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# **ENDOSPERM AND IT'S TYPES**

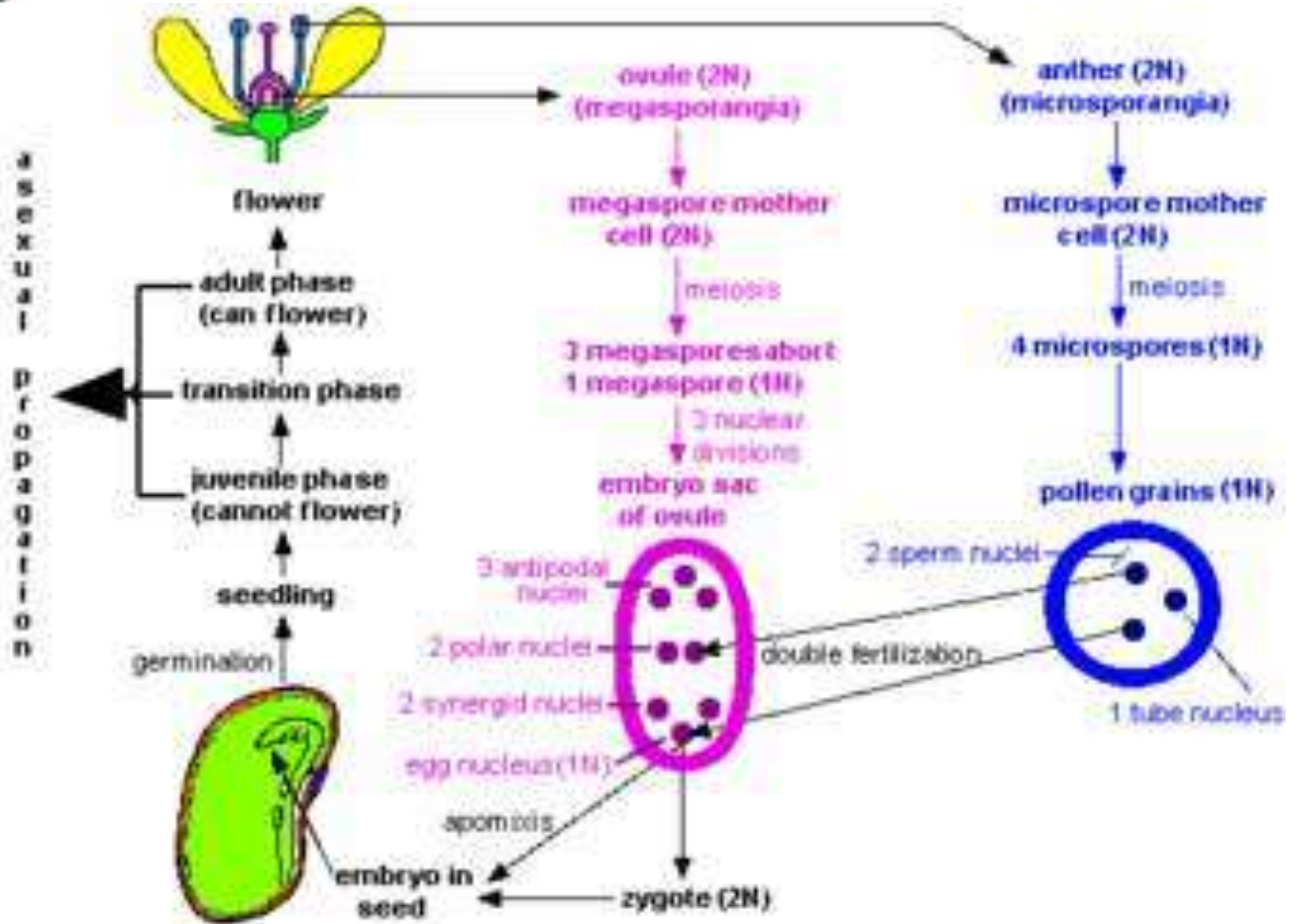
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**BOTANY: SEM- IV, PAPER: GE-4:PLANT ANATOMY AND EMBRYOLOGY, UNIT-7:EMBRYO AND  
ENDOSPERM**



