

NOTES ON NORTH AMERICAN TREES AND SHRUBS

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With two text figures

Carya texana (Le Conte) C. DC. (*C. aquatica* \times *C. Pecan*). In a collection of plants received at the Arboretum several months ago from Mr. B. F. Bush was a fruiting specimen of a hickory, collected near Campbell, Dunklin County, Missouri, by Mr. John H. Kellogg, and distributed as *Carya aquatica*. The mature fruit was quite different from that of the water hickory, and it at once suggested a hybrid between that species and the pecan. No specimens recognized as such a hybrid were found in the herbarium, but upon comparing Mr. Kellogg's specimen with *Carya texana* it was found to agree very closely with certain specimens in the characters of both leaves and fruit. A further examination of all the material of *Carya texana* in the Arboretum herbarium suggests very strongly the probability that this widely distributed but rather rare hickory is in reality a hybrid between the two species referred to above.

Carya texana is found occasionally, though nowhere in abundance, throughout the common range of the water hickory and the pecan, and so far as I am aware nowhere beyond this general range. It is generally known as bitter pecan by the country people, but it is also sometimes called pignut, both of which common names are also applied to other species in the same region, the former to *Carya aquatica* and the latter to *Carya cordiformis*.

The original description of *Hickoria texana* was published by Major John Le Conte in the Proceedings of the Academy of Natural Sciences of Philadelphia, 1853, p. 402, under the title "Description of a new species of Pecane Nut." The author states that he found the plant cultivated in Georgia, but that it is a native of Texas. Amongst the characters pointed out as distinguishing the new species from "the common pecane nut" are the small size of the trees, which it is stated seldom exceeds 10 or 12 feet in height, the smaller size of the leaves and the later date at which they unfold, and particularly the shape of the nut, which is described as ovate and flattened, although protuberant on the sides, and with a rough surface as contrasted with the smooth, cylindrical nuts of the pecan. The description did not say whether the nuts of the trees cultivated in Georgia were bitter or edible, but the fact that they

were in cultivation might indicate the latter. However, in other sections where the tree has been found the fruit is bitter, as the common names indicate.

Both the pecan and the water hickory are amongst the last of the broad-leaved trees to put out their foliage in spring, and from several specimens that I have seen in young leaf, it seems doubtful whether *Carya texana* is more tardy in this respect. The smaller fruit mentioned as characterizing the type plants probably has little diagnostic value, since the nuts of the native pecan vary greatly in size on different trees, and nuts of some of the specimens of *Carya texana* in the Arboretum herbarium are as large as those of almost any native pecan. The small size of the fruiting trees mentioned by the author is not readily accounted for, but this also seems to be quite variable. Sargent in the second edition of the *Manual of the Trees of North America* says that *Carya texana* is sometimes a tree 100 feet high. There are no notes as to size on most of the herbarium specimens, but on the label of one specimen collected by Bush at Columbia, Texas, it is stated that it is from a large tree; while a fruiting specimen collected by Geo. L. Fisher in Chambers County, Texas, is said to be from a shrub only two or three feet high.

The leaves of the water hickory and those of the pecan are quite similar, although there is a tendency for the leaflets to be slightly smaller, narrower, and more numerous in the pecan. The leaves of *Carya texana* are usually indistinguishable in form from those of the water hickory, but in some specimens they more closely resemble those of the pecan. In all three species the leaflets, though variable, are typically lanceolate or ovate-lanceolate, somewhat falcate, long acuminate at the apex, and unsymmetrical at the base in the lateral pairs. The number of leaflets ranges from seven to seventeen in the pecan, eleven to thirteen being most frequent; seven to eleven is the prevailing number in the water hickory, although rarely reduced to five; while in *Carya texana* the number is even more variable, generally being between five and fifteen. The staminate aments in *Carya pecan* are short stalked or nearly sessile, while those of *Carya aquatica* are usually distinctly peduncled. In one specimen of *Carya texana* from Texas the flowering aments are sessile and spring from growth of the season, while in another specimen from Natchez, Mississippi, they are distinctly peduncled and are born on both the new growth and on wood of the previous season. The fruit of *Carya texana* is quite variable in shape and size, as has been stated. In some specimens it is distinctly compressed and with keel-like edges, as in nuts of *Carya aquatica*, while in others it is quadrate or quadrate-cylindric to short elliptic in cross section, and is only slightly

