



Cycas: Part II

Dr. Suranjana Sarkar

Assistant Professor in Botany

Surendranath College,

Kolkata



Cycas- T.S. Microsporophyll

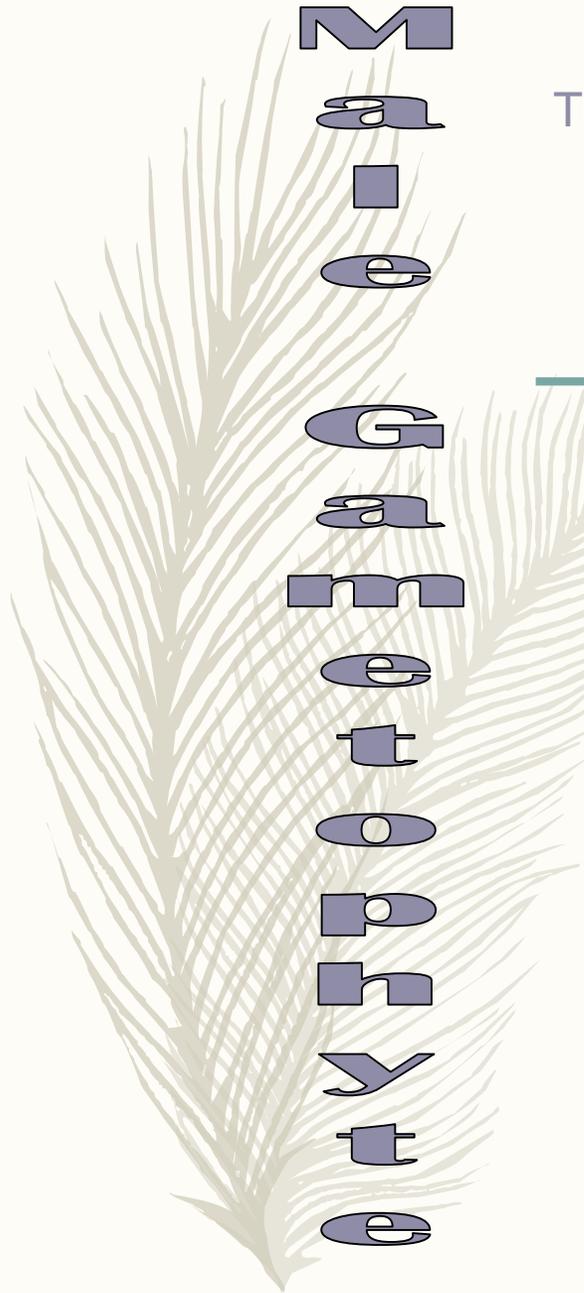


Cycas- Young ovule



Cycas- Megasporophyll with young ovule

Dr. Suranjana Sarkar, SNC



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99

The microspores develop into pollen grains.



This female gametophyte is developed from the megaspores.

*the dominant lifecycle stage is the sporophyte.
Sporophyte relies on gametophyte for a period of time to develop into a seed.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99

Life Cycle of the Cycads



Male reproductive structure, pollen is dispersed by wind or insects to female reproductive structure. (haploid)



gynostrobilus grows a pollen tube, sperm cell swims through pollen tube using its tail, or flagella. (haploid) This fertilizes the egg and it becomes a zygote. (Diploid)

Development of the microspores and megaspores through meiosis (haploid)

Zygote develops into an embryo then a seed is developed in a coat that originates from the ovary. (diploid)

Then the tree grows! (diploid)



REPRODUCTION

Cycas is dioecious. The male and female plants are separate. Sometimes, Cycas plants also reproduce vegetatively. It produces buds on the stem. These buds grow to form new plant.

Male Cones

Male cones are produced on the male plants. Number of cones produced each year varies from one to many. Each male cone is fusiform in shape. Each cone has a central axis. It bears a number of spirally arranged microsporophyll. The microsporophylls are woody in texture. They are wedge-shaped. The microsporangia (Pollen sacs) cover the lower surface of the microsporophylls. The sporangia form sori. Each sorus has groups of two to six sporangia. Each sporophyll has several hundred sporangia. A large number of spores are produced in *Cycas*.





Fig. 8.31. *Cycas*. A single male cone.

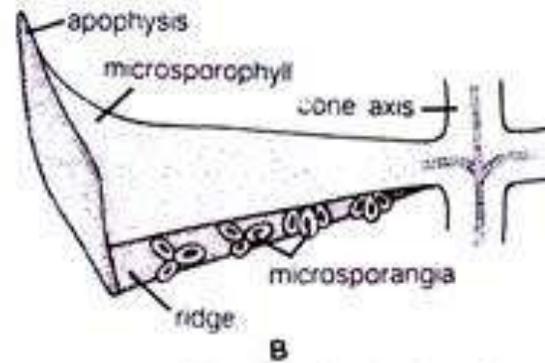
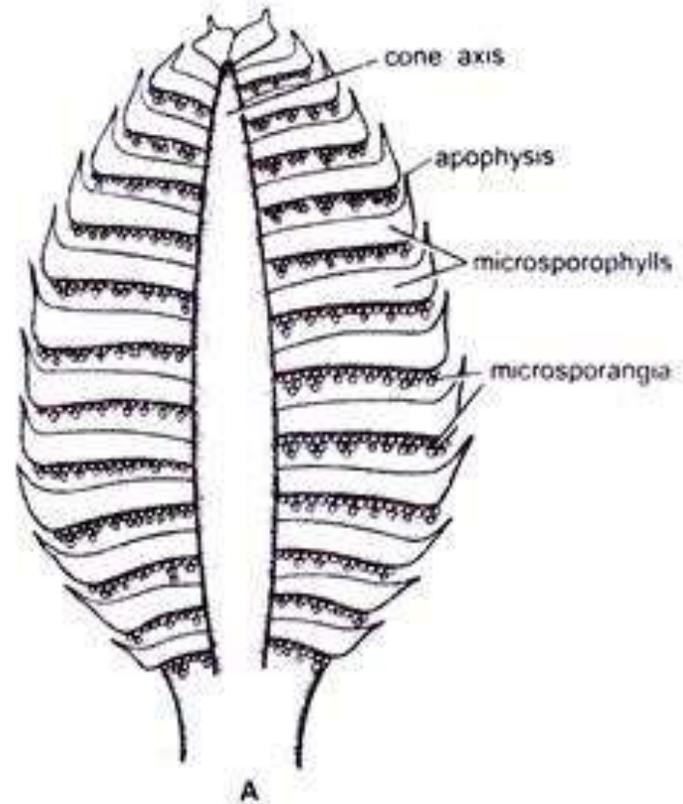


Fig. 8.32. *Cycas*. A, L.S. cone; B, L.S. of a single microsporophyll, along with cone axis.

