ANGIOSPERMS (ANGEION = VESSEL, SPERMA = SEED)

Introduction

- Unlike the gymnosperms where the ovules are naked, in the angiosperms or flowering plants, the pollen grains and ovules are developed in specialised structures called flowers.
- In angiosperms, the seeds are enclosed in fruits. The angiosperms are an exceptionally large group of plants occurring in wide range of habitats.
- They range in size from the smallest Wolffia to tall trees of Eucalyptus (over 100 metres).
- They provide us with food, fodder, fuel, medicines and several other commercially important products.

General characteristics

- The main plant body is sporophyte that is differentiated into roots, stem and leaves.
- The male sex organ in a flower is the stamen. Each stamen consists of a slender filament with an anther at the tip. Within the anthers, the pollen mother cell divide by meiosis to produce microspores which matures into pollen grains.
- The female sex organ in a flower is the pistil. Pistil consists of a swollen ovary at its base, a long slender style and stigma.
- Inside the ovary, ovules are present. Generally each ovule has a megaspore mother cell that undergoes meiosis to form four haploid megaspores. Three of them degenerate and one divide to form the embryo sac. Each embryo-sac has a three-celled egg apparatus – one egg cell and two synergids, three antipodal cells and two polar nuclei. The polar nuclei eventually fuse to produce a diploid secondary nucleus.
- They are divided into two classes: the dicotyledons and the monocotyledons.

Differences between Dicots and Monocots

S.N.	Dicots	Monocots
1	Number of Cotyledons is 2 in the embryo of seed.	Number of Cotyledons is 1 in the embryo of seed.
2	Flower is mostly pentamerous	Flower is mostly trimerous.
3	Tap root system is present.	Adventitious root system is common.
4	Leaves are dorsiventral, bifacial & bear reticulate venation.	Leaves are isobilateral, unifacial and have parallel venation.
5	Vascular bundles of stem are arranged in a ring & they are conjoint, collateral, open (cambium present).	Vascular bundles of stem are scattered in the ground tissue & they are conjoint, collateral, closed (cambium absent).
6	Secondary growth is common in stem and roots.	Secondary growth is usually absent.

- Pollen grain, after dispersal from the anthers, are carried by wind or various other agencies to the stigma of a pistil. This is termed as pollination. The pollen grains germinate on the stigma and the resulting pollen tubes grow through the tissues of stigma and style and reach the ovule.
- The pollen tubes enter the embryo-sac where two male gametes are discharged. One of the male gametes fuses with the egg cell (Syngamy) to form a zygote. The other male gamete fuses with the diploid secondary nucleus to produce the triploid primary endosperm nucleus (PEN). Because of the occurrence of two fusions i.e., Syngamy and triple fusion, this event is termed as double fertilisation, an event unique to angiosperms.
- The zygote develops in an embryo (with one or two cotyledons) and the PEN develops into endosperm which provides nourishment to the developing embryo. The synergids and antipodal degenerate after fertilisation. During these events the ovules develop into seeds and the ovaries develop into fruit.

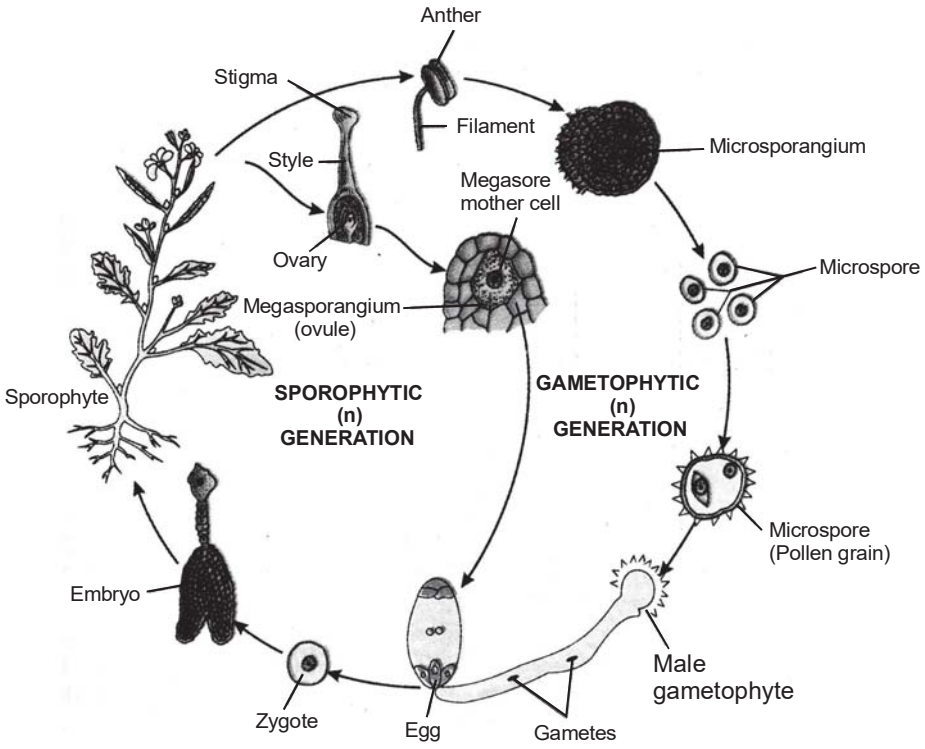

Fig: Life of cycle of an angiospermic plant (TB)

Differences Between Gymnosperms and Angiosperms		
S.No.	**Gymnosperms**	**Angiosperms**
1	Flowers and fruits are absent.	Flowers and fruits are found.
2	Seeds are naked & exposed directly on the surface of megasporophylls.	Seeds lie inside ovary/fruit.
3	Seeds are sessile & unitegmic.	Seed is borne on a stalk (funiculus) & uni / bitegmic.
4	Archegonia present.	Archegonia absent.
5	Double fertilization is absent.	Double fertilization is present.
6	Endosperm is haploid (n) and formed before fertilization.	Endosperm is triploid (3n) and formed after double fertilization.
7	Seed bears three generations (parent-sporophyte, gametophyte and future sporophyte).	Seed bears two generations (parent-sporophyte and future sporophyte).
8	Pollination is direct and by wind only.	Pollination is indirect and by many agencies.
9	Vessels in xylem, sieve tubes and companion cells in phloem are absent.	Vessels in xylem, sieve tubes and companion cells in phloem are present.