ATOMIC ENERGY CENTRAL SCHOOL, INDORE

CLASS XI BIOLOGY **MODULE 3.3**

UNIT – I DIVERSITY IN THE LIVING WORLD

CHAPTER 3. PLANT KINGDOM

PREPARED BY-

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PGT(SS) - BIOLOGY

CHAPTER 3.
PLANT KINGDOM

3.4 GYMNOSPERM

3.5 ANGIOSPERM

Bamania

3.4 GYMNOSPERM

- The gymnosperms (Gymnos = naked; sperma = seeds) are plants in which the ovules are not enclosed by any ovary wall and remain exposed, both before and after fertilisation.
- These are small groups of seed plants which are represented by only 900 living species. Unlike bryophytes and pteridophytes, in gymnosperms the male and the female gametophytes do not have an independent free-living existence. They remain within the sporangia retained on the sporophytes.

Gymnosperms

first plants to have seeds

3.4 GYMNOSPERM

- **Most of the Gymnosperms are evergreen, perennial woody trees or shrubs.**

- The plant body i.e. sporophyte is differentiated into root, stem and leaves


Sequoia

ROOTS :

Specialized *Coralloid roots of Cycas* show association with *N_2-fixing blue-green algae* and *Pinus* show association with *endophytic fungi called mycorrhizae*

STEM :

The gymnospermic **stem** is mostly erect, aerial, solid and cylindrical.
In *Cycas*, it is *unbranched*, while in *Pinus*, *Cedrus and conifers* it is *branched*

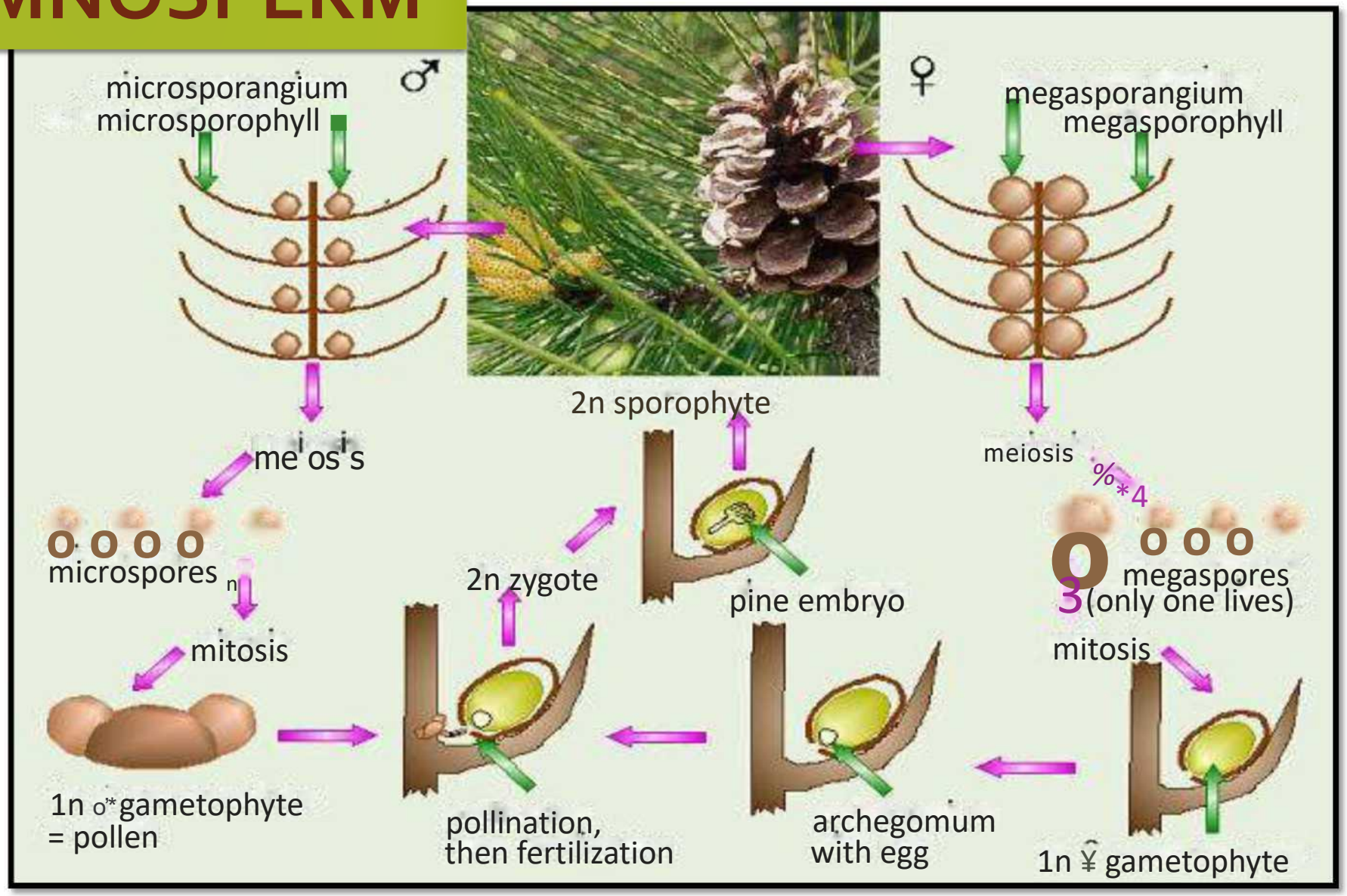
LEAVES :