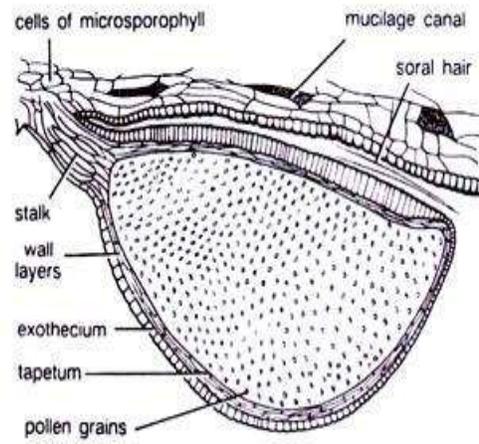


Fig. 8.36. *Cycas*. A part of T.S. microsporophyll showing an enlarged sporangium cut longitudinally.

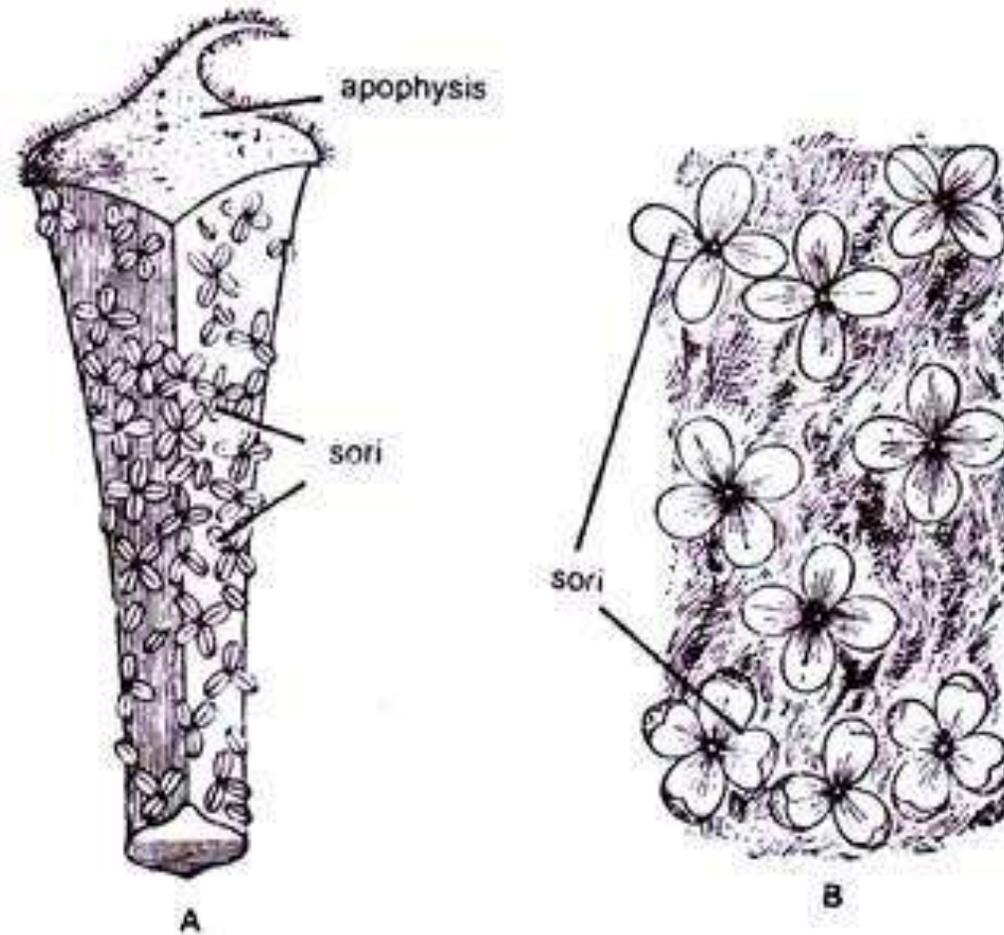
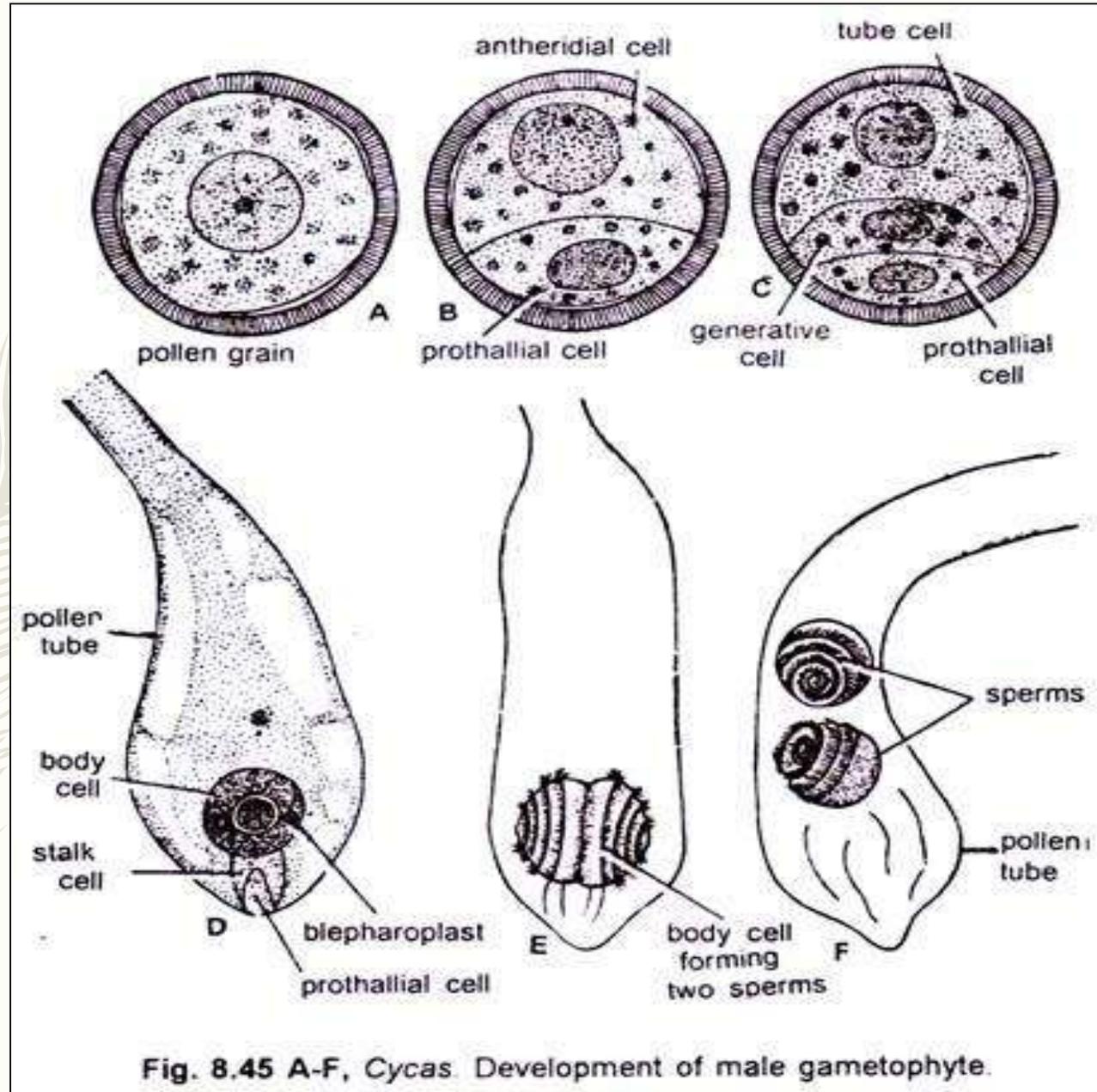


Fig. 8.34. *Cycas*. A, Abaxial surface of a microsporophyll; B, Groups of microsporangia (sori) enlarged.



