

Cretaceous Cycadales

By the Cretaceous the true cycads were apparently quite large. One fossil from Japan, a large stem over 4 feet in diameter named *Sanchucycas gigantea* shows structural characteristics similar to both *Cycas* and *Encephalartos*.

Another fossil from Japan is a unique form of cycad unknown today. Its compound leaves had regular rows of pinnae that grew from a series of short shoots extending radially from a slender stem. *Nilssoniocladus nipponense* had leaves similar to the *Nilssonia* pattern. No reproductive material was associated with the fossil.

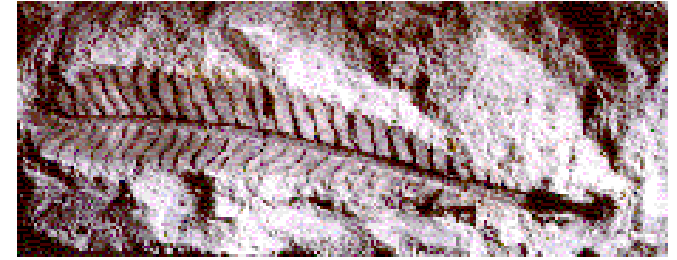
The *Williamsonia* were still present in Mexico, England and India during the Cretaceous period. This slender cycadophyte apparently depended heavily on large herbivores consuming the ripening cones and distributing the undigested seeds in its dung. This would be an obvious disadvantage should the large herbivore disappear suddenly. The cycadeoids also remained numerous, and many fossils have been discovered in the Black Hills of South Dakota, and in Wyoming. Their low growing, stocky trunks with a prominent armor of leaf bases were often mistakenly taken for cycads. The female reproductive structures resembled flowers, but were really loose cones. Beetles apparently served as both pollinators and seed predators.

Fossil leaves from the Lower Cretaceous of Argentina described as *Mesodoscolea* have been assigned to the Stangeriaceae (Archangelski & Petriella, 1971). The only surviving member of this genera, *Stangeria*, is endemic to the coastal region of South Africa. *Mesodoscolea* suggests that the Stangeriaceae were a much more important family 200 million years ago, with an extensive range in Gondwana.

With so many gaps in the fossil record it is possible that major families of the Cycadales that were once quite common remain completely unknown. The curious genus *Pterosoma* known only from Lower Eocene fossils found near Victoria, Australia, is another example. It possessed forked veins in its leaves, like the Stangeriaceae and must have been widespread in southern Australia during the Cretaceous.



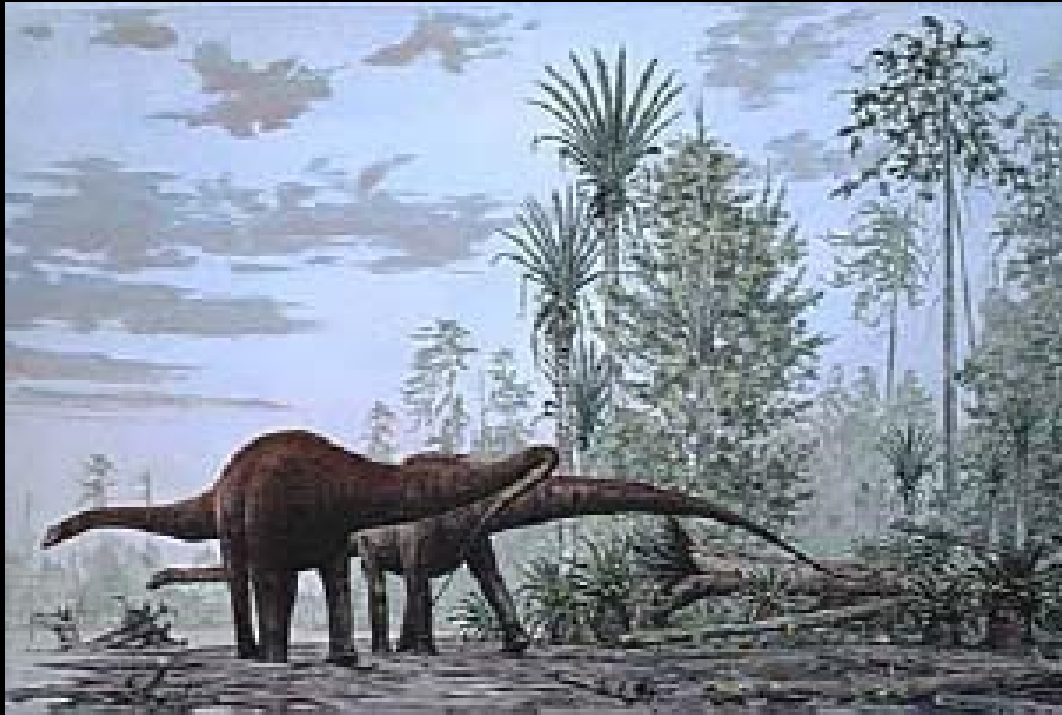
Cycadeoidea marylandica, fossilized stem of a cycadeoid, Maryland, Jurassic thru Cretaceous



Douglas Henderson

Williamsonia sp., a Bennettitid Cycadophyte with a compound leaf pattern (see above) and arborescent trunk.

Jurassic thru Cretaceous



Left: in this reconstruction of a lowland Jurassic forest by Douglas Henderson a pair of diplodoci make their way across a floodplain dotted with cycadeoid-type plants. By the end of the Jurassic the predominantly lowland character of the continents had begun to change. The climate became less humid, vegetation thinned and in many areas like Asia and North America adapted to more arid conditions. Flowering trees and bushy angiosperms appeared. Beeches, oaks, magnolias, and hickory now shared the landscape with cycads, conifers and ferns.

Below: an upland Cretaceous forest where dawn redwoods and early angiosperms dominate while Cycadales and Cycadeoidea make up the understory vegetation. The appearance of woody, tough-leaved vegetation also produced a shift in herbivores. The long necked pegtoothed sauropods were replaced by hadrosaurs, iguanodonts, and ceratopsians with massive batteries of teeth capable of rending anything from pine needles to thorny cycad leaves.

The Upper or Late Cretaceous was a time of growing environmental stress. Gondwana and Laurasia were now in the process of breaking apart. India had become a wild runaway (geologically speaking) shooting across the Indian Ocean toward Asia, and a vast outpouring of magma was forming the Deccan Traps (steps). Sea levels were dropping, the deep ocean was turning cold, and the world climate was now more seasonal as mountain ranges thrust up in the Americas, Europe, and Asia. The three cycad-like families, the Williamsonia, Cycadeoidea, and the Cycadales, were in a contest for survival and the future would go to the most adaptable. But what no one figured on was a wild card player arriving out of the asteroid belt.

