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Cycadophyta (The Cycads)

There are 9 genera and about 100 species of cycads, including *Zamia*, which is native to Florida, and a fairly common house plant, *Cycas revoluta*, the sago palm. Cycads are found in tropical and subtropical regions. They were much more abundant in past eras than today. There is some evidence that seeds require animal dispersal, and that the animals that fed on cycads are no longer around to eat and then disperse seeds. Cycad seeds are difficult to germinate.

Cycads are increasingly declining in the "wild" and many are near extinction, both from habitat destruction and because of their slow growth and low reproductive success.

Cycads have great value to some as ornamental plantings, so much so that a mature cycad can be sold for several thousand dollars to cycad collectors. That they are uncommon in our world today helps increase their value to collectors, but puts cycads at great risk for poaching from their native habitats, reducing their numbers even more. The safest place today for a cycad is in a botanical garden or preserve.

Vegetative Characteristics of the Cycad Sporophytes:

Cycads are slow-growing woody shrubs with a short or columnar unbranched stem, up to about 15 meters tall in the largest species. Most are less than 2 meters tall. The stem has a terminal crown of long, leathery, pinnately compound leaves. Cycad leaves have circinnate vernation (like ferns).



Some cycads form root associations with nitrogen-fixing Cyanobacteria. The roots that host the Cyanobacteria form at the substrate surface providing light penetration for the Cyanobacteria to photosynthesize.

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Reproduction in Cycads

Cycads are dioecious. The very large male and female strobili are found on separate plants. The female strobilus may be a meter in length. Sporangia (called pollen sacs in the male) are produced on sporophylls in both female and male. Observe the strobili demonstration materials available. Both male and female sporangia retain the spores after meiosis and male and female gametophytes develop within the diploid sporangia on the sporophyte plants.



Male Strobilus

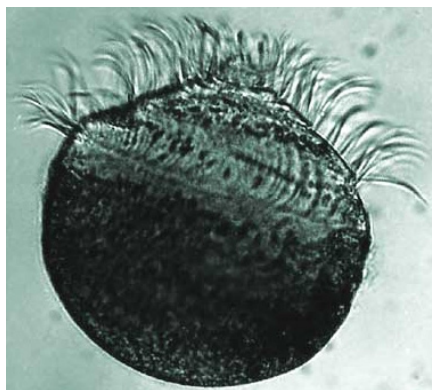


Female Strobili



Strobilus with Seeds

The male gametophyte consists of a pollen grain that contains multiflagellated sperm (as many as 40,000 flagella). Mature pollen is released from the diploid strobilus and it is believed that weevils and other beetle species serve as the pollination agents. Once pollen reaches a female gametophyte, retained in the megasporangium of its diploid plant, the male gametophyte grows a pollen tube in through the nucellus of the female gametophyte. Ultimately the base of the microgametophyte ruptures and sperm must swim to the egg. Each male produces two sperm. It may take 4 - 6 months to complete fertilization following pollination. The zygote develops into the seed, still protected by the previous generation diploid sporangial tissue as well as the surrounding female gametophyte tissues.



Cycad Sperm