Female Reproductive Structure

The female reproductive parts are produced on the female plants. It is formed of large megasporophylls.

Megasporophylls are loosely arranged to form crowns.

Each megasporophyll is leaf like in form.

The upper portion of the sporophyll is pinnate.

Ovules (megasporangium) are arranged in two rows in the basal half of the sporophyll.

The whole sporophyll and young ovules are covered by a dense mat of hairs.

The ovules lose this hairy covering on maturity.

Each ovule is covered by a single massive integument. It has a narrow micropyle at the tip.

Integument projects around the micropyle to form a small beak. Nucellus projects into the micropyle. But later the nucellar cells in this region disorganize to form a small cavity called pollen chamber. It plays an important part in early stages of fertilization. One of the nucellar cells increases in size and becomes megaspore mother cell. It undergoes meiosis to form four megaspores. Three megaspores degenerate. Only one becomes functional megaspore.



Cycas- Mature ovule



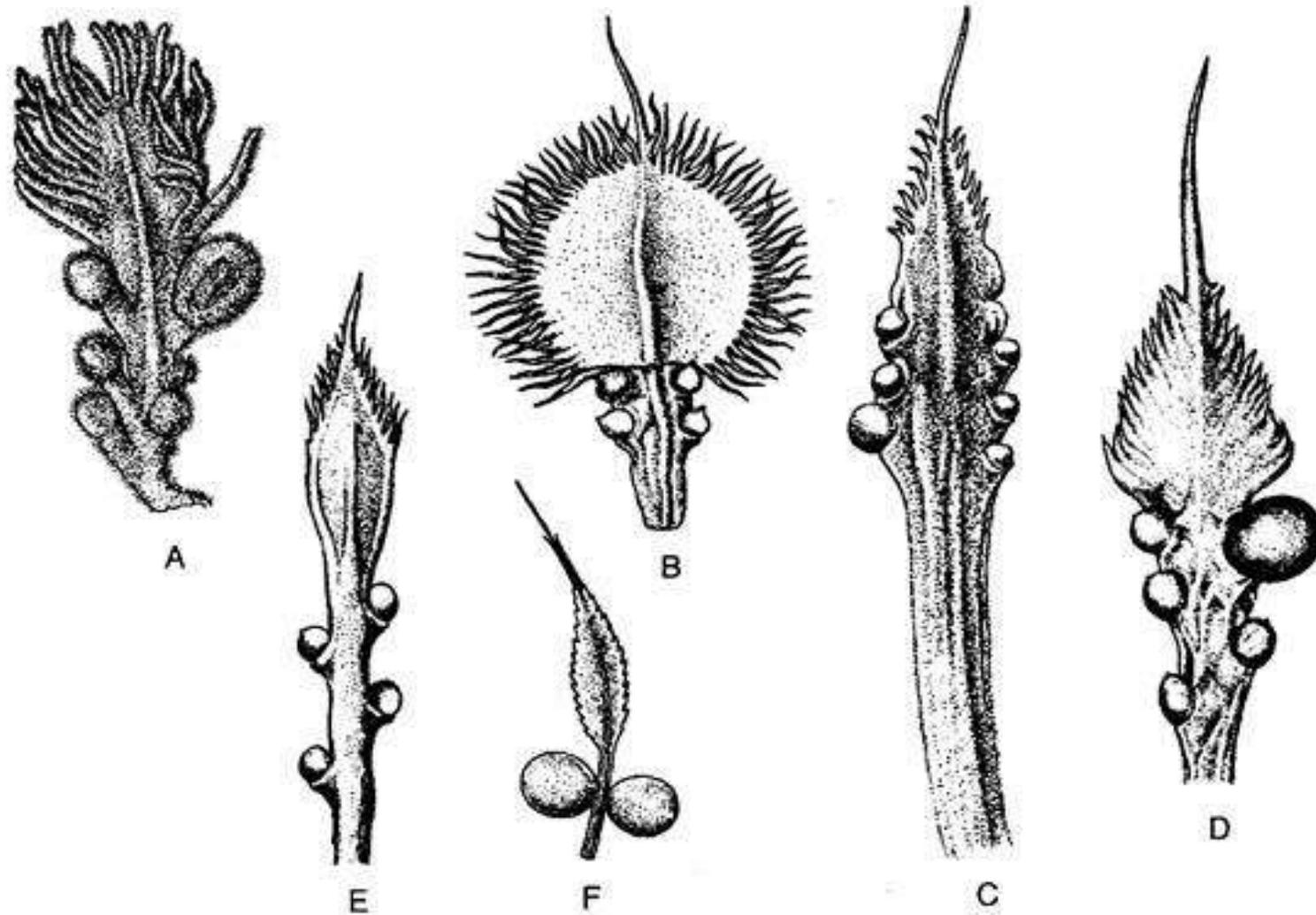


Fig. 1.18 : Megasporophylls : A. *Cycas revoluta*, B. *C. pectinata*, C. *C. circinalis*, D. *C. rumphii*, E. *C. beddomei*, F. *C. normanbyana*