compressed. The nuts in *Carya aquatica* are roughened or irregularly corrugated on the surface, and are of a uniform dark brown color, while those of the pecan are smooth, and red-brown with darker irregular lines. Examination of the fruit from a large series of specimens of *Carya texana* shows a range of variability in these characters between the pecan and the water hickory. In the majority of specimens the fruit approaches more nearly that of the pecan in shape and in the smooth or nearly smooth surface, but in some cases the surface shows distinct signs of wrinkling or roughening, although not so pronounced as in *Carya aquatica*.

The idea that *Carya texana* may be a hybrid does not seem to be an entirely new one, although it has generally been accepted as a distinct species in manuals. Dr. William Trelease in a paper on the Hickories in the 7th Annual Report of the Missouri Botanical Garden (1896), p. 34, suggested that it is probably a hybrid of the pecan, although he did not express an opinion as to the other parent species. But in a later paragraph he referred to a paper by Dr. Charles Mohr in Garden and Forest, 1889, p. 570, in which it is said that crosses between *Carya pecan* and *C. aquatica* are often met with where the two species grow together.

The water hickory is abundant about Campbell, Missouri, where Mr. Kellogg's specimen was found. The pecan also grows in southeastern Missouri, although I have seen no specimens from the immediate vicinity of Campbell. After a full examination of the material available for study, I think that the evidence is abundantly convincing that the bitter pecan, *Carya texana* (Le Conte) C. DC., is a hybrid between *Carya aquatica* and *C. pecan*, and the specimen collected by Mr. Kellogg, no. 27036, near Campbell, Dunklin County, Missouri, Sept. 4, 1935 is referred to this hybrid.

Mr. Kellogg's discovery of *Carya texana* in Missouri extends its range greatly, and also adds another interesting tree to the flora of the state. Besides this new record, *Carya texana* is represented in the herbarium of the Arnold Arboretum by specimens from Arkansas, Mississippi, Louisiana, and Texas, and the nearest station to the Missouri locality is Van Buren, Arkansas, more than three hundred miles distant.

× ***Carya Demareei***, *hyb. nov.* (*C. cordiformis* × *C. ovalis*). *Hybrida intermedia inter parentes*; folia 5-9, plerumque 7, lanceolata vel ovato-lanceolata, falcata; fructus obovatus vel oblongo-ovatus, exocarpio tenui 1.5-2.5 mm. crasso.

ARKANSAS: flat woods near Piggott, Clay Co., *Delzie Demaree*, Aug. 11, 1927 (type); low woods, foot of Crowleys Ridge, near Jonesboro, Craighead Co., *E. J. Palmer*, no. 26689, Oct. 21, 1924. Specimens in the herbarium of the Arnold Arboretum.

The intermediate character of the foliage, fruit, and winter buds of this tree, which is described from specimens collected by Dr. Delzie Demaree in Clay County, Arkansas, clearly indicates that it is a hybrid between the bitternut and the small-fruited hickory. The number of leaflets ranges from five to nine, but is usually seven as in *Carya ovalis*; while the small, tightly compressed winter-buds resemble more closely those of *Carya cordiformis*. The fruit on the type specimen is quite similar to that of *C. cordiformis* in the very thin, smooth involucre, although in the shape of the nut and in the less prominently winged sutures of the involucre there is an approach to the other parent species. In a specimen collected by the writer in Craighead County, Arkansas, which is apparently the same hybrid, the involucre and shell are slightly thicker and the sutural ridges are more prominent.

Carya Demareei has so far been recognized only in northeastern Arkansas, where it grows in low or flat woods in close proximity to the supposed parent species, but it may be expected to occur in other sections where these species are found.

