



Cycas: Part III

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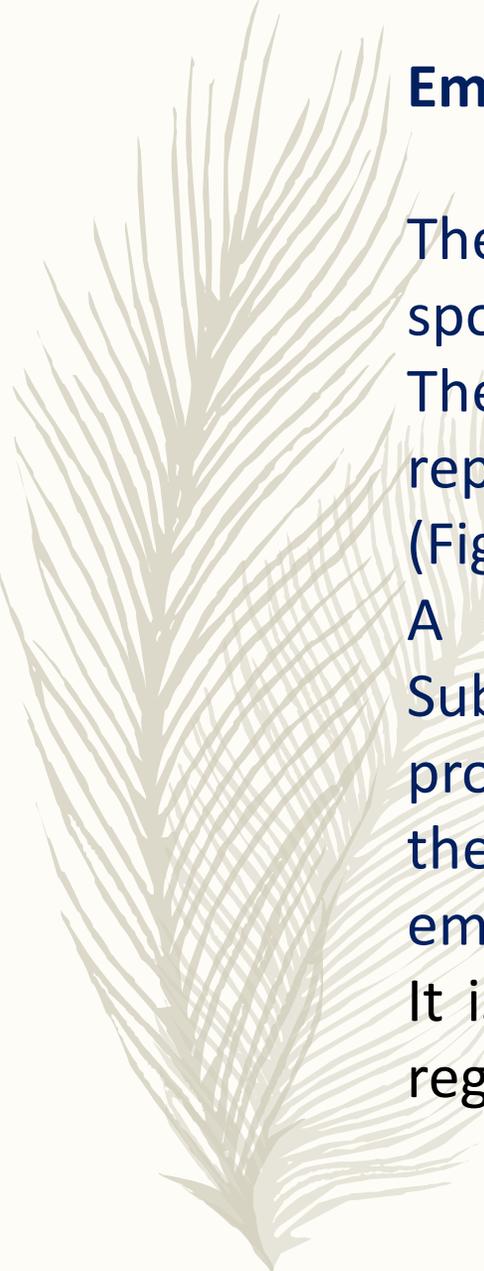
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EMBRYOGENY

Three main steps involved in embryogeny in cycas. The steps are: 1. Development of Zygote 2. Structure of Seed 3. Germination of Seed.



Embryogeny in Cycas: Step # 1. Development of Zygote:

The diploid oospore or zygote is the first cell of the sporophyte. It contains dense cytoplasm and a large nucleus. The nucleus moves towards the base and starts dividing by repeated free-nuclear divisions to form hundreds of nuclei (Fig. 8.51). They lie scattered throughout the cytoplasm.

A vacuole appears in the centre after some time. Subsequently the wall formation starts from the base and progresses towards the upper side to form a small mass of the cells. This embryonal cellular mass represents the pro-embryo.

It is meristematic in nature. Some of the nuclei in its upper region remain free and are seen scattered in the cytoplasm.