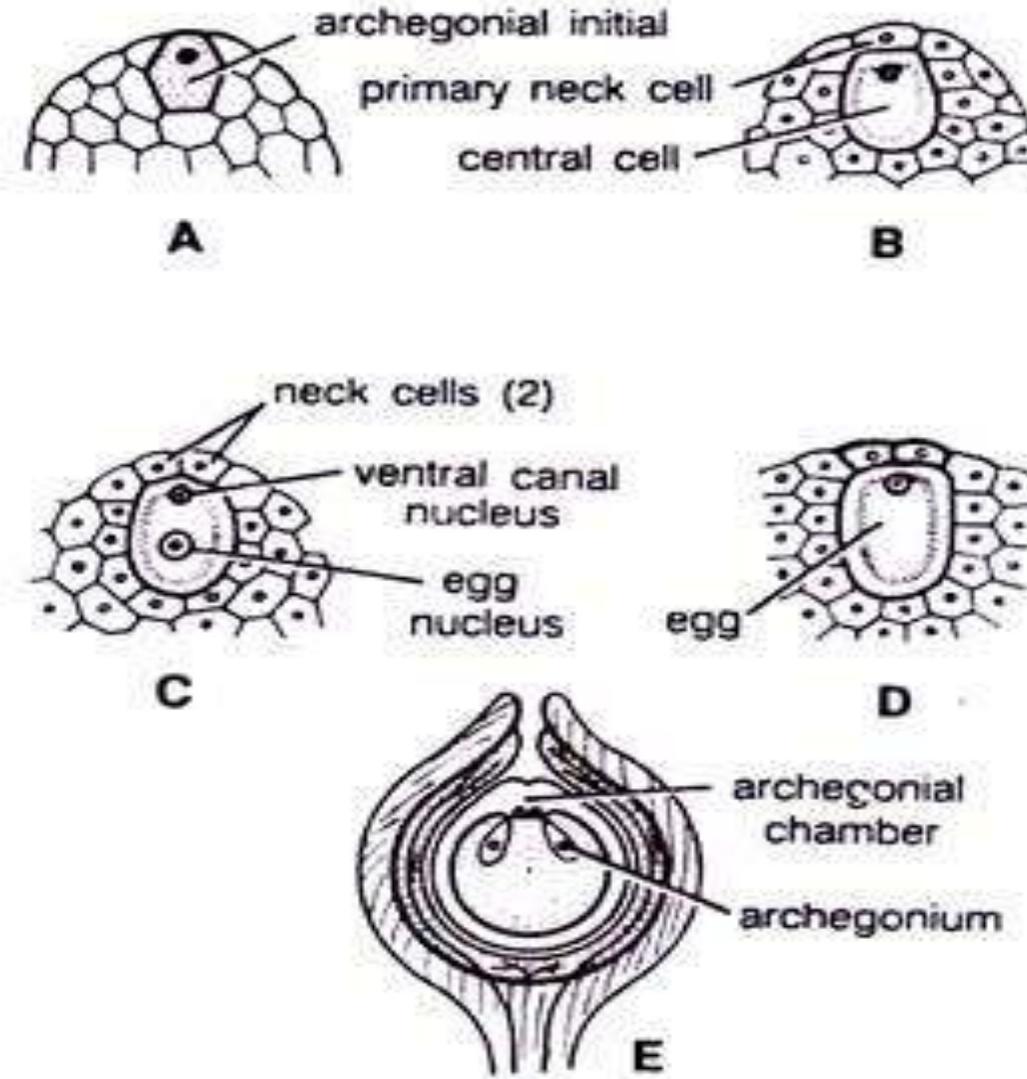
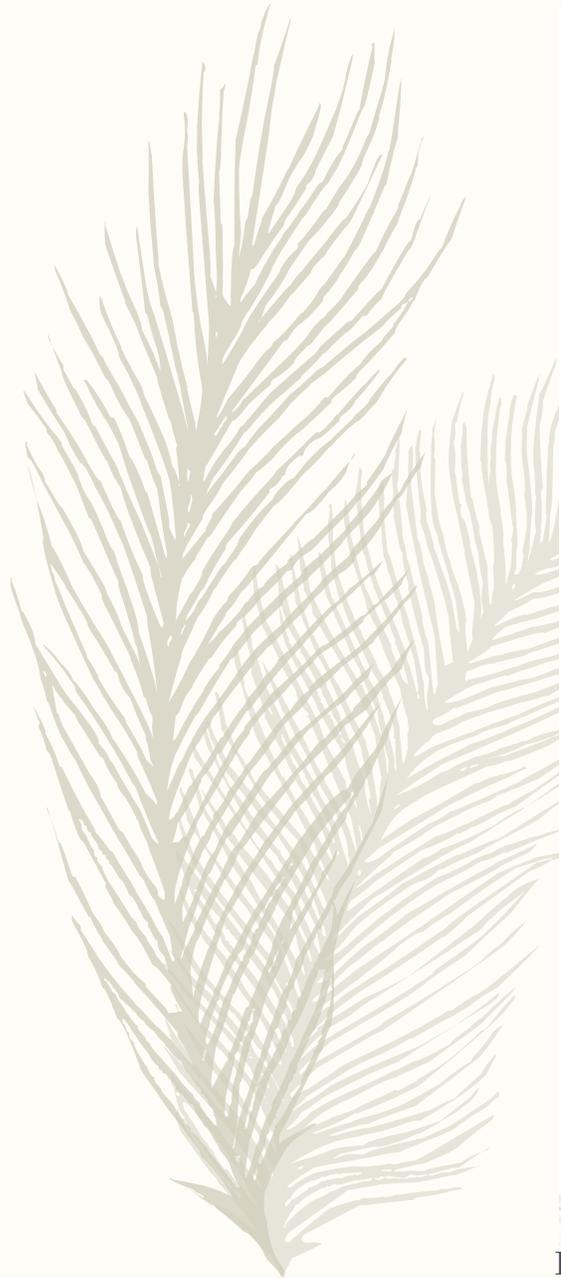