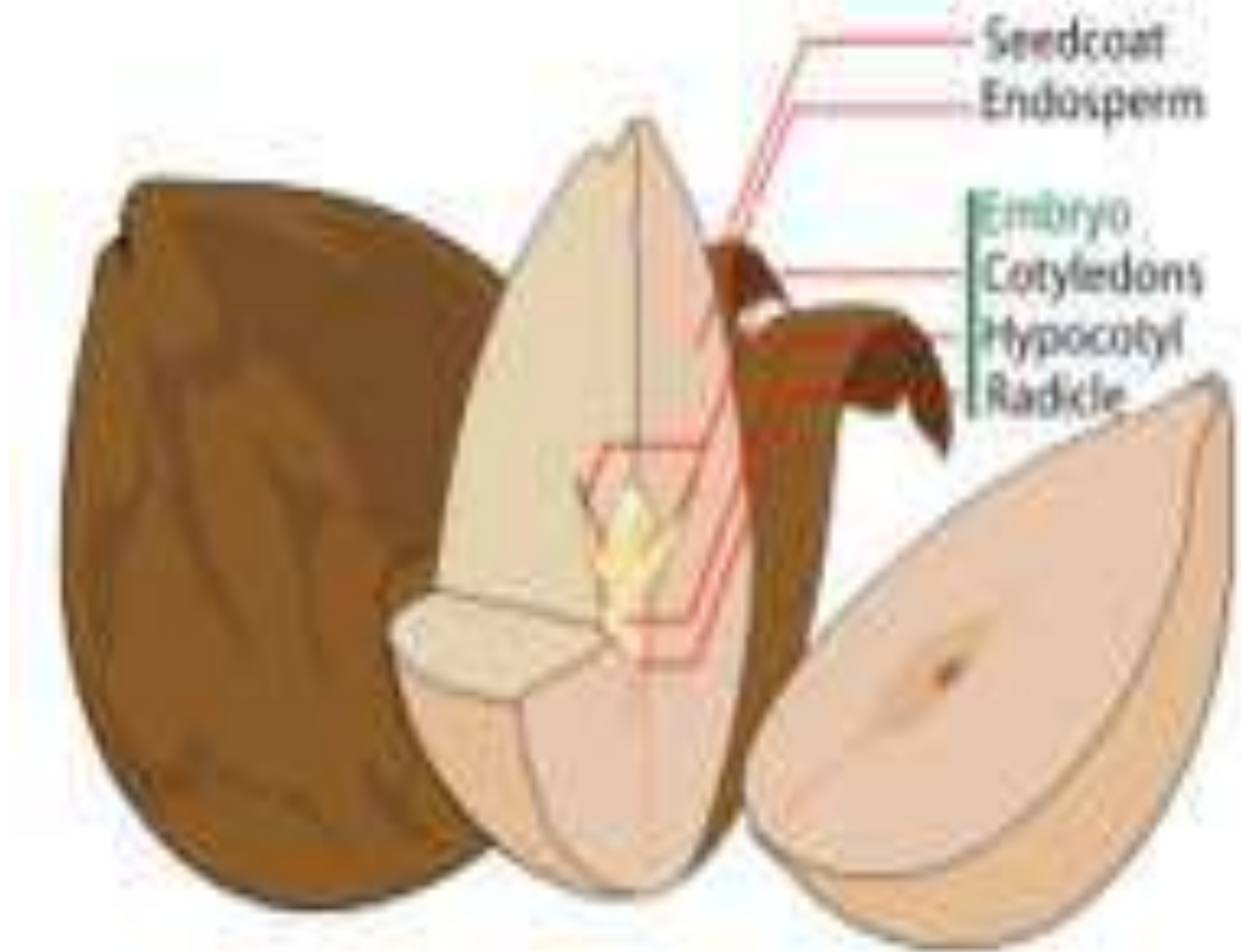
## ENDOSPERM-

- Endosperm is the most common nutritive tissue for the developing embryo in angiosperms.
- In gymnosperms, it represents the female gametophyte whereas the female gametophyte in angiosperms differentiates before fertilization and is haploid, the endosperm is the product of fertilization and is usually triploid.
- After double fertilization the egg is called zygote, and the fusion product of polars and the second male gamet is termed Primary endosperm nucleus.