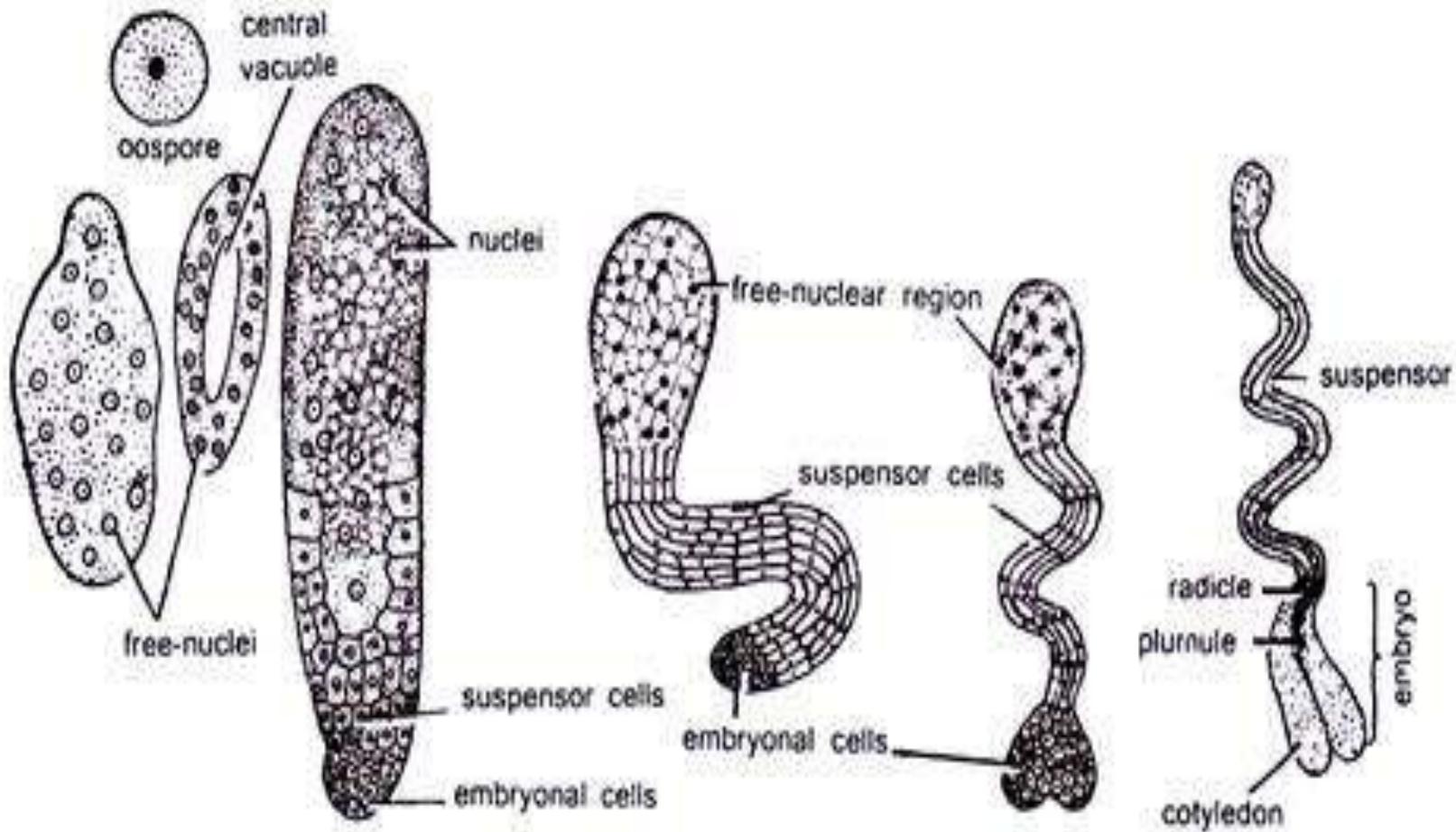
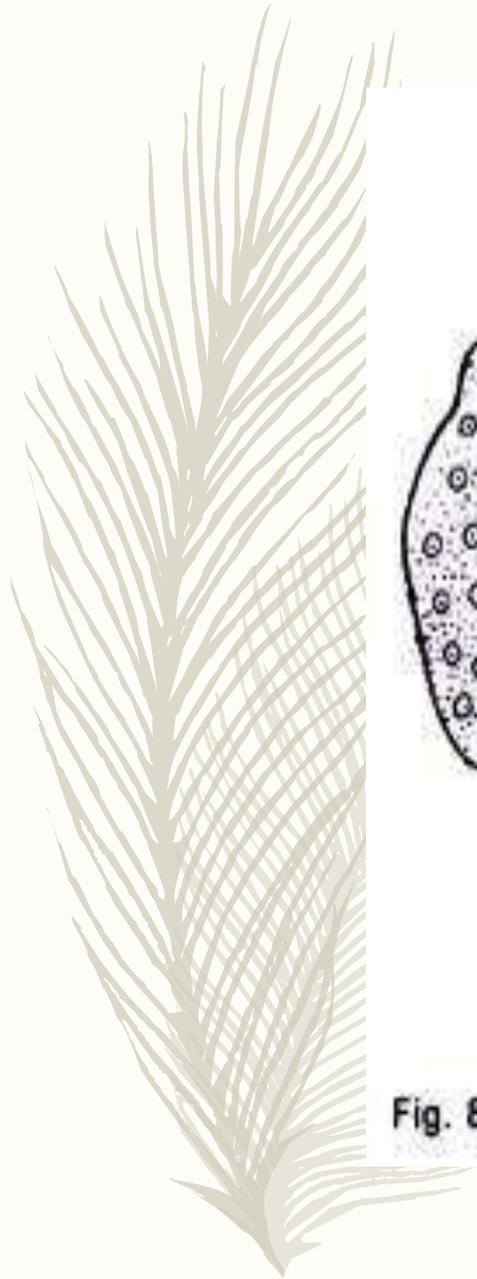


