Topic: Gnetum; Embryo Development
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Dr. Sanjeev Kumar Vidyarthi

Department of Botany

Dr. L.K.V.D. College, Tajpur, Samastipur

L.N. Mithila University, Darbhanga

The Embryo Development

The embryo development in several species of Gnetum has been studied by many different workers including Lotsy (1899), Coulter (1908) and Thompson (1916), but the details put forward by these wokers are highly variable.

Maheshwari and Vasil (1961) have stated that in all the angiosperms the first division of the zygote is accompanied by a wall formation but in all gymnosperms, except Sequoia sempervirens, these are free-nuclear divisions in the zygote.

Gnetum in this respect forms a link in between gymnosperms and angiosperms by showing both free-nuclear divisions as well as cell divisions.

Thompson (1916) opined that a two-celled pro-embryo is formed. From each of these two cells develops a tube called suspensor. Now the nucleus divides and one of the two nuclei undergoes free-nuclear divisions forming four nuclei.

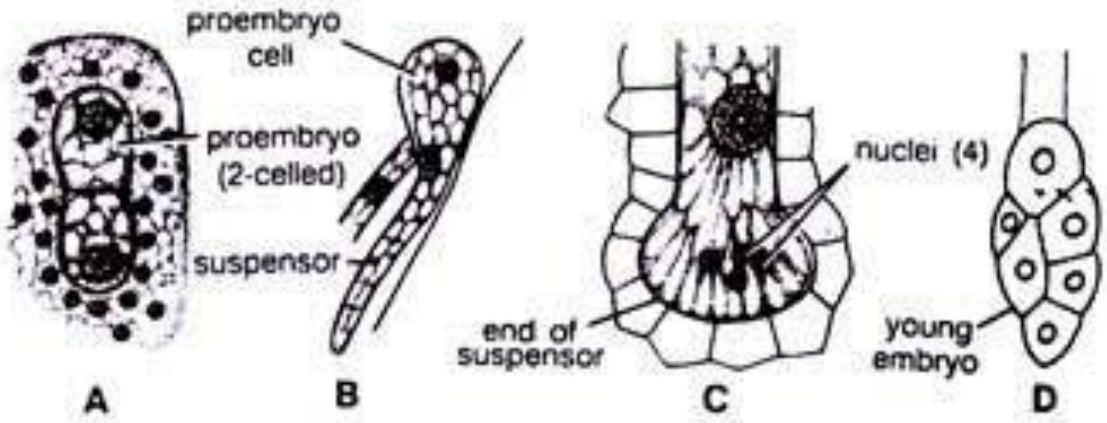

Fig. *Gnetum*. Development of embryo. A-B, *G. gnemon*; C-D, *G. maluccense* (after Thompson,1916).

The embryo gets organised by these four nuclei. There is no division in the other larger nucleus.

Madhulata (1960) has worked on the zygote development in *Gnetum gnemon.* According to her 2-4 or sometimes up to 12 zygotes may develop in a gametophyte, of which normally one remains functional.

From the zygote develops generally one or sometimes 2-3 small tubular outgrowths.

Only one of these tubes receives the nucleus and survives while the remaining tubes disintegrate and soon die. The surviving outgrowth elongates, becomes branched and grows into different directions through the intercellular spaces of the endosperm. All the primary suspensor tubes usually remain coiled round each other.