Quercus Nuttallii E. J. Palmer.¹ (Text figure 1.) Since the publication of the description of this species many inquiries about it have been received and a number of specimens have been sent in to the herbarium by collectors and foresters. From these reports it appears that the tree is much more abundant in some sections than I was aware of at the time it was described. One correspondent states that it is one of the important timber trees in the lowlands of the Yazoo delta and the lower Mississippi valley, and that it is so different from any of the other oaks that the loggers and lumbermen readily distinguish it. Frequent requests have been received for the published description, but as no reprints of it were made at the time and as the number of the Journal in which it appeared has long been exhausted, it is now impossible to supply it. Recently what appears to be a small-fruited form or variety of *Quercus Nuttallii* has been discovered, and as no illustration of the typical form has been published previously, a sketch of the leaves and fruit of both this and the new variety described below are now published, which it is hoped will facilitate their identification.

Quercus Nuttallii var. *cachensis*, var. nov. A typo differt fructu minore 16–18 mm. longo 12–16 mm. lato, cupula brevior glandem circiter 1/3 includente. (Text figure 2.)

ARKANSAS: bottoms of Cache River in overflow (large trees, bark like *Q. Phellos*), Cotton Plant, Woodruff Co., *D. Demaree*, no. 10865 (type), Aug. 29, 1934; low wet woods about 2 mi. west of Wheatley,

¹Jour. Arnold Arb. 8: 52 (1927).

Moore Co. (2 ft. D. B. H., just cut for logs — from top of tree), *D. Demaree*, no. 10910, Sept. 1, 1934; very low ground, Clarendon, Monroe Co. (3 ft. D. B. H.), Clarendon, Monroe Co., *D. Demaree*, no. 10917, Sept. 2, 1934; Fulton (Hempstead Co.), *John H. Kellogg*, Aug. 31, 1910.



FIGURE 1. *QUERCUS NUTTALLII* E. J. Palmer. $\times 3/5$

In the specimen that is taken as the type of this variety and in others collected in the same vicinity, the fruit which is short-oblong or depressed-conic, with the nut about one-third enclosed in the shallow cup, has considerable resemblance to that of *Quercus palustris*, and suggests the possibility of a hybrid between *Quercus Nuttallii* and that species. But since the acorns in all respects except their shape and size indicate a close relationship to the latter species, and since the leaves and winter-buds are quite like those of the type, it seems best to treat it as a variety of *Quercus Nuttallii*.

Typical specimens of *Quercus Nuttallii* are growing in the immediate vicinity of the new variety and the species is not uncommon in the region. *Quercus palustris* is rather rare in Arkansas, and I have not seen specimens from Woodruff, Moore, or Monroe counties, although it is occasionally found in northeastern Arkansas.



FIGURE 2. *QUERCUS NUTTALLII* var. *CACHENSIS* E. J. Palmer. $\times 3/5$

Quercus breviloba (Torr.) Sarg. (*Q. annulata* Buckley, 1861, not J. E. Smith, 1819). In an interesting collection of plants made by Mr. George M. Merrill in the Platt National Park, near Sulphur, Oklahoma, were several specimens of *Quercus breviloba*, a species characteristic of the limestone regions of central Texas, and not previously known north of that state. The discovery of this shrubby oak in Oklahoma not only extends its known range northward, but it also adds a very interesting species to the flora of the state and furnishes another example of the incursion of species characteristic of the Edwards Plateau of Texas into the Arbuckle Mountain region, most of which is underlain by a lime-

stone formation somewhat similar in character to that found south of Red River, although it is much older geologically.¹

Another specimen in the same collection is an evident hybrid between *Quercus breviloba* and the post oak (*Quercus stellata*). According to notes furnished by Mr. Merrill, several small trees were found growing in a dry, exposed situation, where *Quercus breviloba* is predominant, and with *Q. stellata* in the immediate vicinity. The trees are 10 to 15 feet in height and have rough bark, similar to that of the post oak. A specimen with immature fruit was collected by the writer near Strawn, Texas, and one with leaves only, near Brownwood, Texas, several years ago, both of which appear from their characters and association to belong to this hybrid. As Mr. Merrill's specimen has mature fruit, it may be taken as the type.

