

**NORTH POINT SR. SEC. BOARDING SCHOOL,
ARJUNPUR**

Class -XII Subject: Biology

CHAPTER

**SEXUAL
REPRODUCTION IN
FLOWERING PLANT**

TODAYS TOPICS

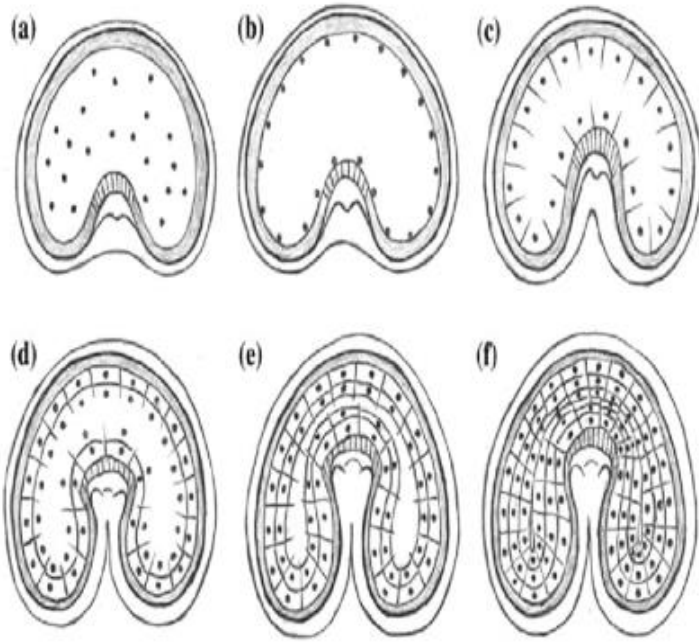
- ENDOSPERM FORMATION
- EMBRYO FORMATION IN DICOT PLANT
- EMBRYO FORMATION IN MONOCOT PLANT
- PARTS OF FRUIT
- PARTS OF SEEDS

2.4 POST-FERTILISATION : STRUCTURES AND EVENTS

Following double fertilisation, events of endosperm and embryo development, maturation of ovule(s) into seed(s) and ovary into fruit, are collectively termed **post-fertilisation events**.

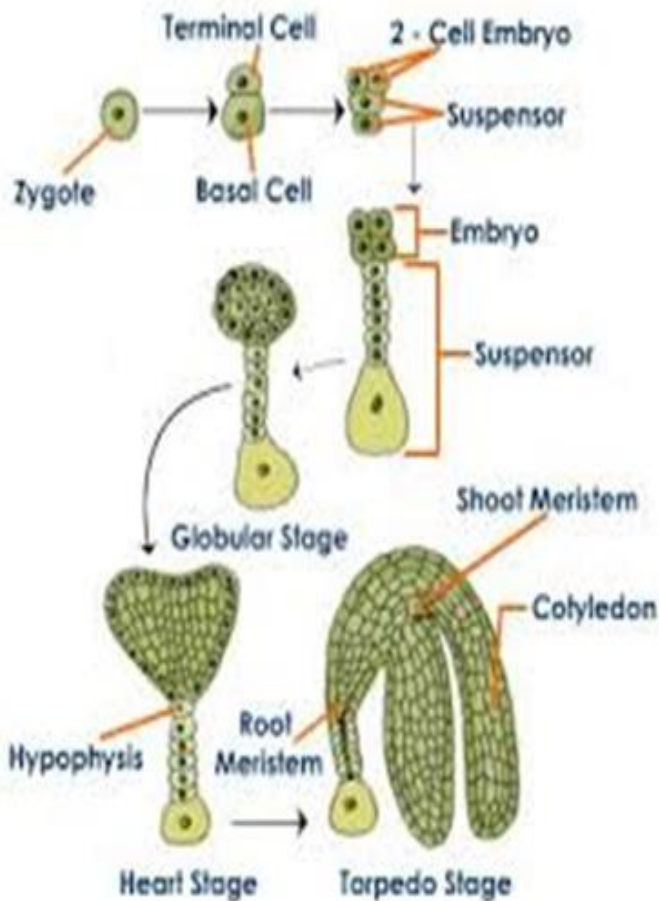
2.4.1 Endosperm

Endosperm development precedes embryo development. *Why?* The primary endosperm cell divides repeatedly and forms a triploid



endosperm tissue. The cells of this tissue are filled with reserve food materials and are used for the nutrition of the developing embryo. In the most common type of endosperm development, the PEN undergoes successive nuclear divisions to give rise to free nuclei. This stage of endosperm development is called free-nuclear endosperm. Subsequently cell wall formation occurs and the endosperm becomes cellular. The number of free nuclei formed before cellularisation varies greatly. The coconut water from tender coconut that you are familiar with, is nothing but free-nuclear endosperm (made up of thousands of nuclei) and the surrounding white kernel is the cellular endosperm.

Endosperm may either be completely consumed by the developing embryo (e.g., pea, groundnut, beans) before seed maturation or it may persist in the mature seed (e.g. castor and coconut) and be used up during seed germination. *Split open some seeds of castor, peas, beans, groundnut, fruit of coconut and look for the endosperm in each case. Find out whether the endosperm is persistent in cereals – wheat, rice and maize.*



2.4.2 Embryo

Embryo develops at the micropylar end of the embryo sac where the zygote is situated. Most zygotes divide only after certain amount of endosperm is formed. This is an adaptation to provide assured nutrition to the developing embryo. Though the seeds differ greatly, the early stages of embryo development (**embryogeny**) are similar in both monocotyledons and dicotyledons. Figure 2.13 depicts the stages of embryogeny in a dicotyledonous embryo. The zygote gives rise to the **proembryo** and subsequently to the **globular, heart-shaped and mature embryo**.