The **leaves** are dimorphic.
The **foliage leaves** are simple, needle like or pinnately compound
Scale leaves are small, membranous and brown.

3.4 GYMNOSPERM

- The gymnosperms are heterosporous; they produce haploid microspores and megaspores.
- The two kinds of spores are produced within sporangia that are borne on leafy structures called sporophylls which are arranged spirally along an axis to form lax or compact strobili or cones.
- The strobili bearing microsporophylls and microsporangia are called male strobili or male cone
- The microspores develop into a male gametophytic generation which is reduced and is confined to only a limited number of cells. This reduced gametophyte is called a pollen grain. The development of pollen grains take place within the microsporangia.
- The cones bearing megasporophylls with ovules are called female strobili or female cone
- The male or female strobili may be borne on the same tree *(Pinus)*. However in *Cycos*, male cones and megasporophylls are borne on different trees. The megaspore mother cell is differentiated from one of the cells of the nucellus (nutritive tissue of the ovule).

3.4 GYMNOSPERM



3.4 GYMNOSPERM

HETEROMORPHIC ALTERNATION OF GENERATION

SPOROPHYTE

Diploid

Dominant

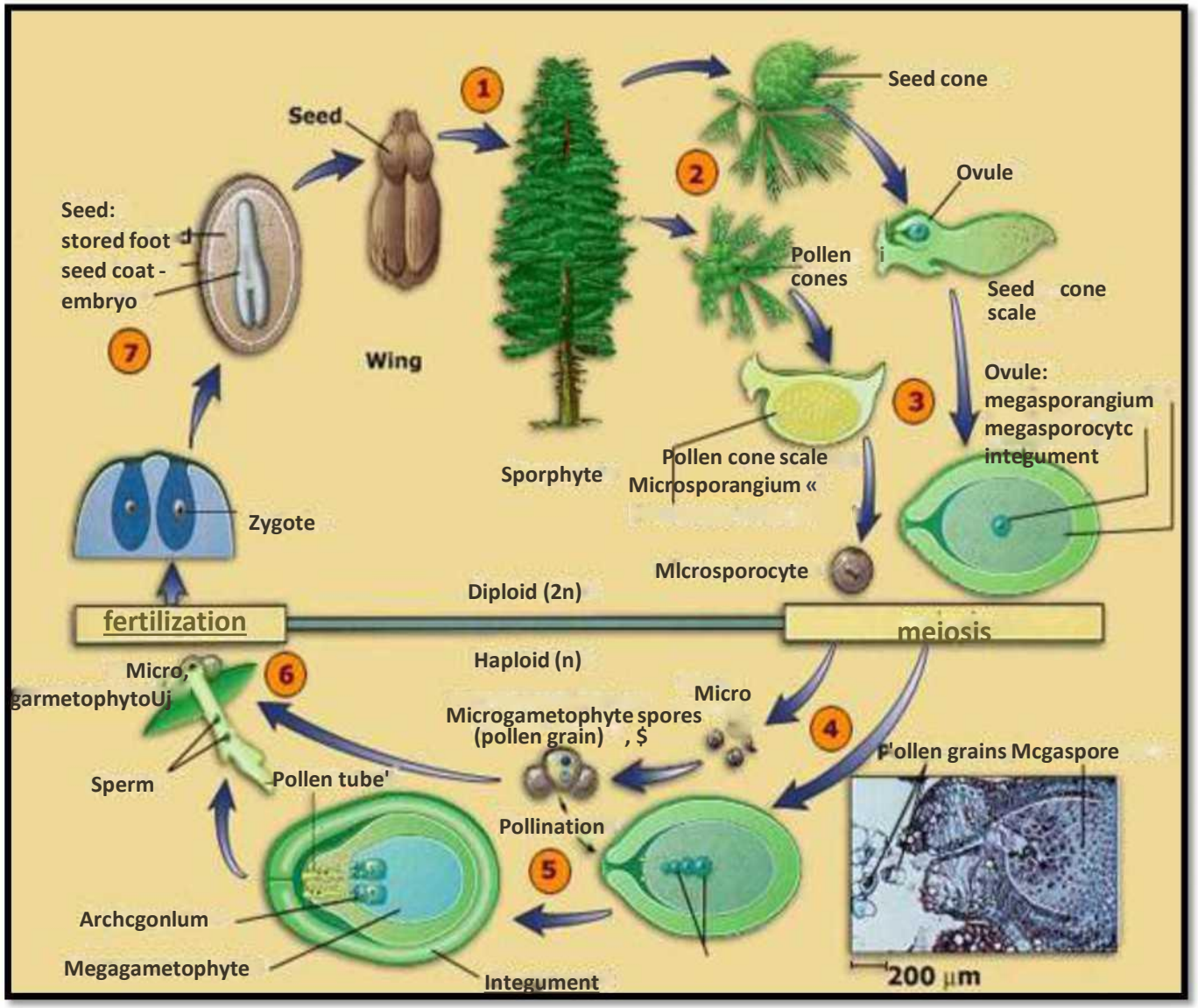
Independent

GAMETOPHYTE

Haploid

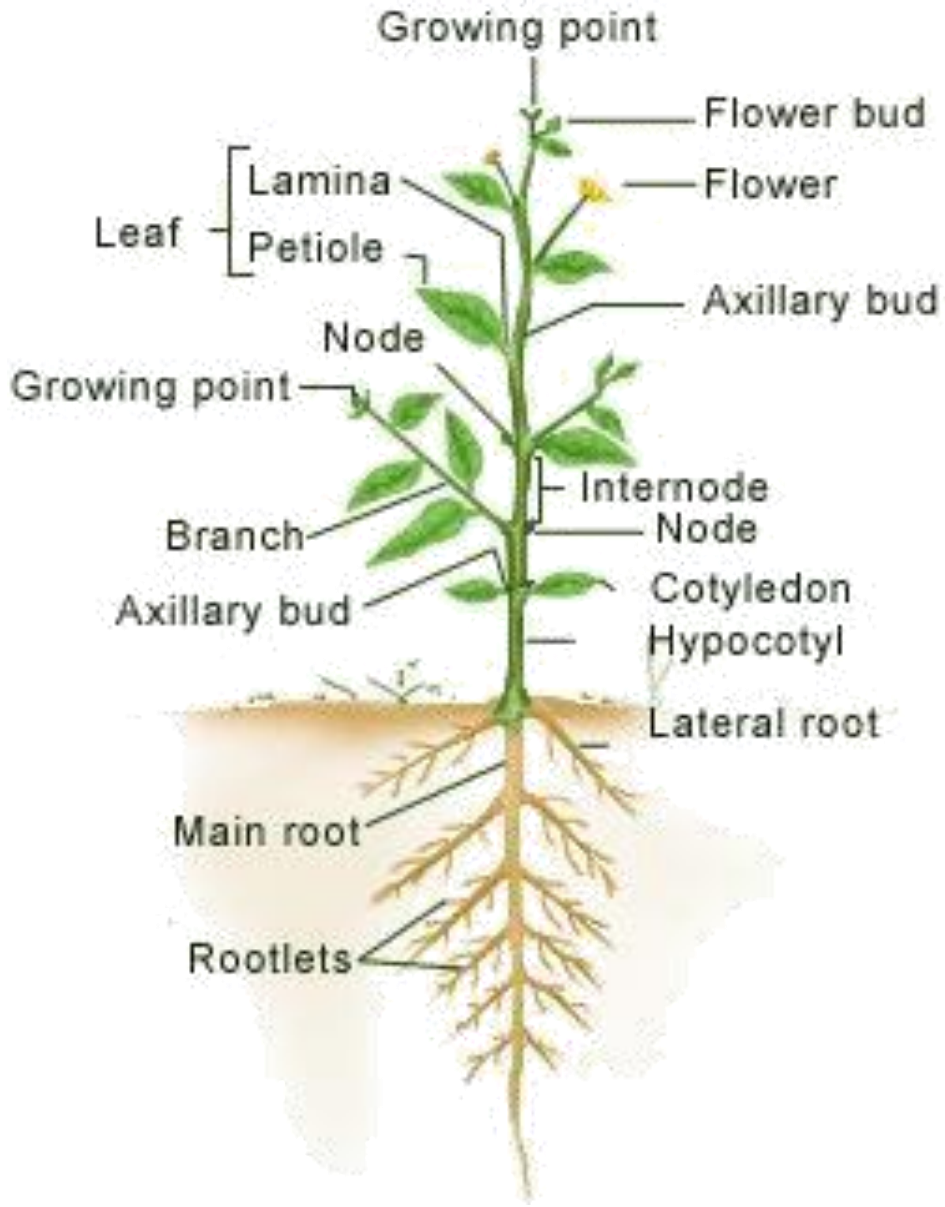
Recessive

Dependent



3.5 ANGIOSPERM

- Angiosperms are seed bearing plants or flowering plants.
- Unlike gymnosperms where the ovules are naked, in angiosperms the sporophyll are organised into flowers and the seeds are produced inside fruits.
- There are about 250000 species of angiosperms in the nature. They evolved about 130-160 million years ago.
- These plant are sporophytic, in the form of herbs, shrubs, trees, climber creepers, etc.
- The smallest angiosperm is water plant Wolffia and tallest is Eucalyptus regnans (100 mand above).
- Primary root develops from radicle. It forms tap root system. In many angiosperms roots develop from places other than radicle, these are adventitious roots.
- Stem develops from plumule.