Fig. 8.49 A-E. *Cycas*. Development of archegonium

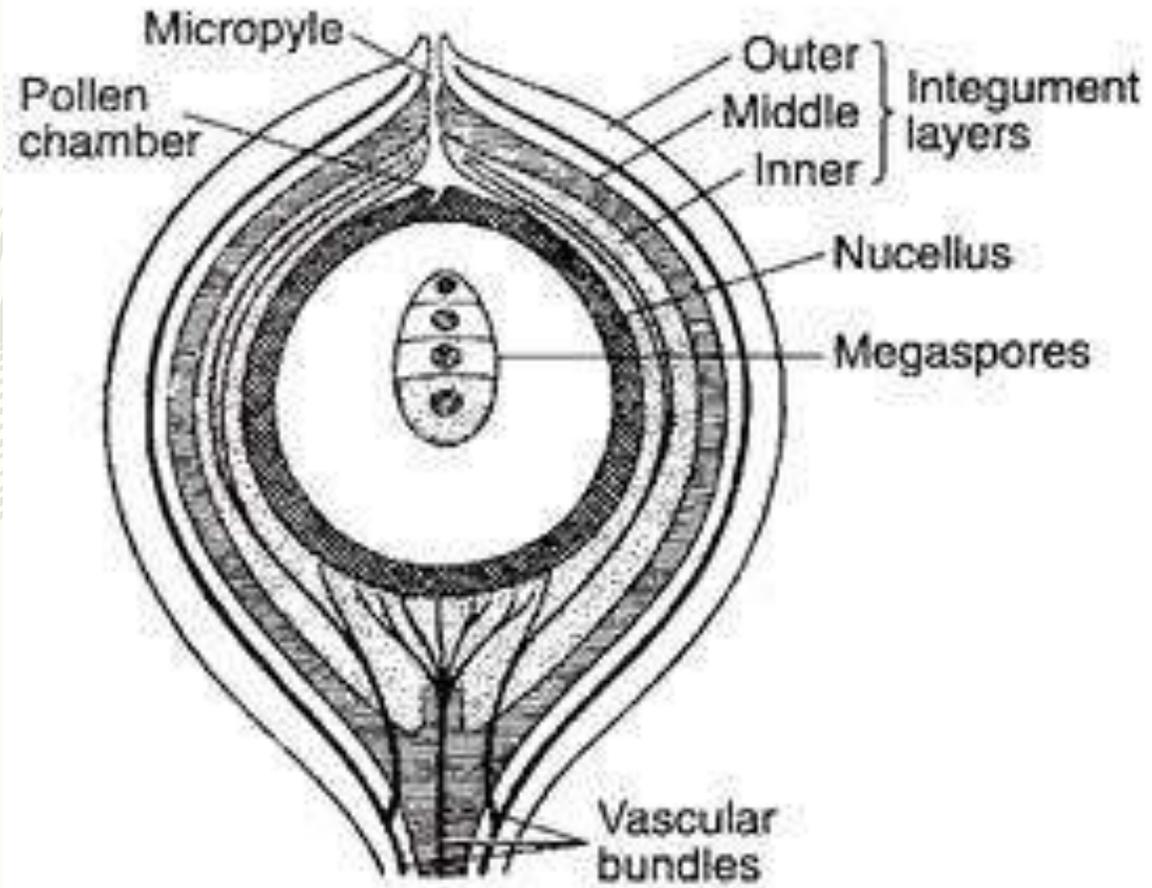


Fig. 1.19 : Vertical median section of *Cycas* ovule

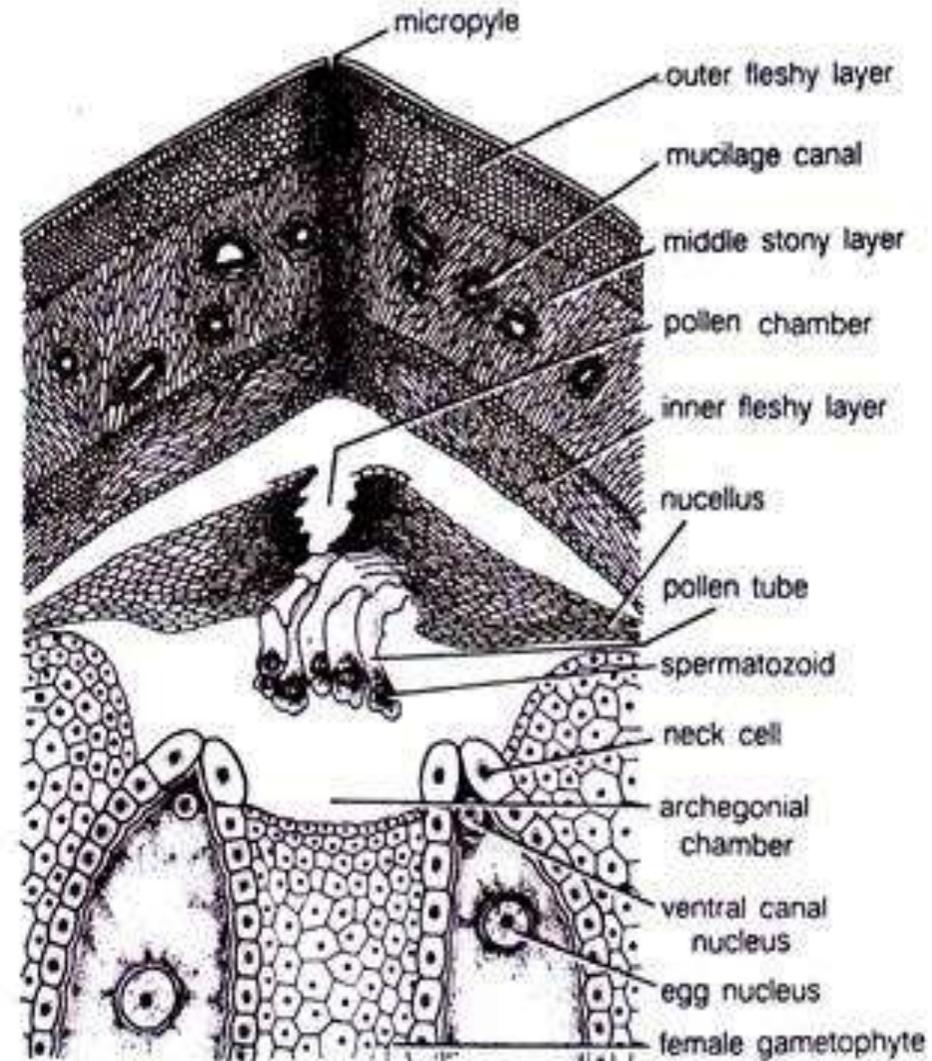


Fig. 8.50. *Cycas revoluta* A part of V.S. of mature ovule showing detailed anatomy. (modified after Swamy, 1948).

