

Q/ Give an account of embryogeny in the members of gymnosperms studied by you.

Ans/ → Introduction: →

After fertilization a diploid zygote is formed in all the living members of gymnosperm. Zygote develops into an embryo and such phenomenon of the development is known as embryogeny. The early stage of the development of embryo in all members is more or less similar. The first phase in embryo development is the free nuclear division unlike of Angiosperms. The development of embryos in diff. members of gymnosperm is described as below:

Cycles: → The zygote increases in size ~~by the proembryo~~ and the nucleus of zygote divides by free nuclear division to form about 200 to 300 nuclei. The size of the proembryo increases due to the formation of a large central vacuole. Now nuclei are arranged ~~to~~ toward the periphery, wall formation starts from periphery towards the centre, thus it is centripetal. In this way a complete cellular proembryo is formed.

The proembryo is differentiated into 3 regions: -

- ① The upper most region near the micropyle known as haustorial region.
- ② The middle region known as suspensor zone.
- And ③ the lower most region is known as embryonal region.

The suspensor elongates rapidly & pushes the embryonal region deep into the endosperm. Now embryo differentiates into a radicle, hypocotyle, plumule and cotyledons. The shoot end of the embryo is directed

resulting into the formation of massive embryos, which gets organised into diff. regions. Cleavage polyembryony is seen in the embryogeny of pinus. Besides this, there is also simple proembryo. Some times the cells of the rosette tier also developed into embryos and this condition is known as rosette polyembryony.

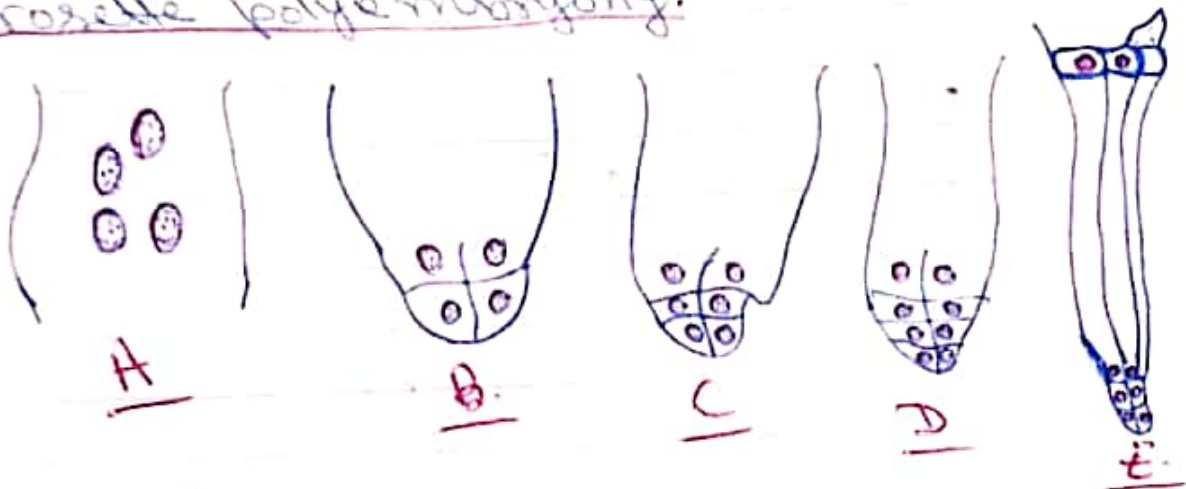


Fig. Showing the various stages of embryogeny of Pinus.

Taxus: → Sterling [1948] has studied the embryo development in Taxus cuspidata. The 2-gate nucleus divides by 4 divisions, resulting into the formation of 16 free nuclei. Now wall formation starts. The cells of the proembryo organised into two tiers — the upper tier of 9-13 cells and lower tier of 3-7 cells. Another division in the upper tier results in the formation of 3 tiers — the lower embryonal tier, the middle suspensor tier and upper open tier. After ~~the~~ the suspensors elongate, which push the embryonal tier deep into the endosperm. Cleavage polyembryony has been also reported by Sterling. The terminal tier gives rise to the different