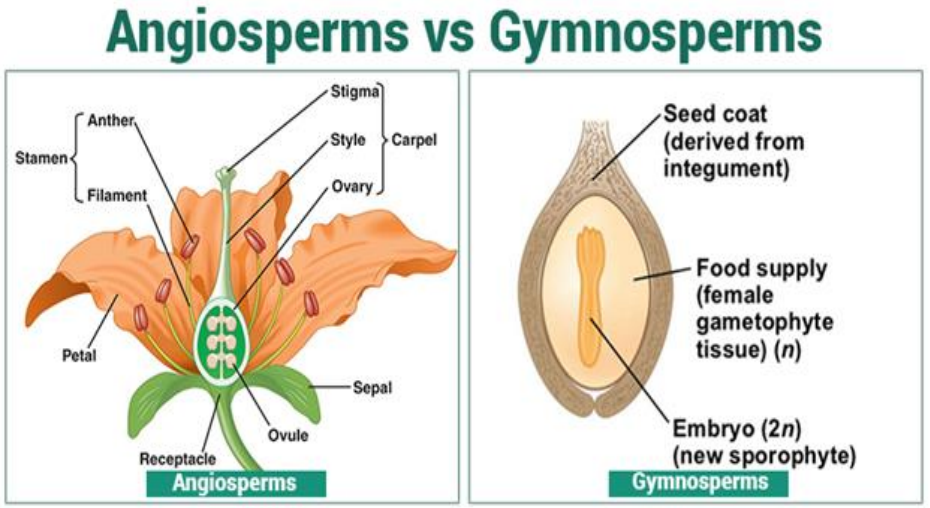
Seed producing plants

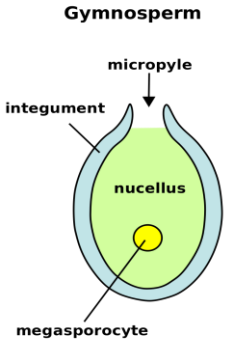
Gymnosperms

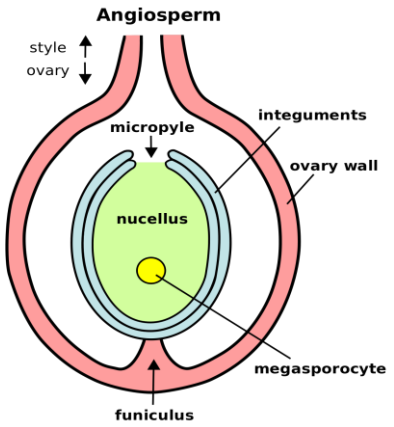
- Sporophyte dominant
- Conifers & relatives
- Heterosporous
  - Mega- and micro-
  - Small gametophye matures in protected cones
    - Female in ovulate cones
    - Male in staminate cones
      - Wind blown-pollen
- Seeds protected in ovulate cone
  - Dispersed by wind, animal, water sometimes

Angiosperms

- Sporophyte dominant
- Flowering plants
- Heterosporous
  - Mega- and micro-
  - Small gametophye matures in protected flowers
    - Female in flower ovary
    - Male in flower anthers
      - Animal pollination and some wind-blown
- Seeds protected in fruit
  - Dispersed by animal mostly







