

# **BIO 101: Introductory Biology**

## **Osinaike T.S. (Lecture C19 -3)**

**Gametogenesis**

# GAMETOGENESIS

- Gametogenesis is the process of the formation of haploid ( $n$ ) gamete from diploid ( $2n$ ) reproductive body.
- Gametes are formed by specialized meiosis/reduction division.
- Although the male and female gametes are sometimes very dissimilar morphologically (oogamy)- in higher plants and animals, yet both comprise similar phases of sequential changes.

# GAMETOGENESIS CONT'D

- Gametogenesis is of two types first one is known as microgametogenesis (spermatogenesis) and the second one is megagametogenesis (oogenesis).
- Microgametogenesis/spermatogenesis is the process of formation of functional antherozoids –plants and sperm-animals from diploid microsporocyte/ spermatocyte.
- Oogenesis is the formation of haploid egg/ovum from the diploid spore mother cell (megasporocyte)/ oocyte of the ovary.

# **MICROGAMETOGENESIS:**

- This is Gametogenesis leading to the formation of male gametes in plants and animals.
- In Angiosperms, the most advanced group of plants it occurs in two stages:
- Microsporogenesis
- Microgametogenesis

## **Microsporogenesis**

- The androecium of the plant is made up of the stamen, filament, and anthers.
- The pollen grains that carry the male gametes are contained in the anthers.

# MICROGAMETOGENESIS CONT'D

- The anther is anatomically divided into lobes and the lobes are further divided into chambers called microsporangia.
- Pollens present in these microsporangia are known as pollen sac.
- It is said that the pollen sac develops from a parent cell known as the archesporial cell.
- This archesporial cell divides into outer and inner layers.
- The inner layer forms the sporogenous tissue or cell that forms the pollen mother cell.

# **MICROGAMETOGENESIS CONT'D**

- This sporogenous tissue is surrounded by the tapetum layer which provided nourishment to the pollen or microspore mother cell present in the sporogenous tissue.
- The microspore mother cell is diploid and divides meiotically to form haploid microspores or pollen.

