Introduction of Gymnosperms

The gymnosperms are commonly known as naked seed plants forming a distinct sub division of the seed plants. The term gymnosperm is derived from the two greek words, gymnos – means naked, sperma – means seed. In gymnosperm the seeds are freely exposed upon megasporophyll and not enclosed inside the ovary (unprotected). On the other hand in angiosperm, angios – means vessel, the seeds are always enclosed within an ovary (protected). Gymnosperms are regarded as most primitive among all seed plants originating during late palaeozoic era about 300 million years ago and flourish well during mesozoic era – known as Age of Cycads.

Characteristic of gymnosperms

VEGETATIVE CHARACTERS:

1.Most oders like Cycadales, Coniferales, Ginkgoales and Gnetales are living, while orders Pteridospermales, Cordaitales and Bennettitales are represented by fossil members.

2.Mature plants are sporophyte (2n) –dominant phase, woody perennial trees or shruby, differentiated into root, stem and leaf, showing xerophytic characters.

3.Root – tap root system, diarch to polyarch with exarch stele.

4.Stem is branched but unbranched in cycas, some times branched.

5.Leaves : 2types – scale and foliage leaves.

6.Vascular bundles in stem – conjoint, collateral, endarch and open arranged in ring.

7.Xylem is composed of xylem parenchyma, xylem trcheids with bordered pits, xylem vessels are absent except Gnetales having vessels – characteristic of

Angiosperm – Gnetales are supposed to be connecting link between gymnosperm and Angiosperm.

8.Phloem is composed of sieve tubes, phloem parenchyma, companion cells are absent

9.Wood : Secondary growth is prominent

Manoxylic wood : wood is not compact due to presence of well developed pith, wide cortex, broad medullary rays, xylem tracheids are less developed, e.g., cycas.

Pycnoxylic wood : wood is compact as parechymatous pith, cortex are reduced, narrow medullary rays, thick- walled xylem tracheids are well developed.

Homoxylous wood : Only tracheids are present, vessels are absent,e.g. most of the gymnosperms.

Heteroxylous : Both tracheids and vessels are present, order Gnetales- Gnetum, Ephedra and Welwitschia.

REPRODUCTIVE CHARACTERS

10.Naked seed bearing plants.

11.Seed is an integumented and indehiscent megasporangium.

12. Heterospory may be presumed as first important step toward seed bearing habit.

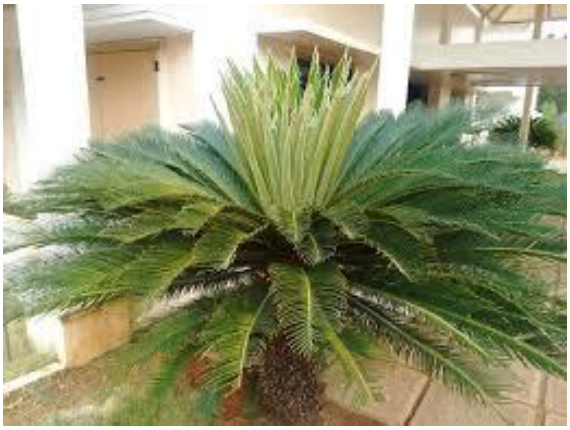
13. Reduction of megaspores number to a single functional megaspore which is permanently retained inside megasporangium.

14. Germination of microspore and megaspore begins in situ while they are still inside their respective sporangia.

15.The automobile transfer of antherozoids through the medium of water is replaced by pollination.

16.Fertilization in gymnosperm takes place by means of pollen tube known as siphonogamy.

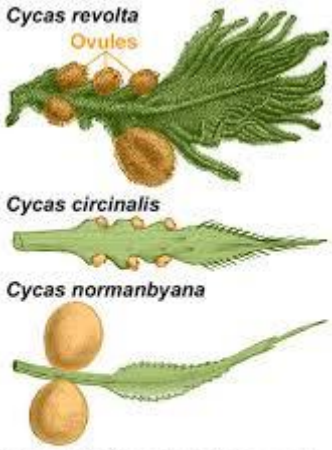
17.Embryogeny is endoscopic



Cycas plant

Cycas male cone

Cycas megasporophyll showing naked seeds



Cycadales (cycads) - *Cycas* spp. megasporophylls ("carpels").
From: Zimmermann (1930), Die Phylogenie der Pflanzen, Verlag von Gustav Fischer, Jena. Drawing: Karsten. Colorization: Leubner.

Cycas naked seeds

SOME INTERESTING GYMNOSPERMS

1. Longest gymnosperm --- Sequoia sempervirens
2. Widest gymnosperm --- Sequoidendron giganteum
3. Longest gymnosperm --- Pinus longavea
4. Parasitic gymnosperm --- Gnetum trinerve and Parasitaxus ustus
5. Epiphytic gymnosperm --- Zamia pseudoparasitica
6. Herbaceous gymnosperm --- Zamia pygmea and Stangeria paradoxa