3.5 ANGIOSPERM

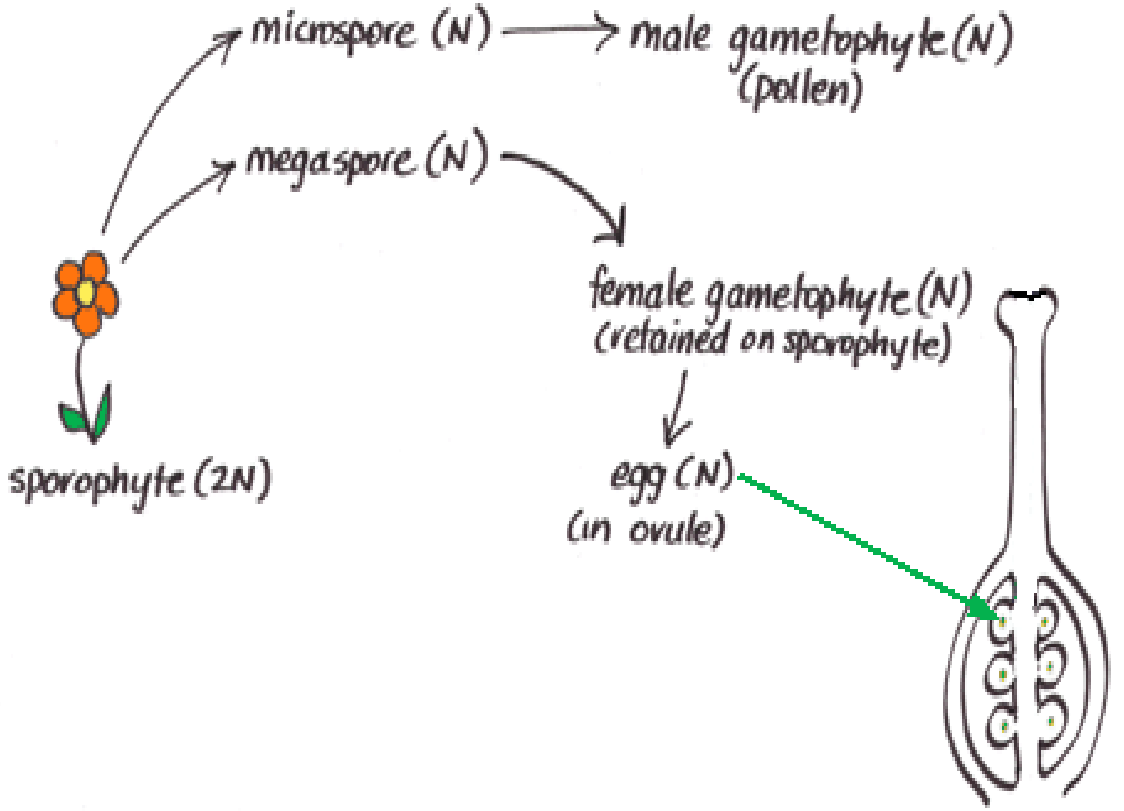
1. The highest degree of perfection of the vascular system with true vessels in the xylem and companion cells in the phloem.

2. The organisation of the microsporophyll's (stamens) and megasporophylls (carpels) into a structure called the flower, which is typical only of the angiosperms.

3. The presence of four microsporangia (pollen sacs) per microsporophyll (stamen).

4. The ovules are always enclosed in an ovary which is the basal region of the megasporophyll.

5. Production of two kinds of spores, microspores (pollen grains) and megaspores. Angiosperms thus are heterosporous.



3.5 ANGIOSPERM

6. Presence of single functional megaspore which is permanently retained within the nucellus or mega-sporangium.

7. Adaptation of flower to insect pollination.

8. Consists in the transference of pollen grains from anther to stigma.

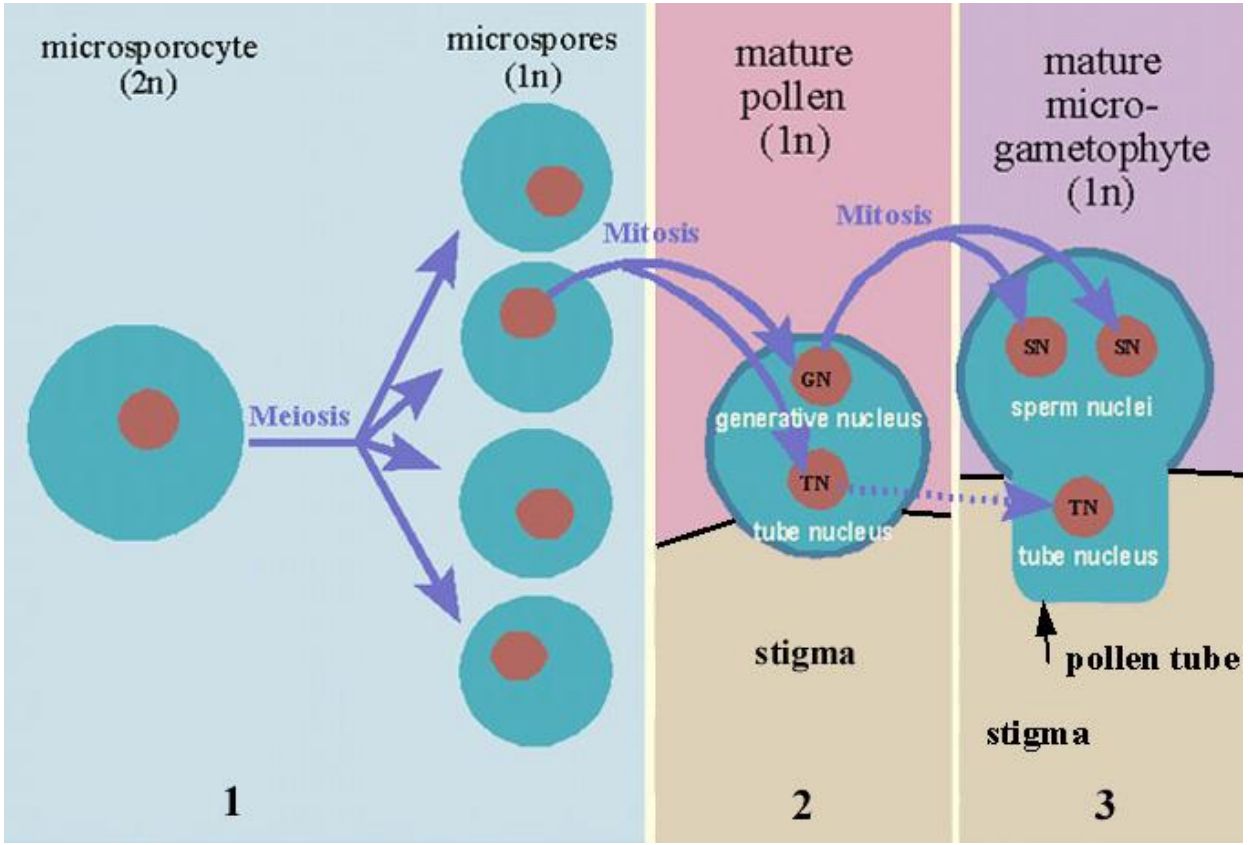
9. Spore dimorphisim having resulted in the production of gametophytes, male and female.

