or Atropous-

In this type of ovule, the micropyle, chalaza and hilum are in one straight line so the ovule remains straight; the hilum lies at the extreme base. the chalaza and the micropyle follow in succession. This type is noted in members of the families Polygonaceae (*Polygonum sp.*), Piperaceac (*Piper nigrum*, *Piper longum*), Urticaceae (*Urtica sp.*) etc.



**Fig:** Types of ovules. A—Orthotropous. B—Anatropous. C—Campylotropous.. D—Amphitropous. E—Hemianatropous.



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**2. Anatropous or Inverted-**

In this type the ovule is completely inverted, so much so, that the micropyle comes very close to hilum; the chalaza is upwardly directed. This type is very common in dicotyledonous and monocotyledonous families like Labiatae, Boraginaceae, Euphorbiaceae (*Ricinus sp.*), Liliaceae, Amaryllidaceae etc.

**3. Campylotropous-**

When the ovule is so curved that the micropyle comes nearer to hilum. This type is met with in members of the families Cruciferae, Leguminosae, Caryophyllaceae etc.

**4. Hemianatropous-**

When the curvature of the ovule is more pronounced and also affects the embryo sac, so that the embryo sac becomes bent like a horse shoe. This type is noted in families like Alismaceae, Butomaceae, Caryophyllaceae, Portulaccaceae etc.

**5. Amphitropous-**

When the ovule is transverse i.e. nucellus and integuments lie more or less at right angles to the funiculus as seen in species of *Lemna* (Lemnaceae), *Ranunculus* (Ranunculaceae), *Nothoscordum* (Liliaceae) etc.

**References:**

1. Studies In Botany (Volume-I). Jatindra Nath Mitra, Debabrata Mitra, Salil Kumar Choudhuri, Moulik Library, 2000. ISBN: 978-93-81676-01-1.
2. A Textbook Of Botany (Volume-II). Ashim Kumar Ghosh, Kashinath Bhattachariya, Gopinath Hait, New Central Book Agency(P) Ltd. 2015. ISBN: 978 81 7381 555 3.

(All the above mentioned information including the figures are collected from the above references and will be solely used for teaching and learning purposes).