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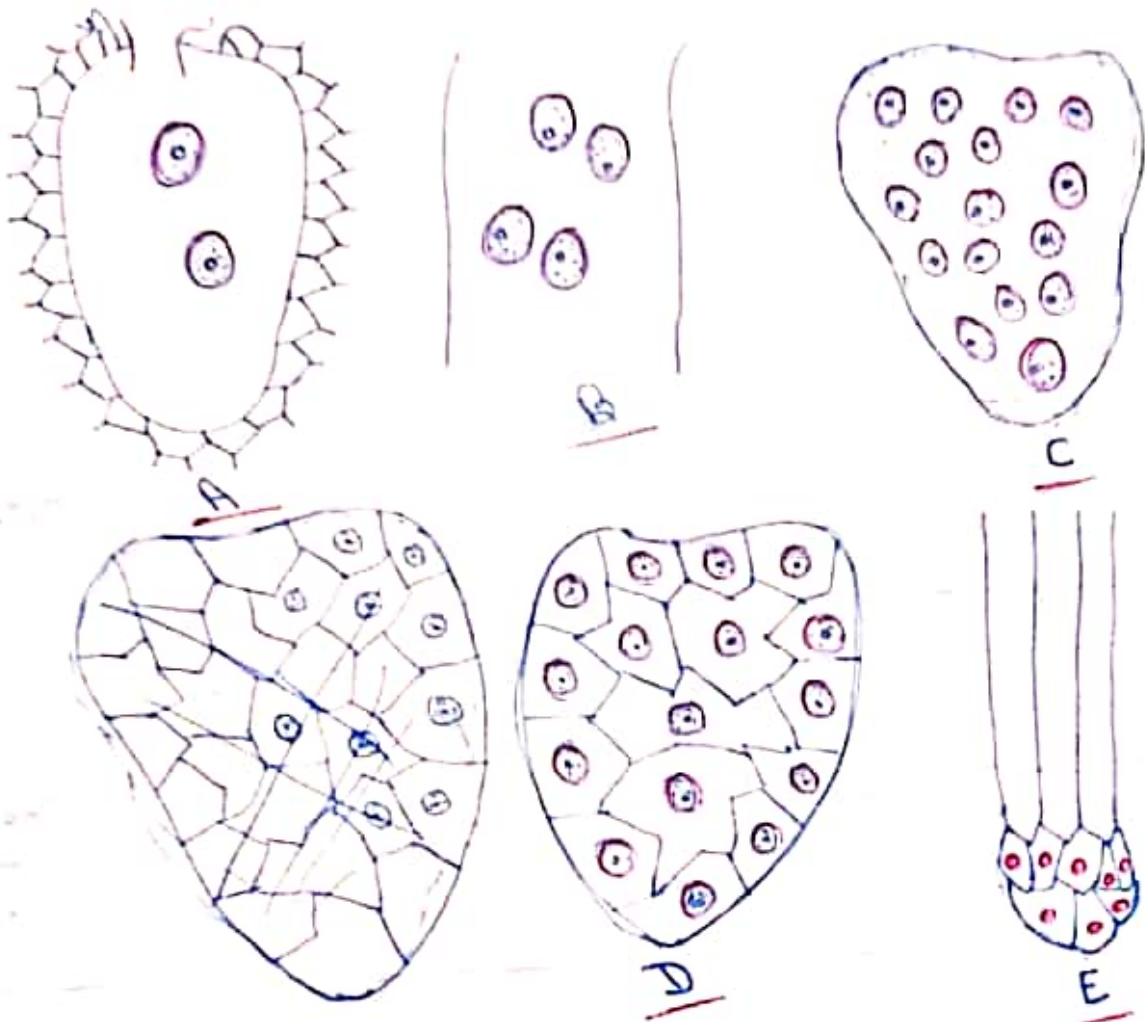
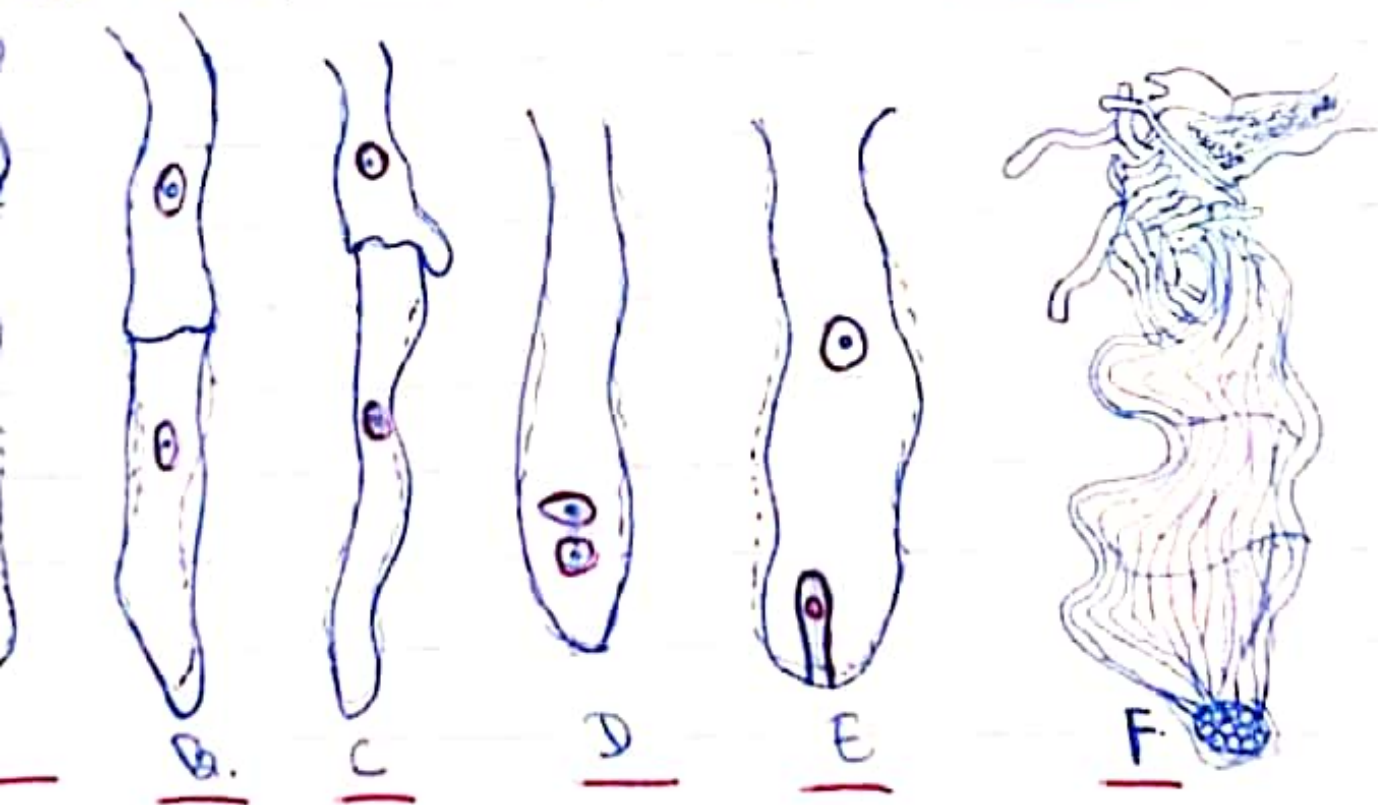