Fig. 8.51. Cycas. Development of oospore Fig. 8.52. Cycas. Showing formation of proembryo.

Following three regions become differentiated soon in the pro-embryo (Fig. 8.52).

(a) Haustorial Region

(b) Suspensor Zone

(c) Embryonal Zone

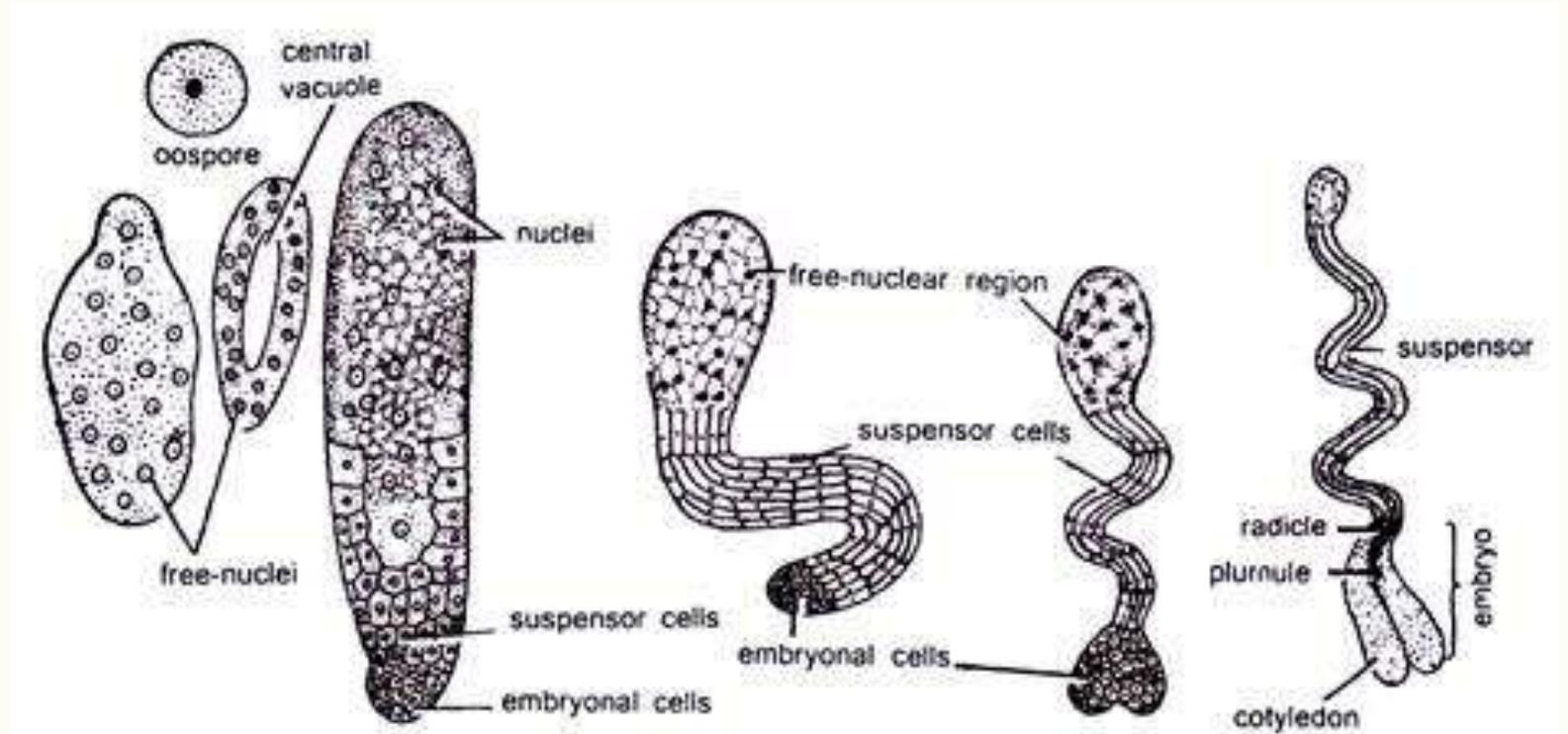


Fig. 8.51. Cycas. Development of oospore Fig. 8.52. Cycas. Showing formation of proembryo.

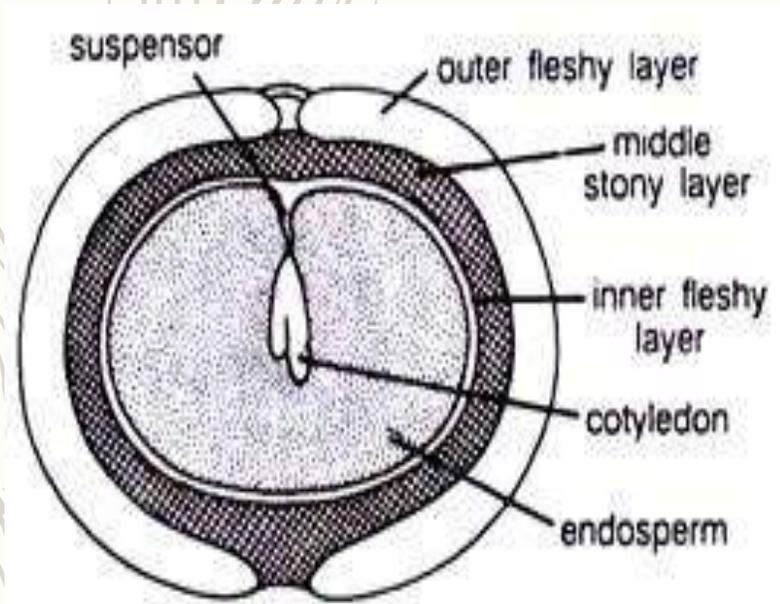


Fig. 8.53 Cycas. L.S. seed.

Embryogeny in Cycas: Step # 2. Structure of Seed:

The mature fleshy Cycas seed (Fig. 8.53) consists of an orange red- coloured outer thick testa or seed coat which is formed from the 3-layered integument of the ovule. The inner fleshy layer and the nucellus are used up during the embryo development, and, therefore, these are represented only by thin layers.