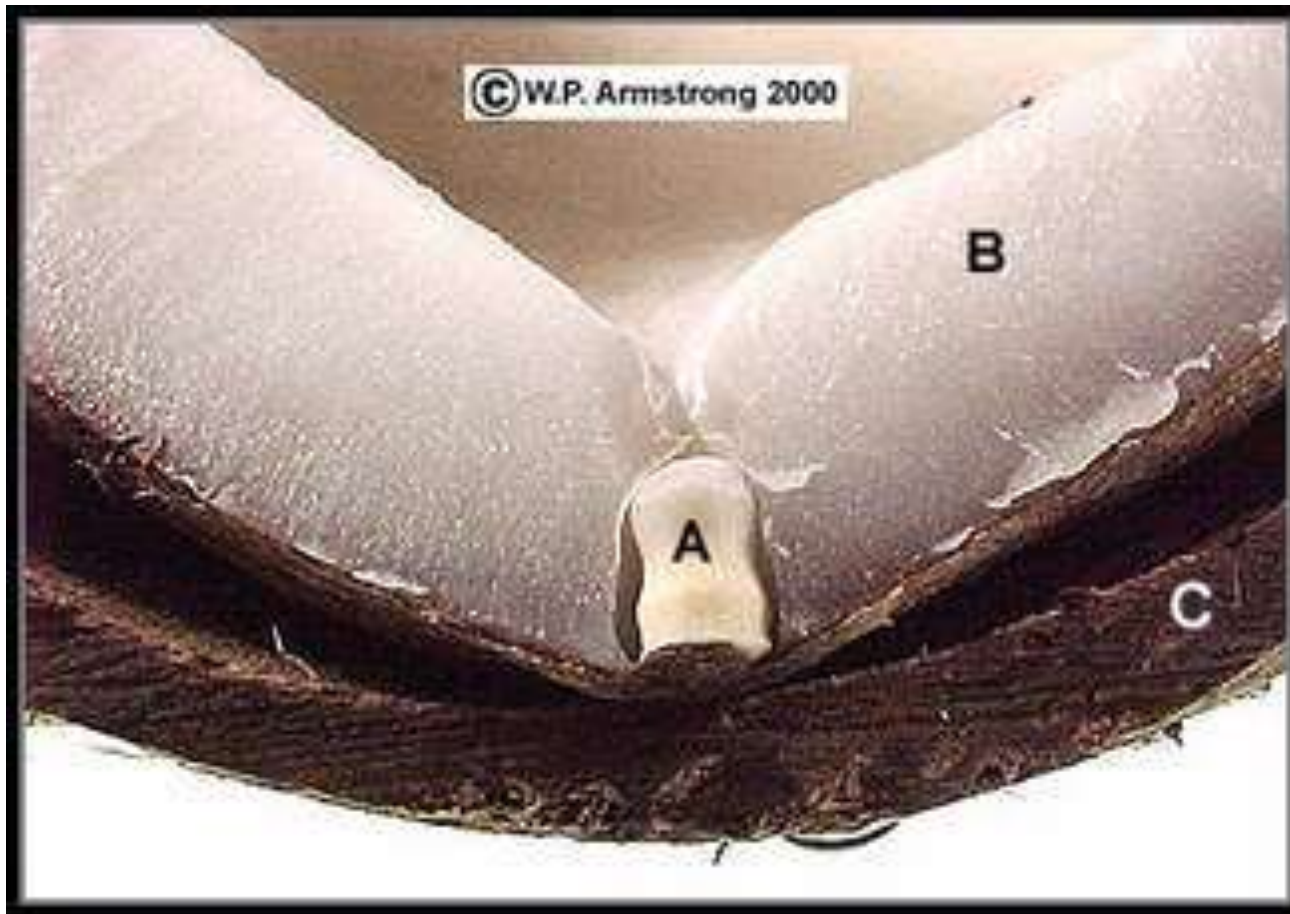
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**BOTANY: SEM- IV, PAPER: GE-4:PLANT ANATOMY AND EMBRYOLOGY, UNIT- 7:EMBTYO AND ENDOSPERM**