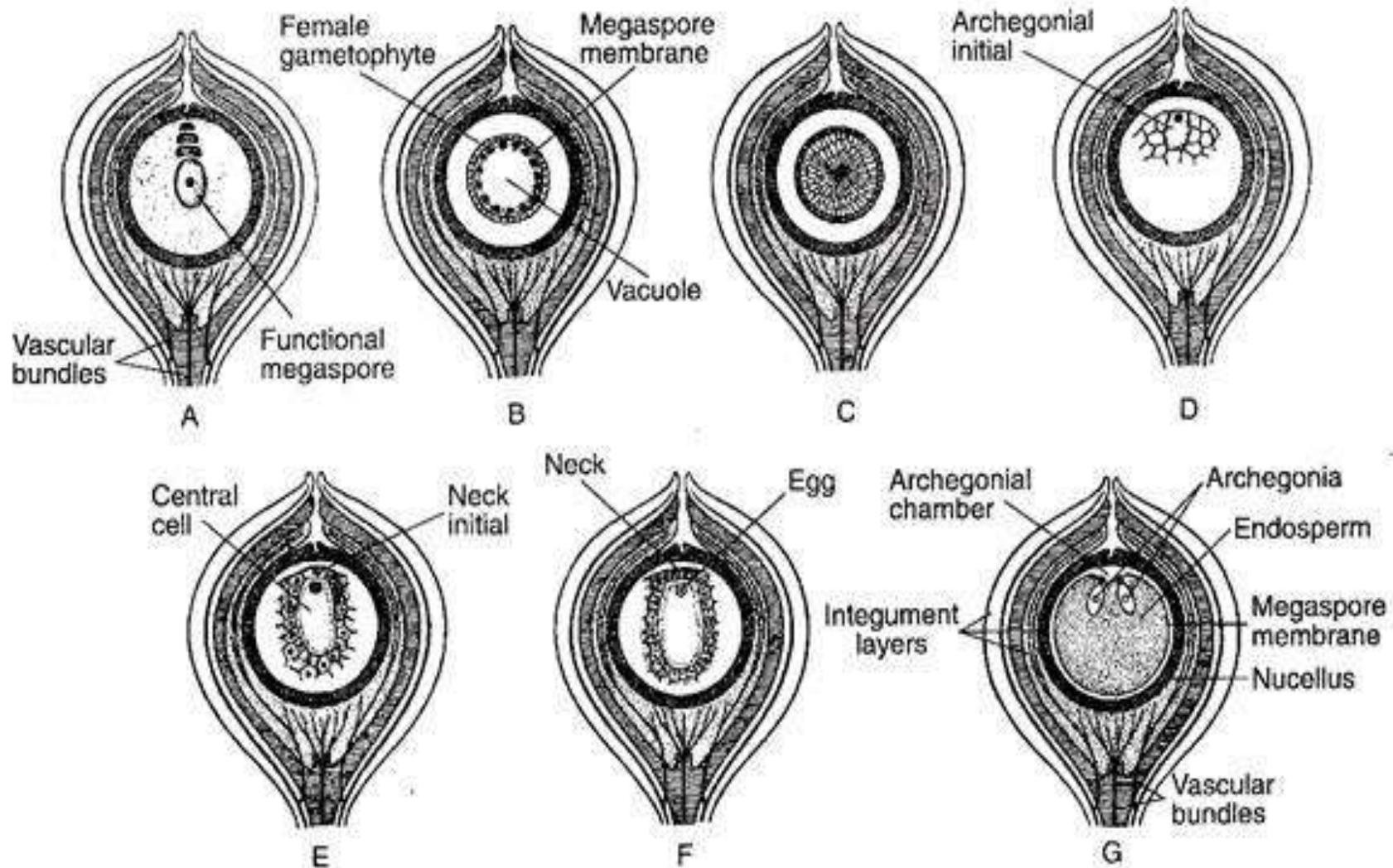
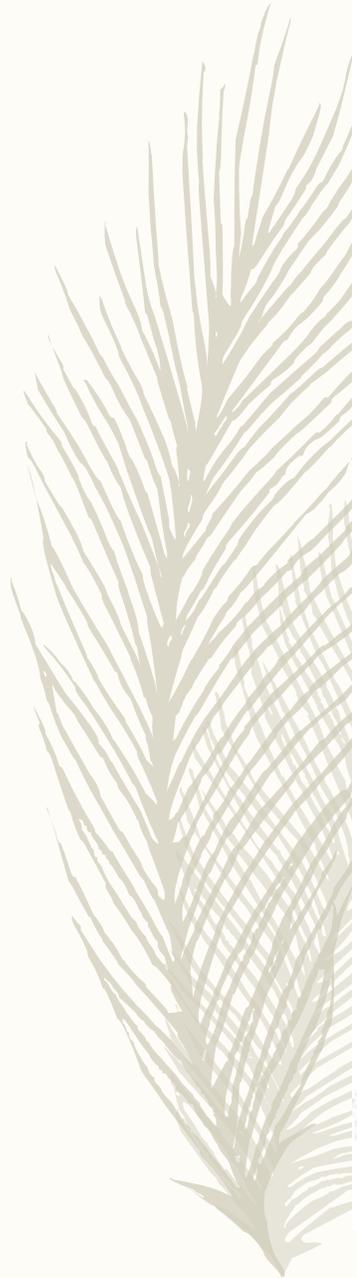
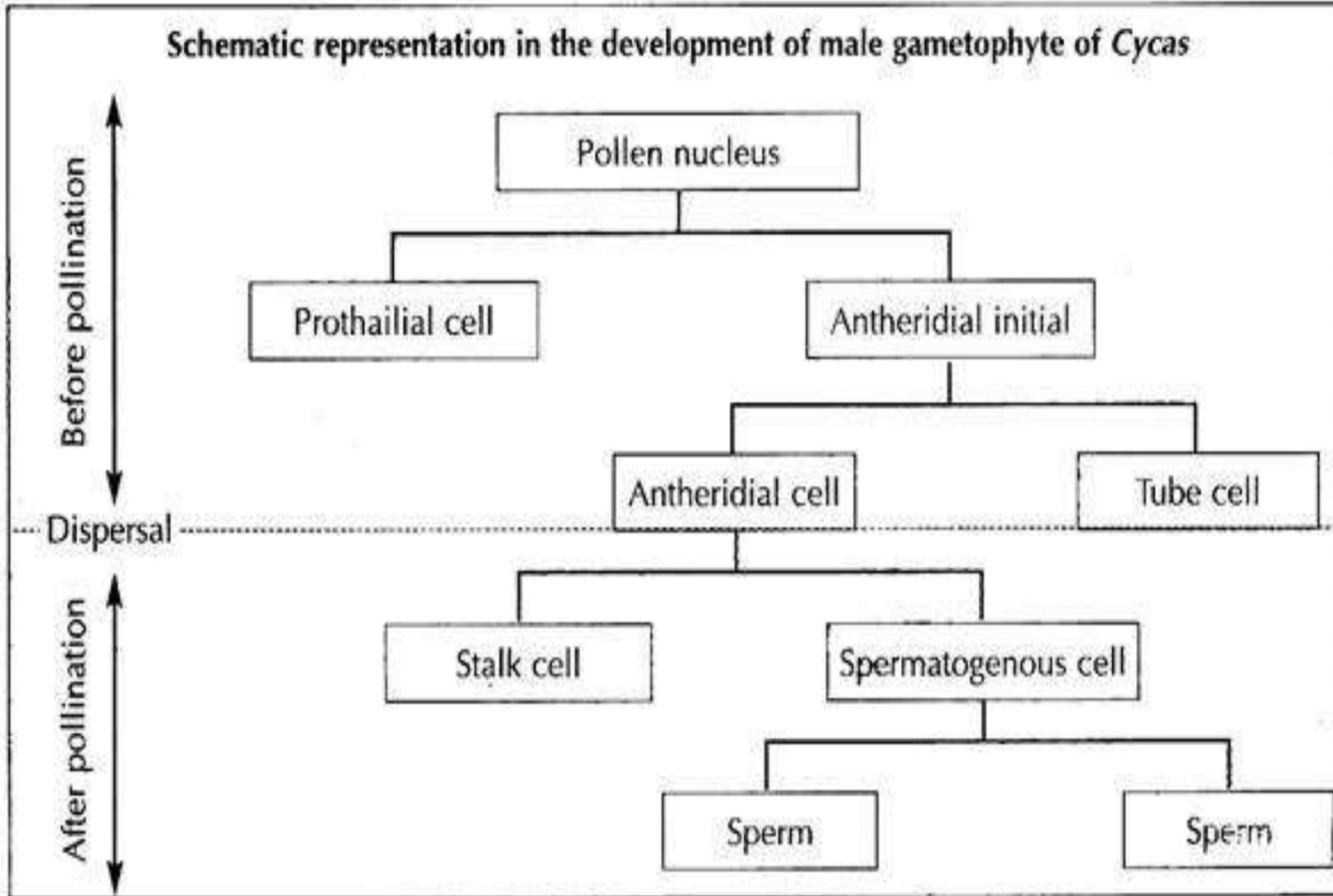
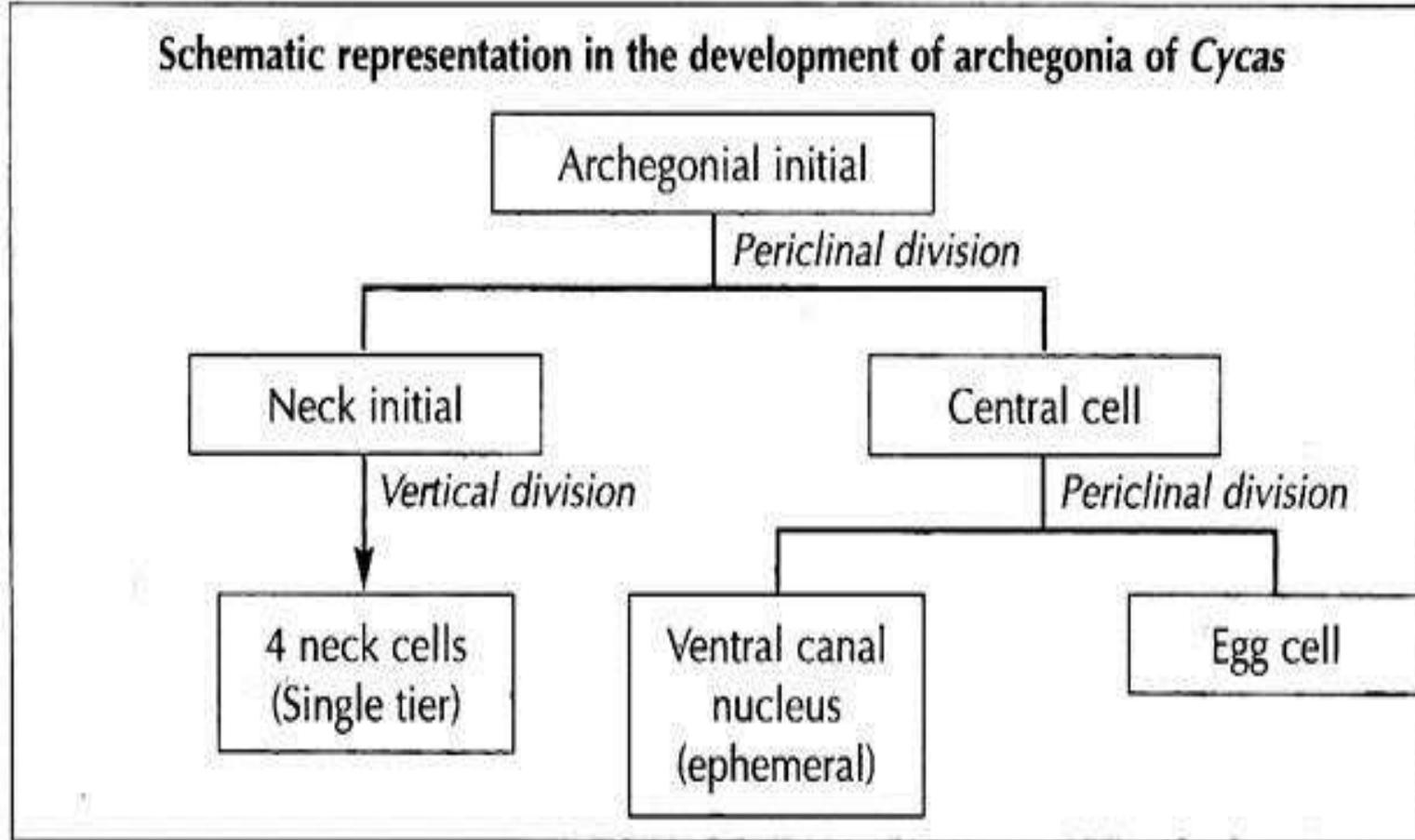