A typical dicotyledonous embryo (Figure 2.14a), consists of an **embryonal axis** and two **cotyledons**. The portion of embryonal axis above the level of cotyledons is the **epicotyl**, which terminates with the **plumule** or stem tip. The cylindrical portion below the level of cotyledons is **hypocotyl** that terminates at its lower end in the **radicle** or **root tip**. The root tip is covered with a **root cap**.

Embryos of monocotyledons (Figure 2.14 b) possess only one cotyledon. In the grass family the cotyledon is called **scutellum** that is situated towards one side (lateral) of the embryonal axis. At its lower end, the embryonal axis has the

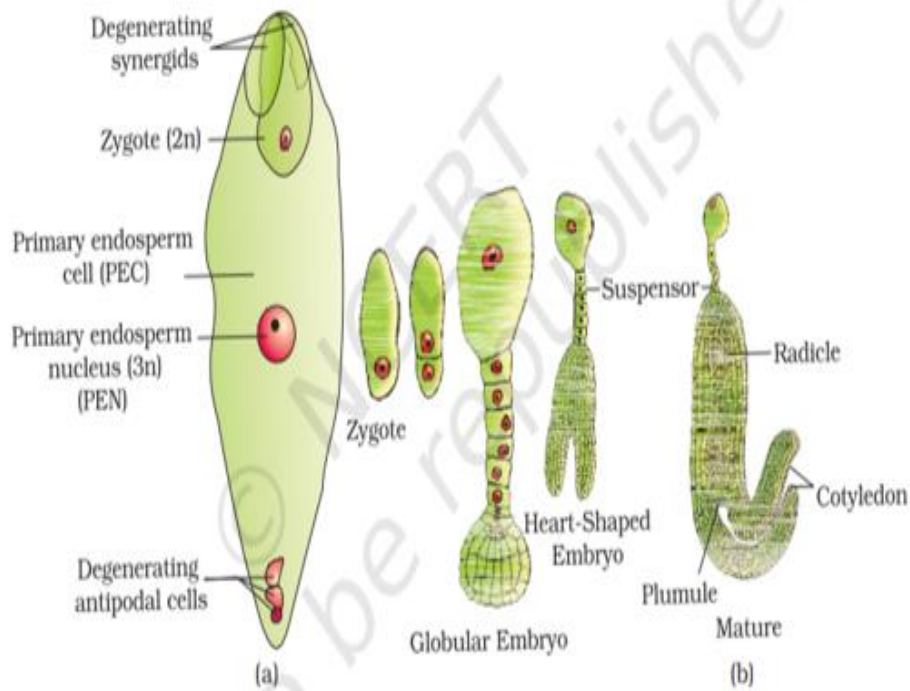


Figure 2.13 (a) Fertilised embryo sac showing zygote and Primary Endosperm Nucleus (PEN); (b) Stages in embryo development in a dicot [shown in reduced size as compared to (a)]

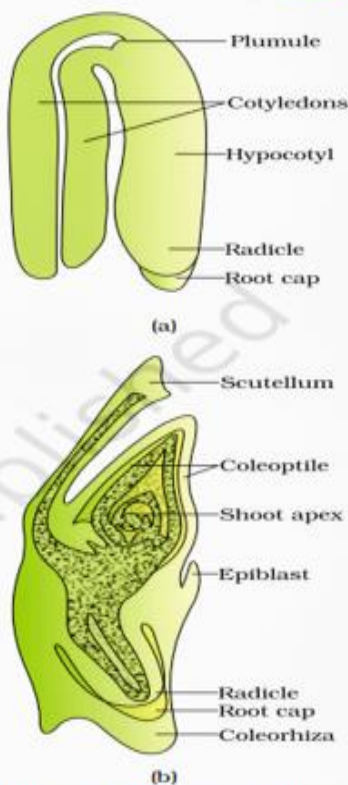


Figure 2.14 (a) A typical dicot embryo; (b) L.S. of an embryo of grass

and mature embryo.

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Embryos of monocotyledons (Figure 2.14 b) possess only one cotyledon. In the grass family the cotyledon is called **scutellum** that is situated towards one side (lateral) of the embryonal axis. At its lower end, the embryonal axis has the

radicle and root cap enclosed in an undifferentiated sheath called **coleorrhiza**. The portion of the embryonal axis above the level of attachment of scutellum is the epicotyl. Epicotyl has a shoot apex and a few leaf primordia enclosed in a hollow foliar structure, the **coleoptile**.

Soak a few seeds in water (say of wheat, maize, peas, chickpeas, ground nut) overnight. Then split the seeds and observe the various parts of the embryo and the seed.

ASSIGNMENT 6

1. WRITE ABOUT TYPES OF ENDOSPERM FORMATION IN ANGIOSPERM.
2. WITH A WELL LABELLED DIAGRAM EXPLAIN THE PROCESS OF EMBRYO FORMATION IN DICOT PLANT.
3. STATE THE DIFFERENCES BETWEEN
 - MONOCOT AND DICOT EMBRYO.
 - PERISPERM AND PERICARP
 - ALBUMINOUS AND NON ALBUMINOUS SEED
 - TRUE FRUIT AND FALSE FRUIT