

How Old Are the Palms?

ARTHUR J. EAMES

The palms stand apart from other flowering plants in many ways, perhaps most conspicuously in the unbranched habit of most species and in their enormous leaves. Technically, the method of origin of the compound leaf distinguishes them from other plants with compound leaves. (The leaflets are formed by a splitting of the leaf primordium when it is only 1-2 mm. long, not, as commonly supposed, by a splitting apart as the leaf unfolds.)

The unusual appearance of the large palm trees and their restriction to tropical and subtropical regions, suggests that the palms, like other unusual and bizarre plants and animals, may belong to another era; that they are perhaps primitive and therefore old in geological time. L. H. Bailey, who spent many years living with palms in the field and in the herbarium, has called the palms "an old kind of vegetation in the geological sense" and the leaf an "archaic type." One who has lived so long and so intimately with a group of plants comes to have an instinctive acquaintance with hidden aspects of the life and history of those plants. Further, the main lines of varied and high specialization in the palms in habit, leaf type, inflorescence, flower, and fruit point to a very long period of existence for the family.

Studies of leaf-form show that the pinnate leaf is the primitive type, the palmate the advanced type. The palmate leaf is a "telescoped" form of the pinnate. This is seen even superficially in the shortened, condensed rachis of the palmate type; the crumpled condition of the tissues in the hastula is often obvious even to the naked eye, and the crumpling appears to have occurred in some forms during the ontogeny of the leaf. The costa-palmate type—a term given by Dr.

Bailey—is intermediate between the pinnate and palmate types; in this type the leaf frond has been reduced and shortened but a strong midrib—the rachis of the pinnate leaf—persists as a costa. So strong a modification of leaf type also suggests old age for the family.

Fifty years ago a French morphologist, Lignier, described fossil palm leaves (*Propalmophyllum*) from Liassic strata in France. Accompanying these imprints of leaves, which bear very close resemblance to leaves of living palms of the costa-palmate type, is a typical Jurassic flora of gymnosperms and lower groups. Because at the time these leaves were described, angiosperms (flowering plants) were not known before the Lower Cretaceous, the identification of these fossil palmlike leaves as true palms was questioned. But the imprints closely match the leaves of living palms and since the fossil plant remains found with the palm-leaf remains are definitely Jurassic, the fossils can hardly be considered other than a very early record for the palms and for angiosperms generally. In recent years, more and more evidence that the angiosperms existed in the Jurassic period has been accumulating in the form of wood and pollen grains. And evidence of the existence of palms even in the Triassic has been found by Dr. Roland W. Brown of the United States Geological Survey. These fossils are not imprints of leaves but a fossil stem-tip with leaves. If the identification of this plant as a palm is confirmed, the palms are indeed very old—perhaps 40 million years—and are the oldest angiosperms of which we have certain evidence from leaf fossils. So great an age does not seem so remarkable now as it did fifty or even twenty or ten years ago, for students of phylo-

geny and morphology are beginning to recognize that the angiosperms must have already been very old by Lower Cretaceous times. The palms, it seems, probably represent one of the oldest major groups of angiosperms living today. The palm tree may perhaps mean

more to us than a plant of magnificent form and stately beauty but an example of a tree that has lived very long and is reminiscent of long ages past when flowering plants were "growing-up" to be a dominant element in the plant world.

Chamaedorea Radicalis

An unidentified palm, seed of which had been inadvertently introduced with that of *Collinia elegans* from Mexico, was flowering and fruiting at the Fairchild Tropical Garden and at Vero Beach, Florida, when I visited there this spring. The species had a familiar look and was tentatively identified as *Chamaedorea radicalis*. Thanks to the kindness of Edwin Johnston, Stanley Kiem, and Nat De Leon, who provided study material of mature fruit and of both sexes in flower, this determination is confirmed.

Chamaedorea radicalis occurs in eastern Mexico from the mountains of Tamaulipas south into Hidalgo so far as is known. It was described in 1849 by Martius who had received specimens collected by Karwinski, perhaps from the same place on the road from Victoria to Jamaube in Tamaulipas where it may be found today. I have seen it growing there together with *Brahea Berlandieri* and *Brahea Moorei* in the shade of oak forest and again, with the same two species, in oak-cedar woods on the trail from Jacala to Barranca de Tepetates in the state of Hidalgo not far from the Pan-American Highway. Specimens collected at Tamosopo Canyon in the state of San Luis Potosí were given the name *Chamaedorea Pringlei* by Sereno Watson in 1891 but prove to be the same as the earlier *C. radicalis*.

Stems of this species are ordinarily very short and for the most part underground or lying on the ground though plants are said to reach a height of six feet on occasion. In nature the species did not appear to sucker freely but plants in cultivation are starting to produce additional crowns. Several leaves to three feet long with 10-18 pairs of slender dark green pinnae to 14 inches long, 3/4 inch wide are rather stiffly erect, arching toward the tip. The inflorescences rise from outside the outer leaves. Their long peduncles nearly equal the leaves and are sheathed with papery brown tubular bracts. Rachillae may be only one (frequently so in female plants) to as many as nine but are most often two or three. The deep green flowers of male plants are borne in lines of 2-3 in close proximity spiralled about the rachilla while flowers of the female plants are always solitary and spiraled. Fruit is about 3/8 inch in diameter, at first green but eventually becoming bright orange-red.

Although *Chamaedorea radicalis* is a coarser species than *Collinia elegans* it may prove more adaptable to Florida conditions due to its preference for limestone areas and its presumed ability to withstand drier conditions than species from the moister forests.

H.E.M.