
PHYLUM CYCADOPHYTE

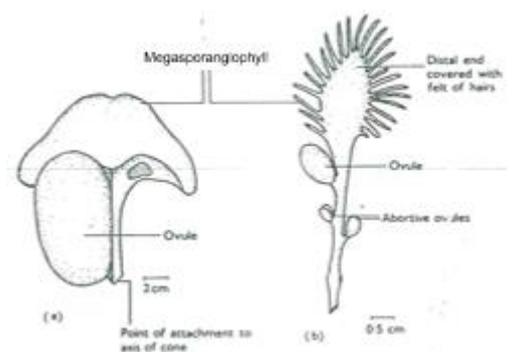
- Cycads
- First cycads appeared in the late Carboniferous
 - Possibly direct descent of the seed ferns
- Confined to tropics & subtropics
- Ca. 330 living species
 - Almost highly endangered

Structure

- All cycads have similar growth habit
- Stems mostly short & sturdy with well developed underground section or elongated to ca. 15m in height
- Stems mostly unbranched
 - With an apical rosette of large, pinnate (feather-shaped) compound leaves
- Have a huge taproot
- Extremely slow growth
- Don't form growth rings
 - Age determined by number of old leaf bases
- Grows from a massive apical meristem at the apex of the main trunk
- Stems produce both photosynthetic leaves (megaphylls) and protective leaves (bracts)
- Foliage leaves can be 1m+ long
- Pinnae (leaflets) are leathery & hard with sharp tips

Female reproductive structure

- Macro- & microsporangiohylls are contained in separate strobili on different plants
- Female cones are borne terminally or laterally
- Consist of many sporangiohylls each with 1 to many pairs of ovules
- Both female cones & ovules of cycads are usually huge



- Dioecious plant – has separate male and female sporophytes/plants
- Cones consist of a series of bracts arranged in pairs
- Fertile structures (flowers) form in the axil of these bracts



- The male unit consists of a short axis
 - Each with a ring of trilobular synangia at the tips
- In the center of the ring, at the tip of the growth axis is a single under-developed ovule



- The female unit consists of a single ovule with 2 integuments
- Fertilization is unusual
 - The egg grows via a tube structure towards the pollen tube
- There's speculation that pollination occurs via the welwitschia bug

Currently it's uncertain whether the bug *P. angolensis* pollinates the plant or just consumes the sap
Either way it lives in close association with the *W. mirabilis*

3. Genus *Ephedra*

- >50% of extant Gnetophytes are this species
- *Ephedra* contains ca. 35 species of shrubs/small trees