10. The seed or seeds remain enclosed in the ripened ovary called the fruit.

12. The phenomenon of double fertilization or triple fusion is the characteristic of the angiosperms.

14. The endosperm develops after fertilization. It is triploid.

15. The angiosperms are completely adapted to life on land.

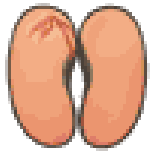
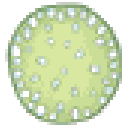
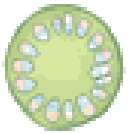


3.5 ANGIOSPERM

Differences between Monocots and Dicots

Monocots	Dicots
They contain one cotyledon.	They contain two cotyledons.
Leaves have parallel venation.	Leaves have reticulate venation.
Fibrous root system is present.	Tap root system is present.
Stomata are dumb-bell shaped.	Stomata are kidney- shaped.
Vascular bundles are scattered.	Vascular bundles are arranged in rings.
Cambium is absent.	Cambium is present.
Stems do not have concentric arrangement of tissue. A ground tissue is present.	Stems have concentric arrangement of tissue epidermis cortex, endodermis, pericycle, pith, etc.
Secondary growth is absent with some exception in stems.	These show secondary growth in stem.
Root has pith in its centre.	Root is generally devoid of pith.
Secondary growth is absent in roots with some exception.	Secondary growth occurs in roots.

Characteristics of Monocots and Dicots

	Monocots	Dicots
Seeds	Single cotyledon 	Two cotyledons 
Leaves	Parallel veins 	Branched veins 
Flowers	Floral parts often in multiples of 3 	Floral parts often in multiples of 4 or 5 
Stems	Vascular bundles scattered throughout stem 	Vascular bundles arranged in a ring 
Roots	Fibrous roots 	Taproot 

Alteration of Generation

Life cycle of an organism is a sequence of events that occur from birth to death of an organism.

In plants, both haploid and diploid cells can divide by mitosis.

This feature leads to the formation of different plant bodies haploid and diploid.

