

SBUGCC-04: Archegoniate

Gymnosperm

Cycas is a living fossil

Cycads look superficially like palm trees, but they belong to a very different group. They first appeared on the planet around 300 million years ago, but they really hit their stride in the Jurassic and Cretaceous period, between 200 and 65 million years ago. When a plant changes little except in size over 300 million years, it has already reached its climax of evolution. Surviving ice ages and meteors and volcanic eruptions proves it is naturally able to withstand significant climatic shifts. It already developed this resilience in the time of dinosaurs, but unlike the great reptiles that could not adapt to epic changes, certain plants took it all in stride. The cycad, a living fossil, is the ultimate plant for a changing climate.



Living fossils are remnants of once great tropical forests of horsetail reeds the size of telephone poles and enormous tree-like cycads. This jungle was rich in primitive plants that reproduce by spores like ferns, while others such as the cycads were evolving more advanced reproductive processes such as seed and pollen. Cycads have their very own family because they were among the first seed plants for a this unique place in evolution. As the world's climate changed over millions of years they

gradually adapted by reducing their overall size to better adjust to a drier world.



When seed of the female cone matures they are large, red in color and fleshy

The most common cycad is sago palm, which isn't a palm at all because it's far too primitive. *Cycas revoluta*, which grows happily all over the valley in sheltered gardens is the most widely grown, a native of Japan where it came into the classic gardens very early on. These plants make the ideal focal point specimen for Asian inspired gardens or as a sculptural plant for modern spaces.

Cycads are dioecious, which means there are "two houses", with female plants and male plants, but until old enough for reproductive structures to form, the plants all look identical. Flowering results in a big central cone that resembles a monster pine cone, which demonstrates how close they are to the conifers evolutionarily speaking. The female cycad has a rounded cone that holds the seed, while males produce a taller slender cone that contains pollen. Asian cycad growers cut off the male cone when it is ready to release its pollen, then manually shake it over female cones for increased pollination rates to yield greater numbers of viable seeds for cultivation.



The female *Cycas revoluta* produces a large round cone that will bear seed

One reason *Cycas revoluta* is so well adapted to our desert communities is that its origins on the rocky shores of the Sea of Japan is a salt-air maritime environment. This makes plants naturally adapted to alkaline soils and water. Our mineral rich ground water used in irrigation increases the PH of desert soils over time to make them gradually more alkaline, but cycads have adapted to such things. This explains why the deep green of the cycad frond is so consistent since alkalinity causes yellowing of leaves in average plants that demand neutral or acidic PH. It is proven cycads grow far more quickly in warm frost free climates though it will tolerate frost to 21 degrees F.

This cycad encloses its seed in a fruity covering called a **sarcotesta**. Generally crows and ravens help disperse its seed by consuming the **sarcotesta**, then they drop the seed into rocky ground below. This is how cycads spread to many tiny islands around the world where it is literally the only living plant.



The taller upright cone of male *Cycas revoluta* contains pollen

Cycads were highly popular in Victorian and Craftsman era homes in Los Angeles. Some 19th century gardens contain huge old specimens with many growth points and big fat trunks. The trunk is believed to be important water holding tissue that help these plants adapt to long dry periods or extended drought. While other plants may defoliate and discolor, cycads simply stop growing and hunker down to wait out the dry season. After all, they've waited out far worse!

History and evolution show us that climate change is nothing new. If only those cycad genes could tell us all the challenges they've overcome since the Jurassic, perhaps we'd realize that human history is but a blink of the eye when it comes to that of the plant kingdom.