Fig. 1.21 : *Cycas*. Development of female gametophyte within ovule : A. Linear tetrad with one functional megaspore, B. Free nuclear stage, C. Cellular stage, D-F. Stages in development of an archegonium, G. A mature female gametophyte containing two archegonia





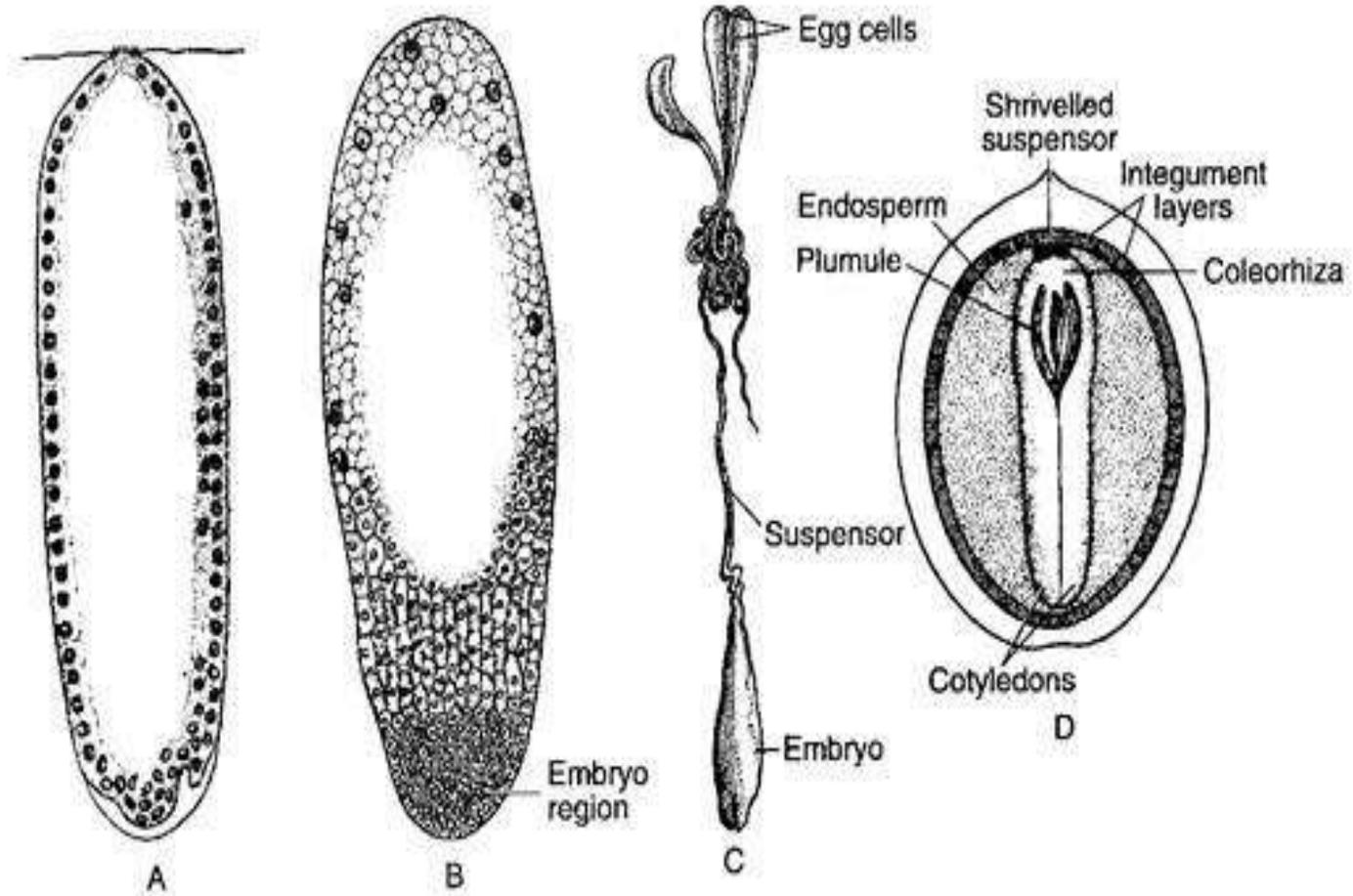
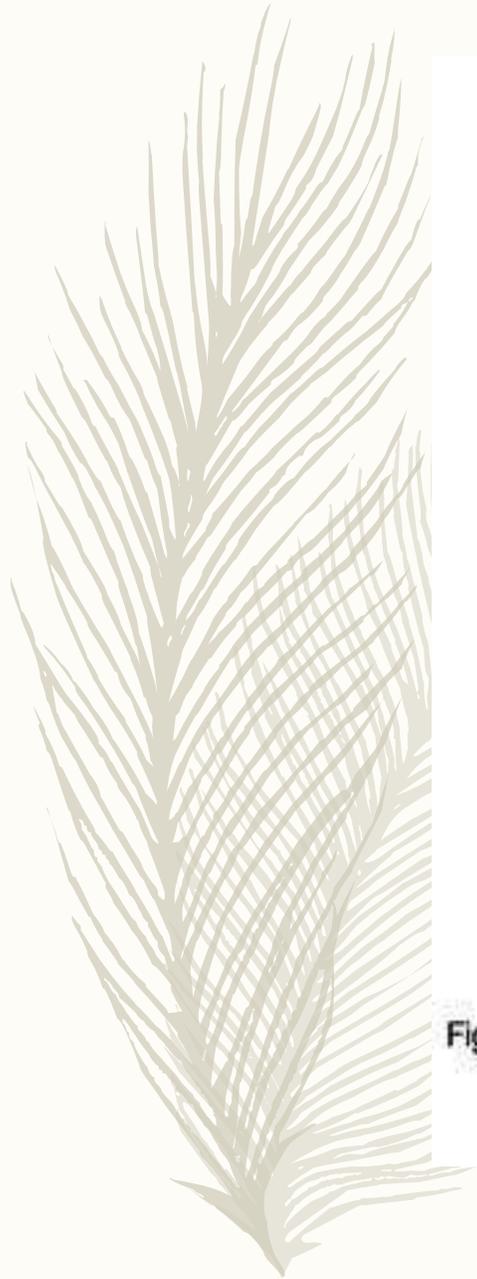