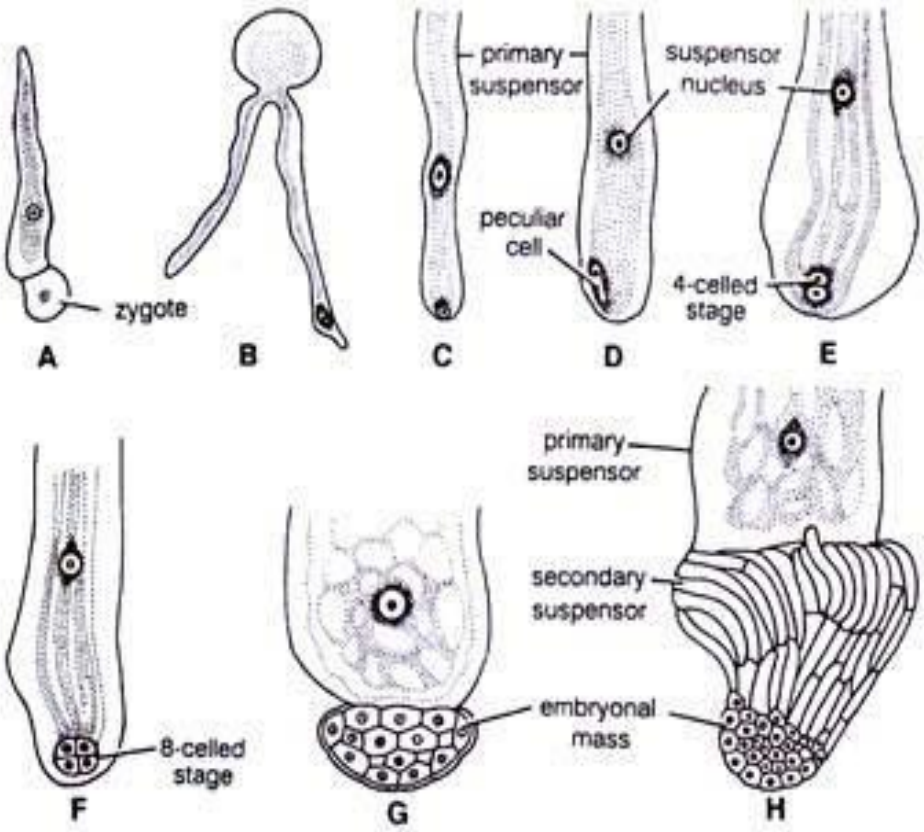

Fig. *Gnetum ula*. Development of embryonal mass. A-B, Germination of zygote; C-D, Formation of peculiar cell; E-F, Formation of 8-celled stage of embryonal mass; G, Embryonal mass formed by peculiar cell; H, Formation of secondary suspensor.

A small cell is cut off at the tip of the primary suspensor tube in *Gnetum gnemon*. It soon divides first transversely and then longitudinally resulting into four cells. Now irregular divisions take place forming a group of cells. Some of these cells divide and elongate to form secondary suspensor. The remaining cells at the tip form the embryonal mass.

In *Gnetum ula* a small cell is cut off at the tip of the tube called peculiar cell. This peculiar cell soon divides and forms a group of cells. The secondary suspensor and embryonal mass are differentiated from this group of cells. By this time, the wall of the tube starts to become thick. What so ever may be the pattern of formation of the embryonal mass and secondary suspensor, the cells of the former are small, compact, dense in cytoplasm and develop into embryo-proper while that of the latter (i. e. secondary suspensor) are thin-walled, uninucleate

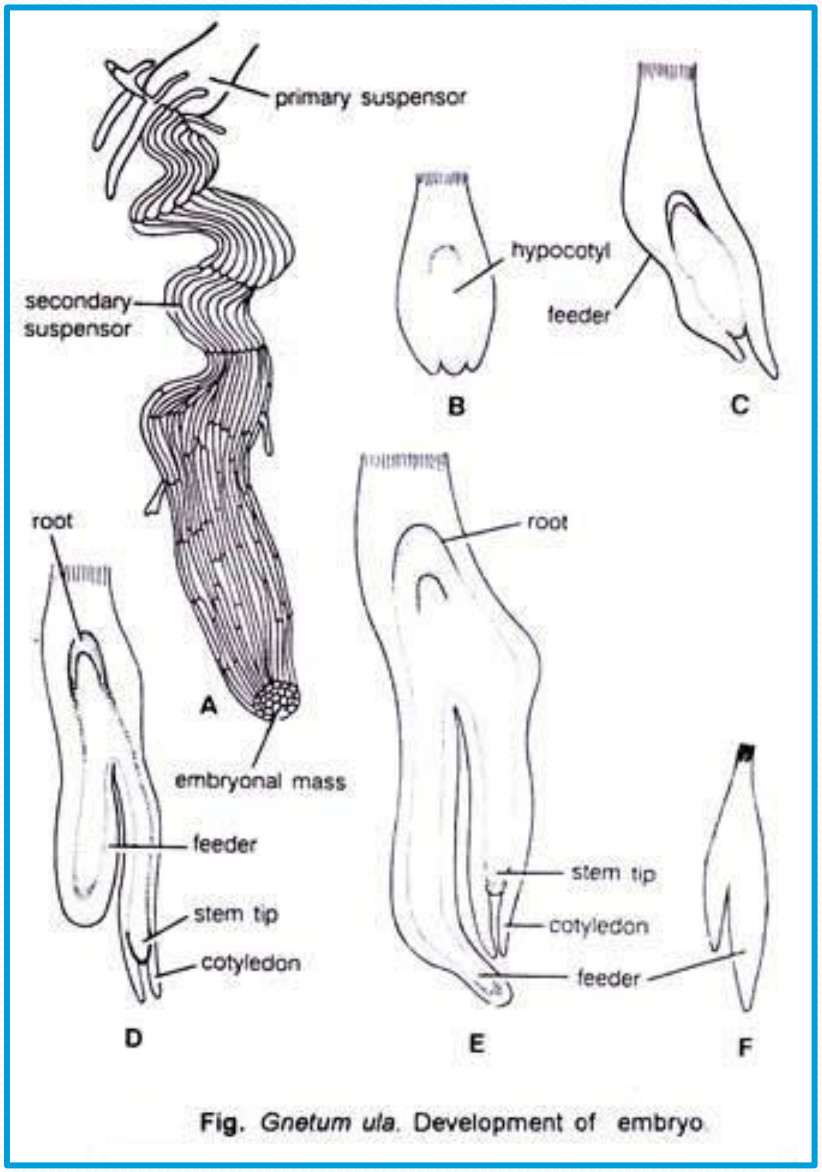

Fig. *Gnetum ula*. Development of embryo

and highly vacuolated.

The primary and secondary suspensors help in pushing the embryo into the endosperm. Soon a stem tip with two lateral cotyledons form in the tip region of the embryonal mass. On the opposite side develop the root tip with a root cap.

A feeder develops after the formation of stem and root tips. The feeder is a protuberance-like structure present in between root and stem tips. Thus, the stem tip, two cotyledons, feeder, root tip and root cap are the parts of a mature embryo.