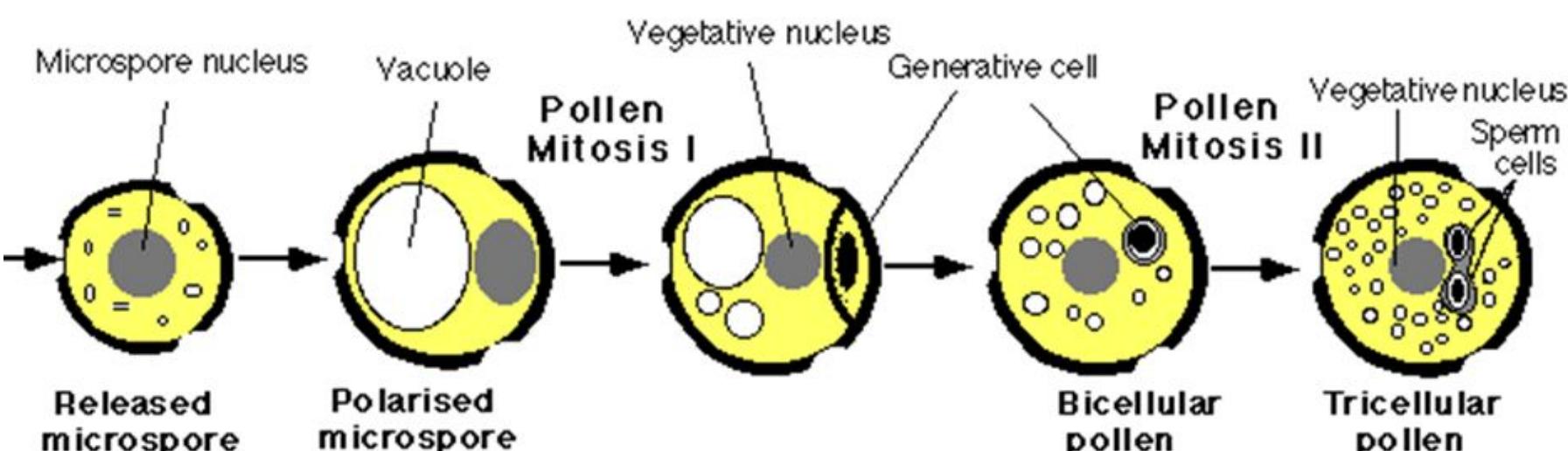
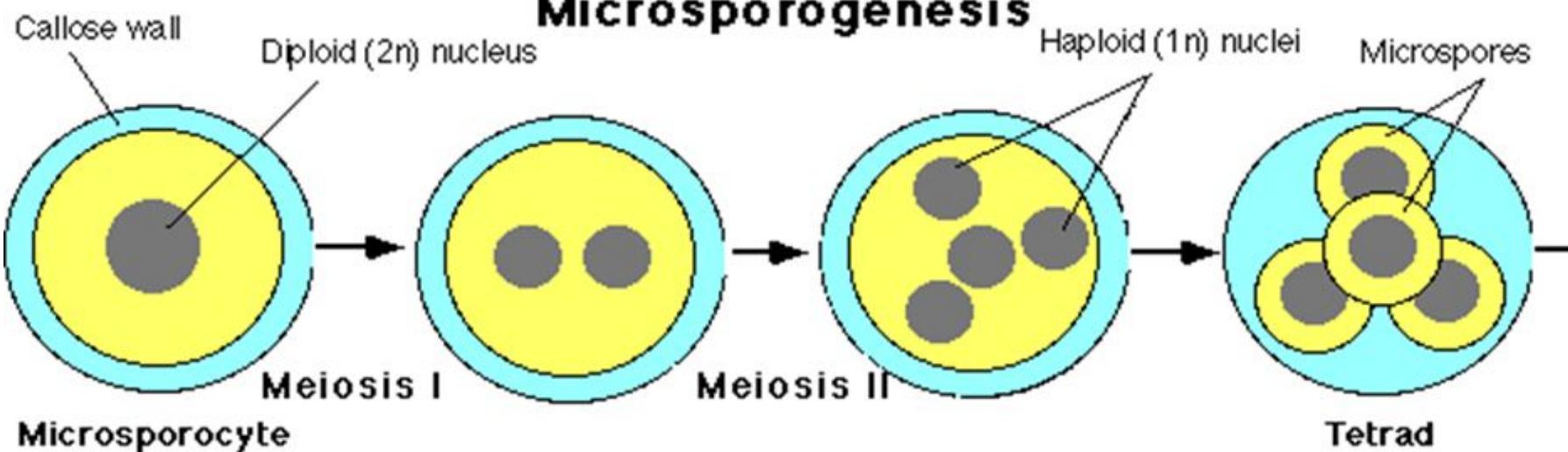
## **Microgametogenesis**

- The pollen grain is the haploid cell that is made up of two layers: the outer exine layer which is derived from the tapetum and the inner layer called intine.

# MICROGAMETOGENESIS CONT'D

- The exine is present all over the pollen grain except in one small part from where the pollen tube emerges during post pollination.
- This small part is known as the germ pore. The pollen grain divides into two halves- the small generative nucleus and the larger vegetative nucleus.
- The generative cell gives rise to two male nuclei whereas the vegetative cell gives rise to the pollen tube.

## Microsporogenesis



## Microgametogenesis

# MEGAMETOGENESIS

- Megametogenesis in plants is a process leading to formation of the female gametes, like the male gametes, occurs in two stages:
- Megasporogenesis
- Megagametogenesis
- The word 'mega-' is used instead of 'micro-' in females because the female gametes are larger in size as compared to the male gametes.