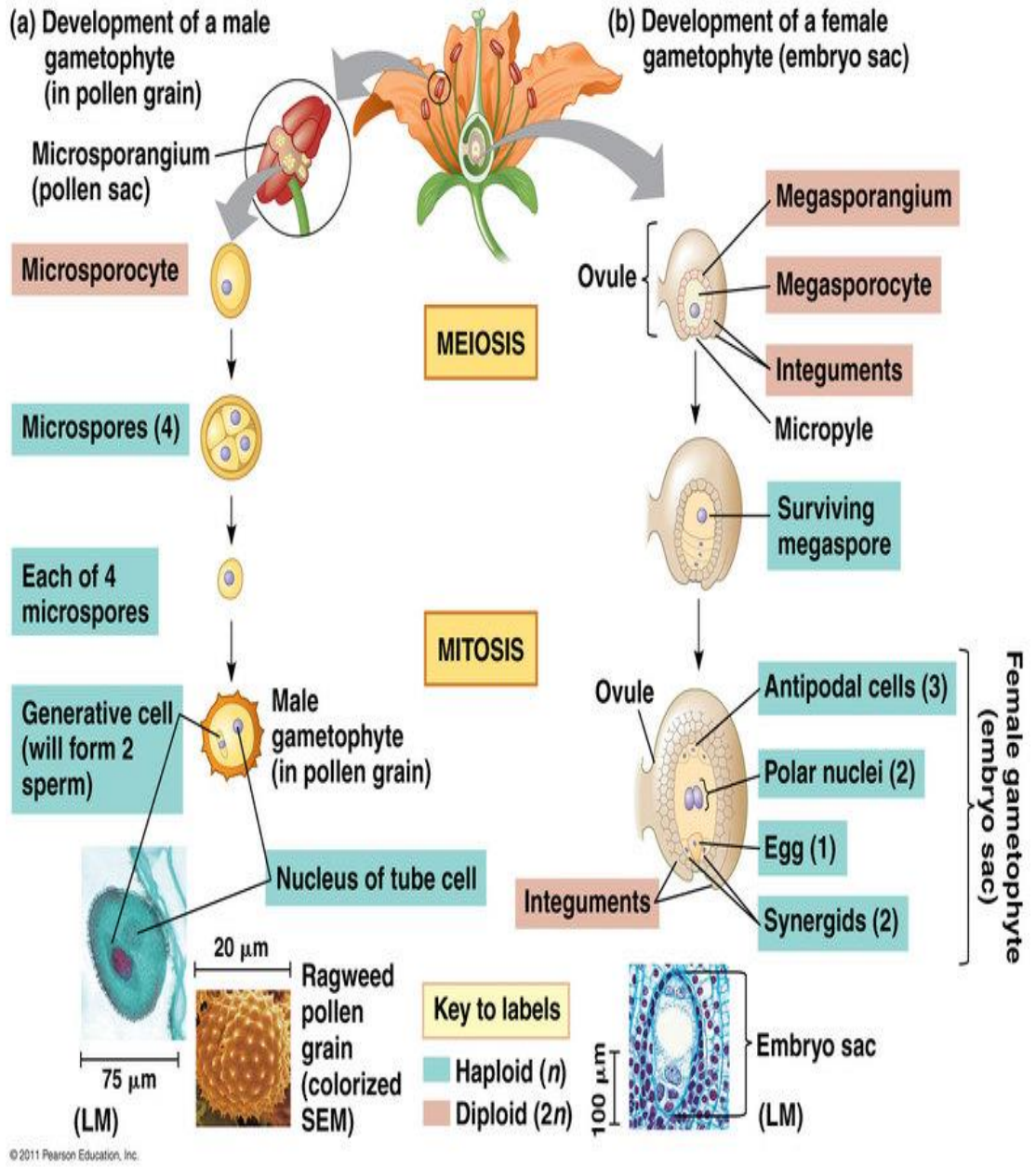
The haploid plant body produces gametes by mitosis. This plant body represents a gametophyte.

After fertilization, zygote also divides by mitosis to produce a diploid saprophytic plant body.

Haploid spores are produced by this plant body by meiosis.

These in turn, divide by mitosis to form a haploid plant body once again.

Thus, during the life cycle of any sexually reproducing plant, there is an alternation of generation between gamete producing haploid gametophyte and spore producing diploid saprophyte.



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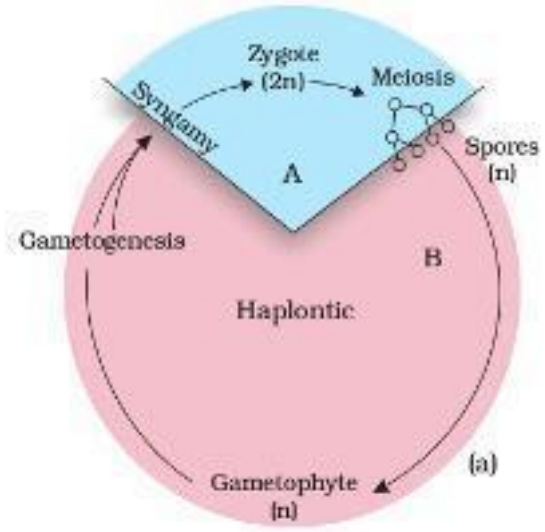
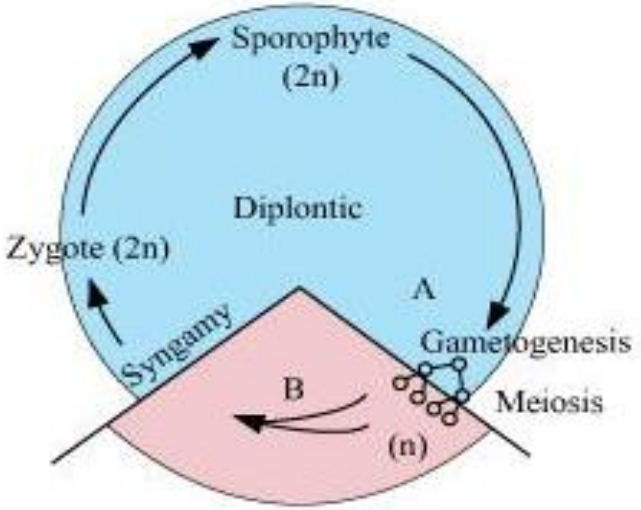
Plant Life Cycles