Fig. 1.22 : *Cycas circinalis*. The stages in the development of embryo : A. Free nuclear stage in proembryo, B. Organisation of embryo region, C. An embryo with long suspensor, D. Median vertical section of a seed showing dicotyledonous embryo

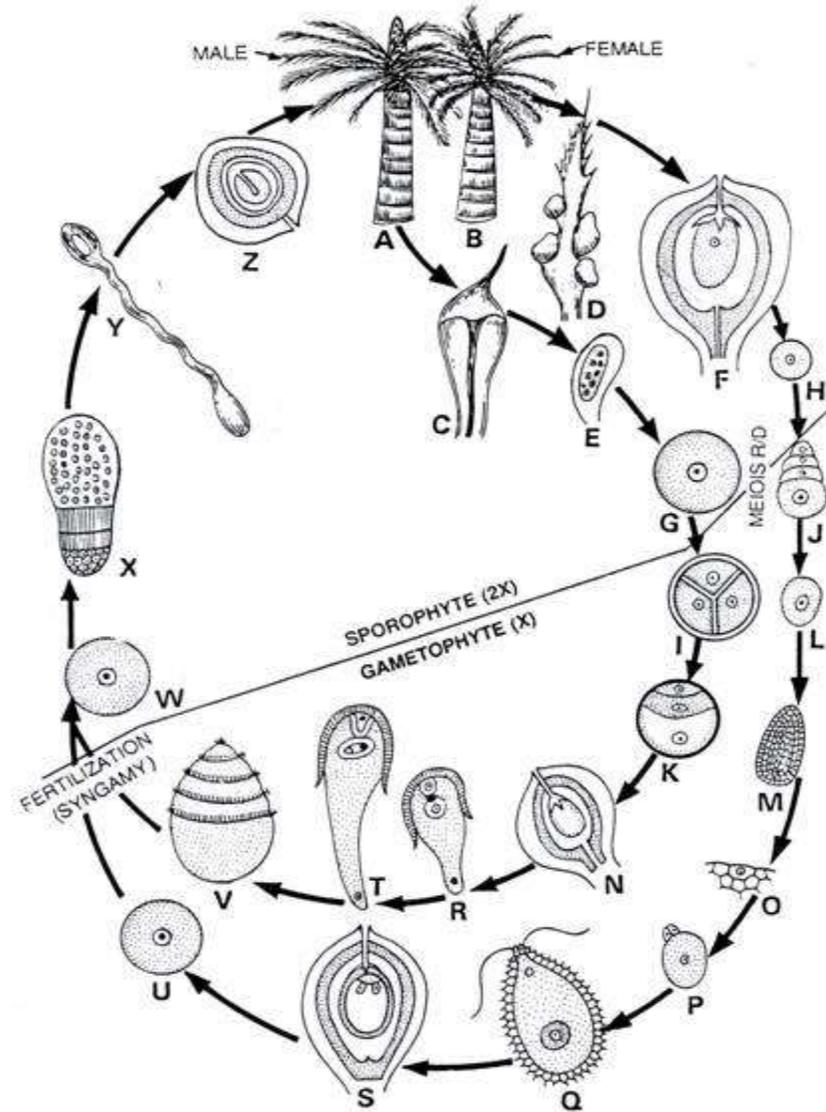


Fig. 3.51. *Cycas* sp. Diagrammatic life-cycle, A, male plant; B, female plant; C, microsporophyll, D, female strobilus; E, microsporangium; F, ovule; G, microspore mother cell; H, megaspore mother cell; I, microspore tetrad; J, megaspore linear tetrad; K, male gametophyte; L, megaspore; M, female gametophyte; N, ovule; O, archegonial initial; P, young archegonium; Q, mature archegonium; R, germinating pollen; S, germinating pollen in pollen chamber; T, germinating pollen; U, egg; V, spermatozoid; W, oospore; X, young embryo; Y, embryo; Z, seed.

Economic and health benefits of Cycads

- **Some cycads are poisonous as a result there are not many medical benefits**
- **These are also very close to extinction**
- **If prepared correctly they can be eaten**
- **The nuts contain a nerve toxin**
- **Consumption of the starch derived from cycads is a factor in the development of Lytico-Bodig disease, a disease symptoms similar to Parkinson's and ALS.**
- **But they look kinda pretty!!**



Thank You All...