# MEGAMETOGENESIS CONT'D

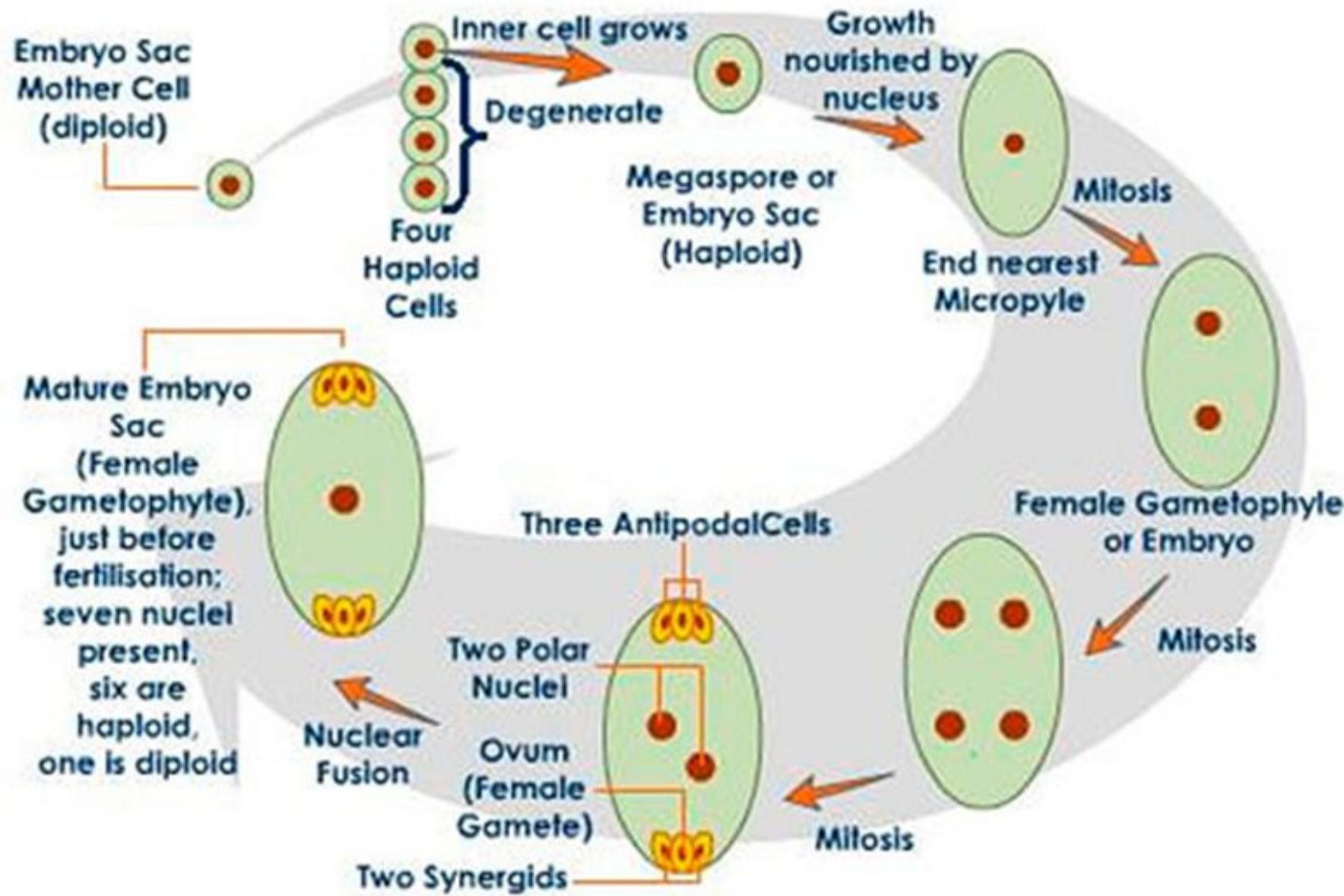
## Megasporogenesis

- In Angiosperms the ovules are present inside the ovary in multiple lobes.
- A cell in the ovule differentiates into a megasporangium.
- The megasporangium undergoes meiosis to form 4 haploid megasporangia.
- 3 of the 4 megasporangia degenerate and only one megasporangium is left in each ovule.

# MEGAMETOGENESIS CONT'D

## Megagametogenesis

- This megasporangium now begins to divide mitotically to form 8 nuclei.
- 6 of the 8 nuclei migrate to opposing poles (3 each) while two nuclei remain at the center.
- The nuclei that remain at the center are known as polar nuclei.
- These polar nuclei fuse to form the secondary nucleus. The megasporangium matures into an embryo sac.



# DIAGRAMMATIC REPRESENTATION OF GAMETOGENESIS IN ANIMALS E.G. HUMAN