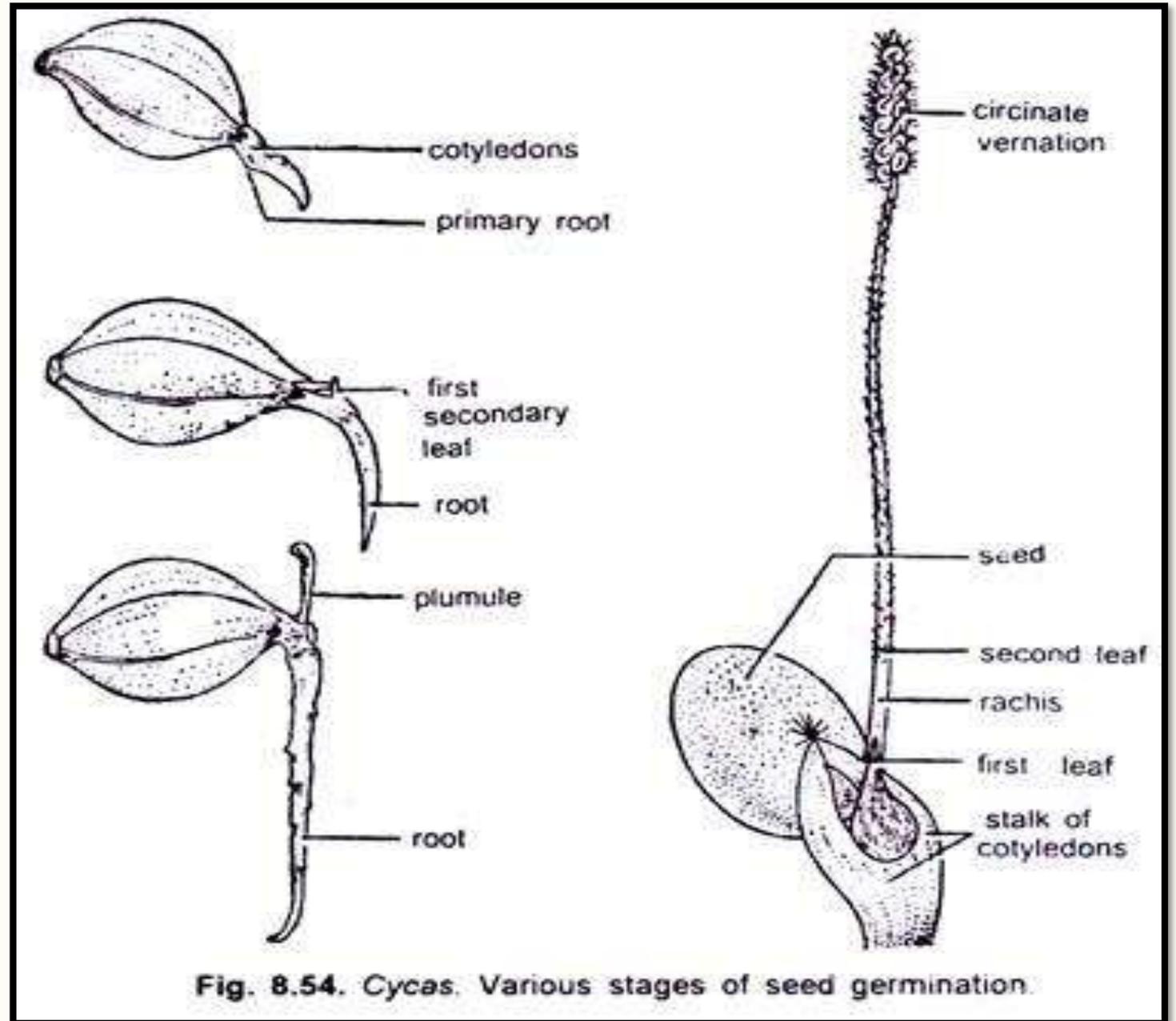
A well- developed endosperm, which stores a large amount of food material, is present. The embryo remains embedded within the endosperm. It consists of plumule, radicle and two large cotyledons. The embryo remains suspended in the endosperm with the help of a long and spirally coiled suspensor.

Thus, in a mature Cycas seed, the parent sporophytic generation is represented by the integument, the gametophytic generation is represented by the endosperm and the new sporophytic generation is represented by the embryo.



Embryogeny in Cycas: Step # 3. Germination of Seed:

- **Seed dispersal is through birds. It is known as Ornithochory.**
- **Seed undergoes a period of dormancy due to physiological immaturity or without any dormancy the seeds germinate.**
- **During germination, the cotyledons remain in the soil. Hence germination is hypogeal (Monocot character).**
- **The radicle develops into taproot which later replaced by adventitious roots.**
- **Plumule develops into underground tuberous stem and gives out few aerial leaves with circinate vernation.**
- **The growth of stem is very slow and eventually becomes aerial with first crown of leaves developed after few years.**