Fig. showing the various stages of embryology of Taxus.

Gymnosperms: Gnetum: → There is a great variation in the development of embryo in species of Gnetum. The early stage of development is also not regular. The zygote may swell and divide free nuclear divisions [Coulter - 1908]. It may divide into larva as embryo and

suspensor tube elongate and may branched rapidly
 later on they degenerate. The nucleus at the tip of the
 tube divides into two unequal nuclei. The smaller
 nucleus is cut off by a cell wall. This is known as
abscission cell. The large nucleus ~~either~~ either may
 regenerate or may produce secondary suspensor. The
 abscission cell divides periclinally. Some times it may
 divide anticlinally. Thus the 4 cells are formed.
 3rd division is transversesed which leads to the
 formation of an octant the further divisions are
 regular. The cells at the tip have denser cyto-
 plasm and develop into embryo proper. The secondary
 suspensor push the embryonal cell deep into the
 spermatophyte. Now embryonal mass is differentiated
 the different regions of the embryo.



showing the various stages of embryogeny of Gnetum.

away from the micropylar end. So, that the embryogeny is endospermic. Polyembryony is of common occurrence in the species of cycas.

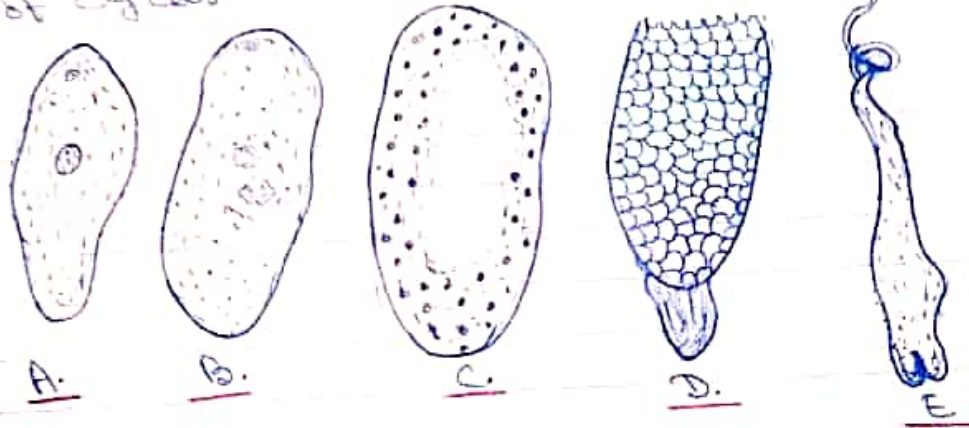


Fig. showing the various stages of embryogeny of Cycas.

Pinus:

→ The zygote nucleus divided twice resulting into the formation of four free nuclei. These nuclei migrate towards the base and arranged in one plane. They divide again forming 8 free nuclei, which becomes arranged in two tiers of ~~4~~ 4 nuclei each. This structure is known as primary proembryo. Wall formation starts after this division. The cells of the both tiers again divide giving rise to 4 tiered structure known as secondary proembryo. The lowest tier, [Apical tier] develops the embryo, the tier next above known as suspensor tier, which elongates and give rise to first embryonal segment. 3rd tier known as rosette tier, which is intermediate between the food supply of the egg and the embryonal segment. The upper most tier is known as open tier.

The cells of the suspensor tier elongate freely. The embryonal cells are thrust down into the endosperm. Now the cells of the embryonal tier divide,