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- Depending upon its mode of development , three types of endosperm have been recognized :
- Nuclear Endosperm
- Cellular Endosperm
- Helobial Endosperm
- Cellular endosperm is largely restricted to dicotyledonous families whereas helobial endosperm to monocotyledonous.





## Nuclear Endosperm -

- In this type of endosperm, the division of the primary endosperm nucleus and a few subsequent nuclear divisions are not accompanied by wall formation.
- This results in a condition where central cell of the embryo sac has formed a few several thousand nuclei freely suspended in its sap.
- Such a condition of endosperm may persist until it is consumed by the developing embryo (*Floerkea*, *Limnanthes*, *Oxyspora*) or it may become cellular at a later stage.
- When latter is the case, which is more common, the wall formation is mostly centripetal.
- The degree of cellularization varies a great deal.



## Examples :

- Mostly endosperm becomes completely cellular but in *Phaseolus* cellularization occurs only around the embryo.
- In *Crotalaria*, the wall formation is confined to the upper region of the embryo sac, the chalazal region remains free- nuclear, and it often elongates and behaves like an haustorium.
- In *Lomatia*, besides the main chalazal haustorium, numerous single- celled, finger shaped projections are present all over the endosperm. This increases the absorbing surface of the endosperm.
- In *Grevillea robusta*, presence of vermiform appendage at the chalazal end of the endosperm is reported, in which, chalazal endosperm haustorium remains free- nuclear





- In mature coconut, the liquid endosperm becomes milky.
- In *Areca catechu*, the endosperm is hardened.
- In *Stackhousia*, there is formation of endosperm nodules or cytoplasmic vesicles which originate from the peripheral lining of the embryo sac. These are rich in various organelles and its function is uncertain, but they may either merge with the endosperm proper or degenerate.



## Cellular Endosperm-

- The cellular endosperm is characterized by the absence of free nuclear stage.
- The division of the primary endosperm nucleus and a few subsequent nuclear divisions are followed regularly by wall formation.
- The occurrence of haustoria is a common feature of this type of endosperm; it is more varied than that is the nuclear endosperm.
- The haustoria may be micropylar or chalazal and occasionally, present in the same plant.
- Micropylar haustoria are known to occur in *Impatiens roylei* and *Hydrocera triflora*.



- A very aggressive chalazal haustorium is formed in *Iodina rhombifolia*. The haustorium is actually formed before fertilization. After fertilization, the division of the primary endosperm nucleus is followed by transverse partitioning of the central cell, resulting in the formation of a micropylar chamber and a chalazal chamber. The endosperm proper is derived from the micropylar chamber alone. The chalazal chamber functions as an aggressive, uninucleate haustorium. Profuse branching at the free- end gives the haustorium a coralloid appearance.
- In the Acanthaceae, the endosperm development is asymmetric and it shows characteristic micropylar and chalazal ends.



## Helobial Endosperm-

- The primary endosperm nucleus moves to the chalazal end of the embryo sac where it divides forming a large micropylar chamber and a small chalazal chamber.
- In the micropylar chamber, free nuclear divisions and cell formation, start at a much later stage.
- In the chalazal chamber, the nucleus either remains undivided or divides only a few times.
- If latter is the situation, the divisions are usually free-nuclear. Sometimes, in *Phylidrum lanuginosum*, it may become cellular.
- Example : *Asphodelus tenuifolius*.



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THANK  
YOU

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ANATOMY AND EMBRYOLOGY, UNIT-  
7:EMBTYO AND ENDOSPERM**