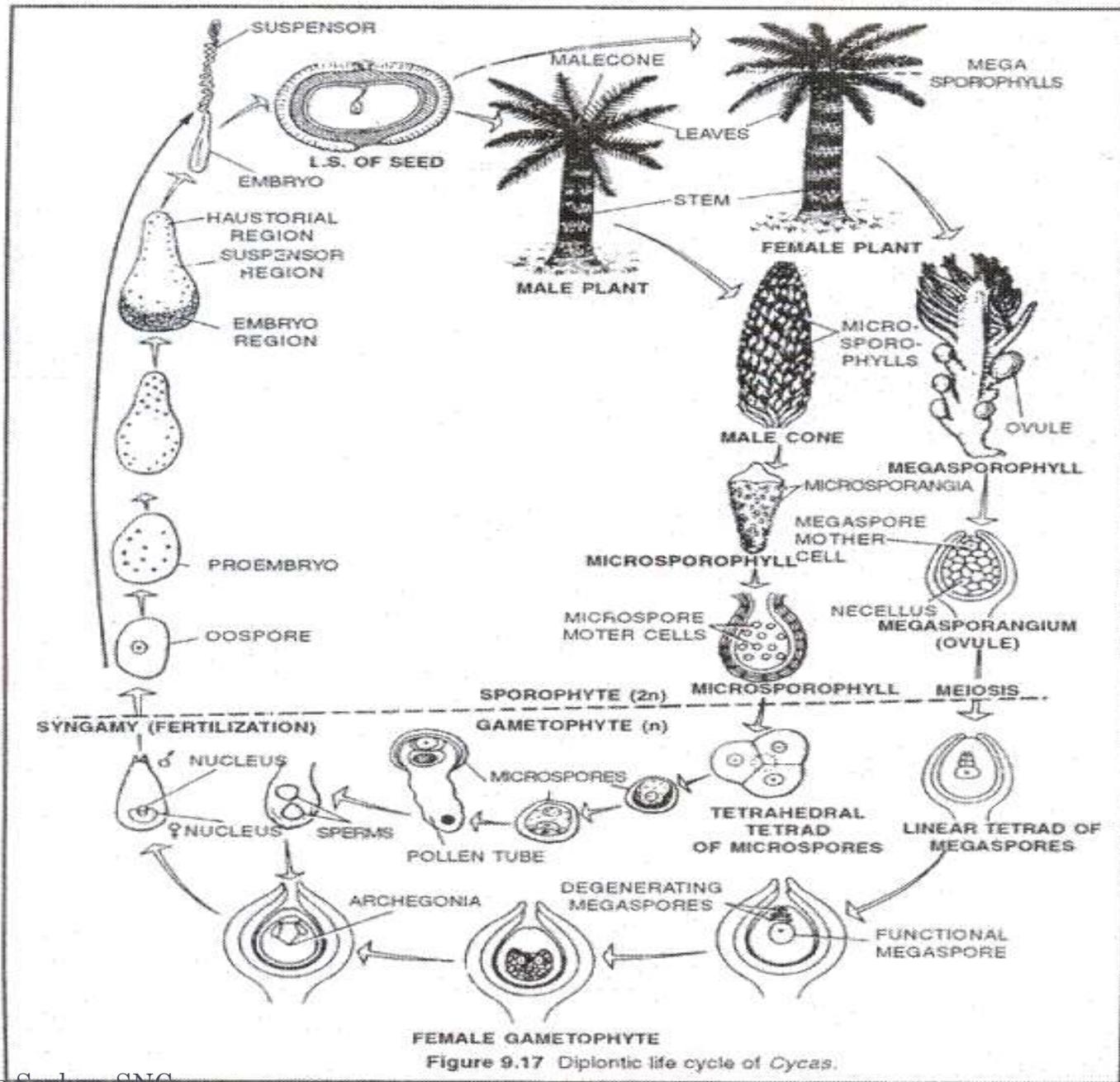




Life cycle

The dominant stage in the life cycle is sporophyte and gametophytes are highly reduced and parasitic on sporophyte. Hence life cycle is described as Diplohaplontic life cycle.

