

ART. XXXIII.—*Fruits of a Date Palm in the Tertiary Deposits of Eastern Texas*; by EDWARD W. BERRY.

So much study and experiment have been devoted to making practical the cultivation of the date palm in the hot arid southwest* that the recent discovery of the fossil fruits of a species of date palm in the Tertiary of eastern Texas is of exceptional interest.

The considerable range of species of Phoenix-like palms in the south European Tertiary has led to the expectation of their discovery in our more tropical southern Tertiaries when these should have been thoroughly explored, just as the Bread-fruit, Cinnanon tree and Nipa palm have been found; nevertheless, the actual finding of proof of the former existence of a date palm in the Western Hemisphere is one of the more spectacular incidents of the paleobotanists' work, since it is likely to attract more attention from botanists and geologists engrossed in their own special lines of study than a tome of admirable descriptive paleobotanical work. In order that the presence of the date palm in the American Tertiary may not remain unknown until my monographic studies of our southern Tertiary floras are published, which will be a number of years hence, I am prompted to publish the present brief note.

In the course of my studies for the U. S. Geological Survey and under the supervision of Dr. T. Wayland Vaughan, I have had the good fortune to receive collections of fossil plants from eastern Texas made under the direction of the veteran geologist, E. T. Dumble, now associated with the Southern Pacific Company. The material on which the following note is based was collected by Chas. Laurence Baker in Trinity county, Texas, and while not abundant contains both large and small seeds and a cast of the entire fruit of a new species of Phoenix-like palm which may with propriety be referred to Brongniart's genus *Phoenicites*. I propose to call this species *Phoenicites occidentalis*. It may be described as follows: Fruit, as preserved in a coarse gray sandstone, an oblate spheroid about 4^{cm} in length by 1.5^{cm} in breadth. The surface is longitudinally wrinkled, due possibly to desiccation before preservation, which may also make the dimensions as given probably under what they were in life. The flesh was relatively thin compared with that of the cultivated date and must have been of considerable consistency and fibrous rather than of the soft and almost fluid character of some of the modern varieties of the latter. The seed was relatively large—in the above mentioned specimen it is rounded at both ends, about 3^{cm} in length,

* Swingle, Bull. 53, Bureau of Plant Industry, Washington, 1904.

nearly circular in transverse section and about 1^{cm} in diameter. A smaller specimen shows a length of about 2.5^{cm} and a diameter of 8^{mm}. The larger of these seeds shows the central hilum, the deep longitudinal sinus on the opposite side, the transverse lamellated structure exactly comparable to that of a modern date seed and the finely corrugated surface coat identical with that of a dried seed of a modern date. The smaller specimen, while not so perfect, shows the general form and sinus and the lamellated structure. There can be no doubt

FIG. 1.

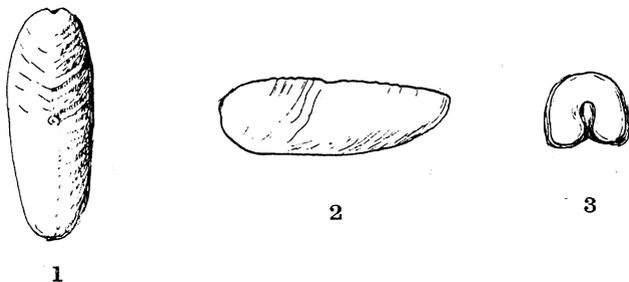


FIG. 1. Top side and end view of type of *Phoenicites occidentalis* (nat. size).

that these remains are those of a Phoenix-like fruit and it is confidently expected that the foliage will eventually be discovered, in fact some of the fragments of palm-rays found at this and other horizons in our southern Tertiary may represent this foliage. Petrified wood of several species of palms is exceedingly abundant in these beds, and while the study of palm woods has not progressed to a point where one can speak with certainty of the generic relations of the petrified woods, it is significant that wood of several different species occurs at this horizon.

While the geologic record is confessedly incomplete, a number of fossil species of Phoenix-like forms have been described, in fact there are more fossil than recent species. These are usually referred to the genus *Phoenicites* of Brongniart as in the present case, although some students refer them directly to the genus *Phoenix* of Linné. The previous fossil occurrences are all European and are based on leaves and inflorescence. In 1886 Conwentz* described a flower preserved in perfection in the Baltic amber and the staminate inflorescence of another species is associated with splendid leaves in the Eocene of the Paris basin.† The oldest known form comes from the middle or upper Eocene of the Paris basin, while in

* Conwentz, *Fl. Bernsteins*, vol. ii, p. 8, pl. 1, figs. 6-9, 1886.

