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The rest of the structures of sporophyte originate the embryo. Genetic evidence has shown that the formation of the meristem of the root and the stem are regulated independently.

Genetics of embryogenesis

Although the morphology of the plant embryo is remarkably simple, it allows molecular support is complex. Gene expression in embryos is broad: it is estimated that the RNAs embryonic Nicotiana tabacum , Plant snuff, is about 20,000 genes an equivalent number expressed in differentiated tissues such as leaves or anthers . However, has been studied which genes are expressed greater extent during embryogenesis, and correspond to the coding for proteins of seed storage. However, there is obviously a temporally and spatially differential expression during embryo development, which generate, for example, the polarity in development.

In botany , the embryo is a miniature seedling dormancy or torpor. Is generally formed as a result of fertilization of the oosphere . The double fertilization of angiosperms results in the development of the embryo and endosperm , which is the nutritive tissue of the embryo duringgermination .

The embryo is formed by the radicle directed towards the micropyle , the hypocotyl which is a short stem, the cotyledons are the first leaves and the plumule or gemmule which is the shoot apex and sometimes some leaf primordia.

In pteridophytes the embryo is unipolar: it only sets the growth pole for the stem, since the roots are adventitious. Instead on thespermatophytes , the embryo is bipolar: in a pole develops the stem, and in the other, the root . In gymnosperms the embryo usually develops two to several cotyledons, two in the case of Ginkgo and 5 to 18 in the case of Pinus . In the dicot has two cotyledons which may have different appearance, foliaceous as in the pumpkin and castor , fleshy and in peanuts and peas , with the ends twisted as in the tomato , folded in various ways, characteristic for each genus or family. In the monocotyledons the embryo presents a single cotyledon: its position is lateral, like that of the plumule.

The embryo develops from the zygote. The set of processes physiological leading to the transformation of a single cell, the zygote , in an individual-the more complex multicellular embryo - contained in the seed matures is called embryogenesis . Requires fine regulation of many elements of development , leading to the development of basic morphologies ( morphogenesis ), the establishment of functionally organized structures ( organogenesis ) and differentiation tissue. Additionally, you must generate the elementary structures of active growth in modular systems that are plants, ie themeristems , as well as the functions necessary for the further survival of the embryo , as are the quiescence and germination .

As a model organism of plant physiologists have used the small crucifer Arabidopsis thaliana , which has been widely studied embryogenesis and compartmentalized in conceptual stages:

1. State of the zygote. Initial, is the result of the merger of the oosphere with one of the generative nuclei of pollen grain .

2. Globular state. Status of eight cells generated after the first zygotic division asymmetrical.

3. State cordate. The one where they differentiate actively dividing two places, which will be the future cotyledons.

4. State torpedo. Due to cell elongation in the longitudinal axis of the embryo and by expansion of the cotyledons.

5. Mature state. After the loss of water and initiation of a quiescent state.

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