Both gametophytes and sporophyte are morphologically dissimilar. Because of this the alternation of generations are described as heteromorphic.



Fern characters of Cycas

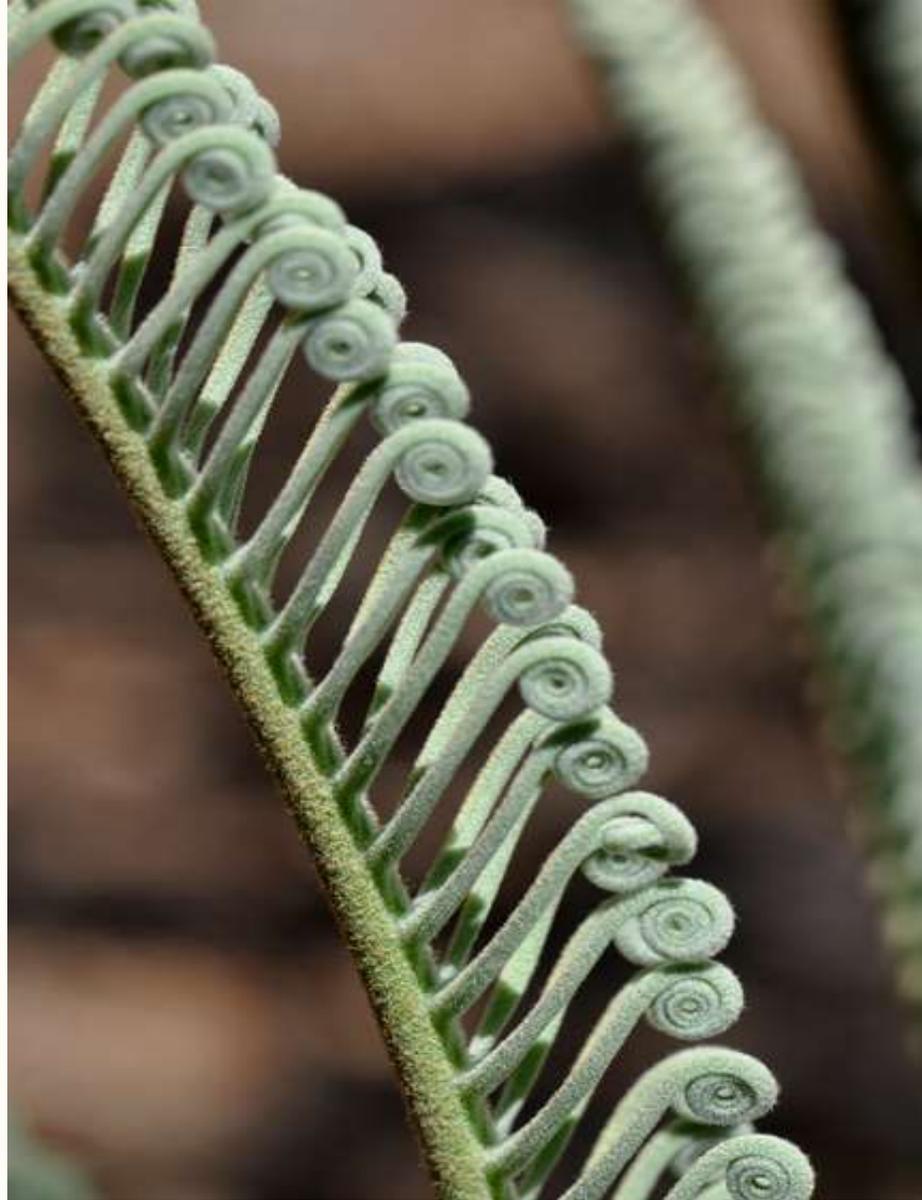
- **Circinate vernation of younger leaves.**
- **Rhizomatous stem.**
- **Presence of Ramenta.**
- **Multiciliate male gametes.**
- **Formation of archegonia in the female gametophyte.**
- **Formation of microsporangia in groups on the lower surface of microsporophyll.**
- **Sori surrounded by Indusial hairs.**
- **Mesarch xylem in the leaves.**
- **Pinnate compound leaves.**