† Saporta, *Essai pl. foss. arkoses de Brives*, p. 25, pl. 1, 1878.

the succeeding Oligocene period the remains of date palms are abundant in Germany, Bohemia, and especially in northern Italy. They are present in the early Miocene of France, Switzerland, and Croatia. A species is recorded from the west coast of the Adriatic in Pliocene times and the presence of a well marked form which Drude calls *Phoenix dactylifera fossilis*, since it is so much like the existing date, is found in the Pleistocene deposits of the volcanic island of Santorin in the Aegean Sea. The latter occurrence indicates that the date

FIG. 2.

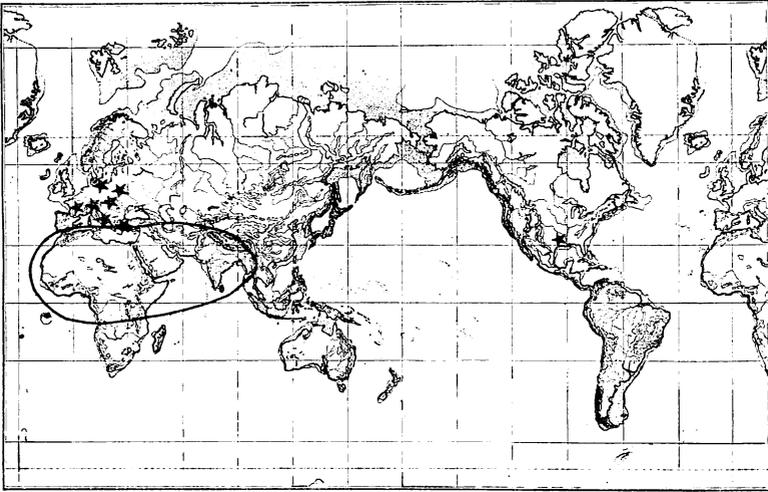


FIG. 2. Sketch map showing the area within which species of *Phoenix* occur and the fossil occurrences of *Phoenicites* (stars).

palm was endemic in at least a part of southern Europe until comparatively recent geologic times.

The cultivated date belongs to a group of about a dozen existing species referred to the genus *Phoenix*, all of which are confined to northern Africa and southern Asia, the bulk of the species being indigenous in the Indian region. Two of the African species, *spinosa* and *reclinata*, are small shrubby forms with small fruits, found along the coasts of Senegambia, Sierra Leone and Natal. The true date in countless varieties has existed since prehistoric times in the hot dry zone extending from Senegal eastward to the basin of the Indus. Dates are so readily transported by primitive races and germinate so readily from the seed that it is difficult to establish the original distribution of the species. Egyptian monuments contain

fruits and drawings of the date and Assyrian inscriptions show that it grew in abundance in the region lying between the Euphrates and the Nile. Herodotus mentions the uses of the wood in Babylon and somewhat later Strabo indicates its abundance in Arabia. There is no historic evidence of the existence of the date palm west of Egypt in the oases of the Sahara, but Pliny mentions its occurrence in the Canaries. If these facts were wanting, a philological study of the names applied to the date would indicate that the most ancient peoples of these regions with a written language, as for example the Egyptians, found the date indigenous in their country. The Greek name *Phoenix* refers simply to the fact that the Phœnicians were possessors of the tree and traded in its fruits, while the specific name of the species *dactylifera* and the vernacular name *date* are both, according to Ritter, derivations of the Hebrew *dachel*.

The commercial date does not perfect its fruit except in incredibly hot climates where clouds are not common and where all forms of atmospheric humidity are very low, in fact no amount of heat or degree of dryness of the air is injurious provided the roots have access to a sufficient supply of moisture. There is an old Arab proverb which says of the date, "its feet shall be in a stream of water and its head in the furnace of heaven." While the great caravan routes that traverse the deserts of northern Africa and southwestern Asia are intimately associated with date culture and while the finest varieties grow in the oases and sunken gardens of the Sahara, a consideration of the ecology of the date and of the other existing species of Phoenix, at least two of which are coastal types, indicates that the geologic ancestors were not necessarily desert types but inhabitants of coasts and stream banks where the water-table approached near enough to the surface to become available for their root system. When corroborated by the associated forms of vegetation they may indicate hot climates with a scanty rainfall as they probably do in east Texas, and it seems certain that temperatures could not have gone below 18° C. without being fatal.

Phoenicites occidentalis comes from a cut on the International and Great Northern Railroad in southern Trinity county, where a spur to the Government Lock leaves the main line. The outcrop is referred to the Catahoula formation, which in this region is of late Eocene or early Oligocene age. The type is shown in the accompanying text figures (fig. 1), while the sketch map (fig. 2) shows in a generalized way the area of distribution of the existing species of Phoenix and the fossil occurrences of Phoenicites.