



Course – BSc Botany

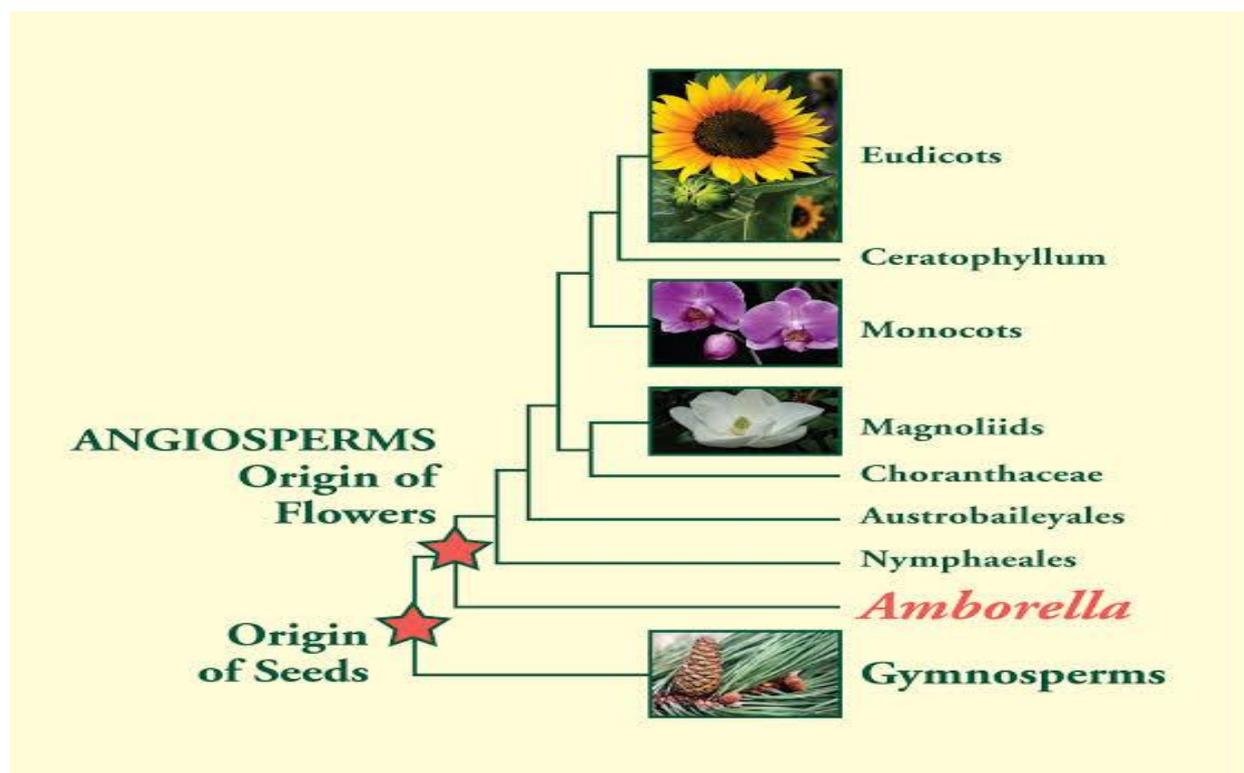
Semester – IV

Paper Name - Plant Systematics/ BOT CC410

Topic – Angiosperm : Origin and Evolution

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Angiosperms: Origin and Evolution

- Systematic botany is the science which deals with the classification and naming of plants . The science of classifying the plants is said to be plant taxonomy and lays emphasis upon phylogenetic relationships.
- The naming of plants is known as nomenclature and provides each plant with a name . This way the systematic botany consists of classifying and naming of plants
- Nomenclature makes the important part of systematic botany . It deals with names which may or may not indicate relationship.
- The science of plant taxonomy classifies the plants on the basis of similarities and differences, which are now known as phylogenetic relationship. Without naming the plants they cannot be classified and therefore , nomenclature makes a very important part of systematic botany.
- They have a great variety of life forms ranging from minute aquatic weeds (Wolffia) to gigantic tropical forest tree (Eucalyptus) which may attain a height of about 100 meters .

- Charles Darwin described the sudden appearance of angiosperms in lower or upper cretaceous as an abominable mystery.

Angiosperms appeared for the first time in lower or upper cretaceous, they were like the trees and the herbs of today.

- The angiosperms are vascular plants and they should be related to other vascular plants . The most distinctive features of the angiosperm as opposed to the gymnosperm are:
 1. Enclosure of the ovule in an ovary .
 2. Further reduction of female gametophyte.
 3. Occurrence of double fertilization.
 4. Development of more complex and efficient conductive symptom.
 5. Exploitation of insect and other animals as agent of pollination.
- Undisputed fossil records place the massive appearance and diversification of angiosperm in the middle to late Mesozoic era .
- Angiosperms produce a flower containing male or female reproductive structures.

- Fossil evidence indicates that flowering plants first appeared in the lower cretaceous, about 125 million year ago and were rapidly diversifying by the middle cretaceous , about 100 million year ago .
- Fossilized pollen recovered from Jurassic geological material has been attributed to Angiosperm.
- The same geological period is also marked by the appearance of many modern group of insect including pollinating insect that played a key role in ecology and the evolution of flowering plants.
- The frequency of angiosperm fossils which are mostly leaf impression , occasionally woods and rarely fruit and seeds increased gradually from middle cretaceous onwards.
- Several leaf genera have been reported from the lower cretaceous
- The number of Angiosperm fossil which can be referred to modern genera with some authority became large by the middle of the upper cretaceous .Some of these are Artocarpus , Dalbergia , Ficus , Typha
- As no fossil remains of earliest angiosperm have been found ,the origin of angiosperms can be discussed on the basis of evidence derived from living forms.

- The earliest angiosperms were undoubtedly woody . They were evergreen plants as are nearly all gymnosperm and most existing magnoliales.
- Flower of the earliest angiosperm had an elongated axis with a large number of free parts arranged spirally on it. They were radially symmetrical and bisexual. They were most probably insect pollinated.
- The ancestral fruit types in angiosperm have been a large cone like structure consisting of large many seeded follicles . The seeds of early angiosperms were large with abundant endosperm and very small and undifferentiated embryo .

Monophyletic origin :

Faegri (1981) , Dahlgren (1983) and several other phylogeneticists believed that angiosperms are monophyletic ie a group originated from a single ancestor at a single time in the past . Hickey and Doyle (1977) also supported the monophyletic origin of angiosperms on the basis of their studies of monosulcate pollens. There is no definite fossil evidence available in favour of the monophyletic origin .

Polyphyletic origin :

Eames (1961) , Meeuse (1970, 1975) ,Krassilov(1977) and several other phylogeneticists have been of the view that angiosperms are polyphyletic , ie dicot and monocots originated at different times from different primitive stock and attain their present status through parallel or convergent evolution .Fossil record variety in perianth and the nature of carpel in both dicot and monocot also support the theory of *polyphyletic origin*.

Some theories of Angiosperm

1. *Isoetes – Monocotyledon Theory*
2. *Pteridosperm Theory*
3. *Caytonialean Theory*
4. *Glossopteridalean Theory*
5. *Bennettitalean Theory*
6. *Coniferales – Amentiferae Theory*
7. *Gnetales – Angiosperm Theory*
8. *Durian Theory*
9. *Pentoxylon Theory*
10. *Czekanowskiales Theory*