Different plant groups and individual have different features in their life cycle

Haplontic

The dominant photosynthetic phase is a gametophyte produced by haploid spores.
The gametophyte produces gametes by mitosis.
The gametes fuse and produce a diploid zygote, that represents sporophytic generation.
There are no free living sporophytes.
Meiosis in the zygote results in formation of haploid spores.
This kind of life cycle is called haplontic.
Many algae such as Volvox, Spirogyra and Chlamydomonas represent this pattern of life cycle.





Diplontic

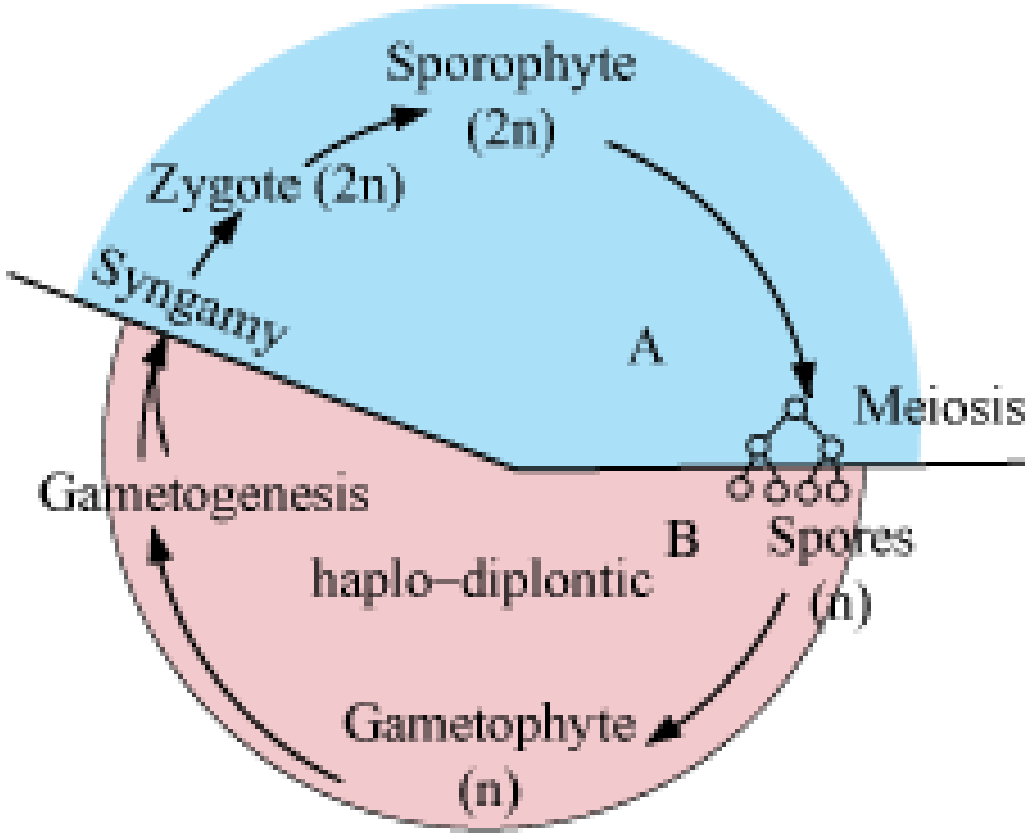
In this type, the diploid sporophyte is the dominant.
The multicellular diploid phase is called sporophyte.
The gametophytic phase is represented by the single to few celled haploid gametophyte.
This kind of life cycle is termed as diplontic.
All seed bearing plants, gymnosperms and angiosperms follow this pattern of life cycle. Fucus, an alga is diplontic.

Haplo-diplontic

In this type, there are two distinct multicellular phases, diploid sporophyte and haploid gametophyte are present. Both phases are multicellular. However, they dilfer in their dominant phases.

(i) A dominant, independent, photosynthetic, thalloid or erect phase is represented by a haploid gametophyte. It alternates with the short lived multicellular sporophyte totally, partially or dependent on the gametophyte for its anchorage and nutrition. All bryophytes represent this pattern.

(ii) The diploid saprophyte is represented by a dominant independent photosynthetic vascular plant body. It alternates with multicellular saprophytic/autotrophic, independent but short lived haploid gametophyte. This pattern is called haplodiplontic life cycle.



All pteridophytes demonstrate this pattern. However, most algal genera are haplontic, some of them such as Ectocarpus, Polysiphonia and kelps are haplodiplontic.


Thank you
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