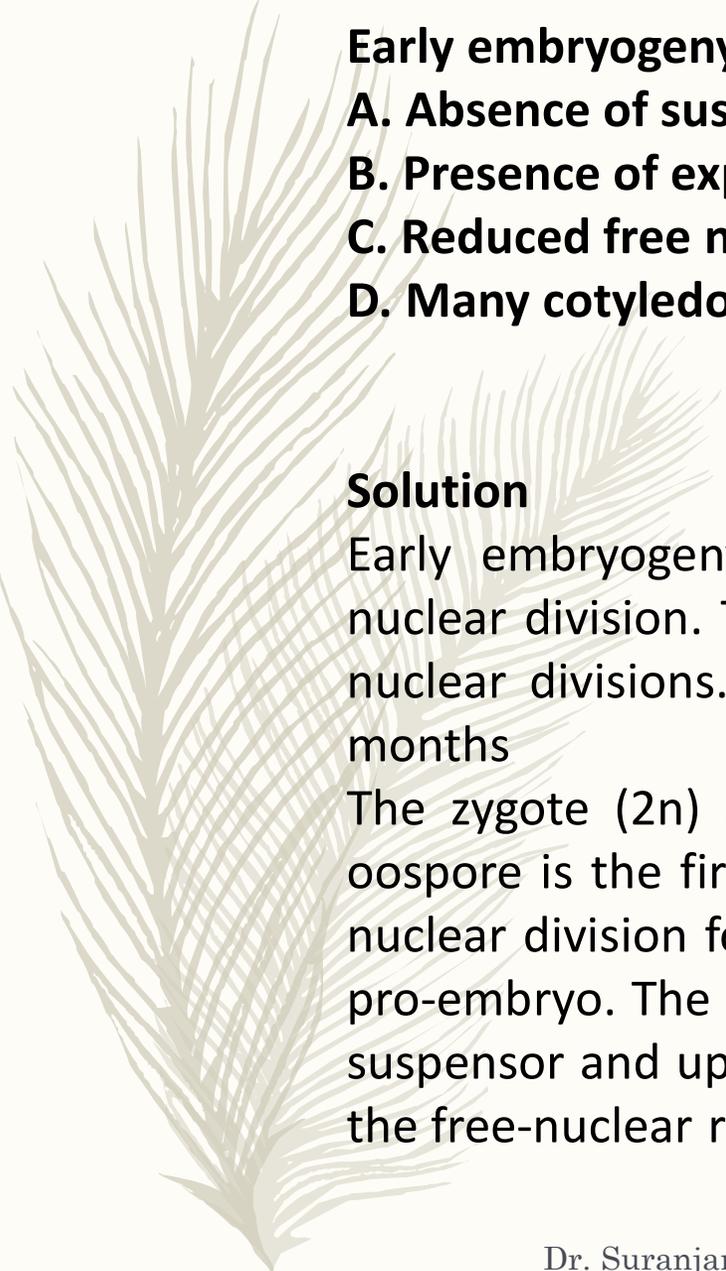




***THANK
YOU ALL!***

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Early embryogeny in *Cycas* is characterized by

- A. Absence of suspensor cell**
- B. Presence of expanded free nuclear division**
- C. Reduced free nuclear division**
- D. Many cotyledons**

Solution

Early embryogeny in *Cycas* is characterized by presence of expanded free nuclear division. The zygote, which is the first sporophytic cell, undergoes free nuclear divisions. The interval between pollination and fertilization is several months in *Cycas*.

The zygote (2n) secretes cell wall and becomes the oospore. The zygote or oospore is the first cell of sporophyte generation. The oospore undergoes free nuclear division followed by wall formation to form a small cellular mass called pro-embryo. The pro-embryo differentiated into a basal embryonalzone, middle suspensor and upper haustorium. The haustorial region remains in contact with the free-nuclear region and soon disappear.