× **Quercus Mahoni**, *hyb. nov.* (*Q. breviloba* × *Q. stellata*). *Hybrida intermedia inter parentes; frutex robustus vel arbor minor ad 2–3 m. alta, foliis obovatis vel oblongo-obovatis lobatis rotundis inaequalibus 4–9 cm. longis 3–5 cm. latis.*

OKLAHOMA: Platt National Park, Sulphur, *G. M. Merrill*, no. 1634 (type), Oct. 28, 1935. TEXAS: Strawn, Palopinto Co., *E. J. Palmer*, no. 14267, June 27, 1918; Brownwood, Brown Co., *E. J. Palmer*, no. 29501, Nov. 1, 1925. All specimens in the herbarium of Arnold Arboretum, and isotype in the herbarium of the Platt National Park, Sulphur, Okla. The name proposed for this hybrid is for Mr. George Mahon Merrill, collector of the type, in recognition of his valuable work in collecting and making known the plants of southern Oklahoma and of other sections.

× **Quercus stelloides**, *hyb. nov.* (*Q. prinoides* × *Q. stellata*). *Frutex plerumque 1–2 m. altus: folia obovata, inciso-lobata, lobis ovatis utrinque 4–6 vel lobis medii paris oblongis subtruncatis, supra viridia, leviter pubescentia vel matura glabra, infra pallida, subtiliter denseque stellato-pubescentia.*

MISSOURI: Greenwood, Jackson Co., *B. F. Bush*, nos. 10227 and 10227A, Oct. 3, 1923, no. 10330, Sept. 5, 1924; same locality, *E. J. Palmer*, no. 26032, Sept. 5, 1924. KANSAS: Neodesha, Wilson Co., *E. J. Palmer*, 21398, May 23, 1922, 22007 (type), Sept. 18, 1922, 24372, Oct. 31, 1923. OKLAHOMA: Muskogee, *E. J. Palmer*, no. 14285, June 30, 1918. All specimens in the herbarium of the Arnold Arboretum.

The post oak (*Quercus stellata*) is widely distributed in the southern

¹See Palmer, E. J., Notes on some plants of Oklahoma (*Jour. Arnold Arb.* **15**: 127-134. 1934).

United States south of a line from Cape Cod to southern Iowa, Kansas, and central Texas. The shrubby chestnut oak (*Quercus prinoides*), sometimes called chinquapin oak in the eastern states and shin oak throughout most of its range, occupies a belt mainly north of the range of the post oak. However, the ranges of the two species overlap widely, and in the region where they are found growing together hybrids have been observed and collected in several places. The hybrid can usually be recognized readily by the intermediate character of the leaves, which differ widely in the two parent species, both in shape and in the character of pubescence.

× ***Quercus humidicola***, hyb. nov. (*Q. bicolor* × *Q. lyrata*). *Hybrida intermedia inter parentes; arbor ad 15–20 m. alta; folia eis parentum similia et intermedia, subtus pallida, pubescentia.*

MISSOURI: low woods, Campbell, *B. F. Bush*, no. 6365 (type), Oct. 6, 1910. ILLINOIS: low woods near Mounds, Pulaski Co., *E. J. Palmer*, nos. 16634 and 16642, Oct. 1, 1919; same locality and collector, nos. 19546, 19549, and 19550, Oct. 16, 1920.

The swamp white oak and the overcup oak grow in quite similar situations and are often found together throughout much of their range, and it is, therefore, not surprising that the two species should hybridize.

A specimen collected by Mr. B. F. Bush, near Campbell, Dunklin County, Missouri, is the best example that I have seen of this hybrid, and it may be taken as the type. Collections made by the writer near Mounds, Pulaski County, Illinois, where several specimens were found growing with the supposed parents, appear also to represent this hybrid. The leaves of the type specimen closely resemble in outline those of *Quercus lyrata*, but they are covered on the pale under surface with a close downy pubescence, as in *Q. bicolor*. The acorns of the type are 2.5–2.8 cm. long, 2–2.2 cm. thick, and are borne on peduncles about 3 cm. long. The oblong-ovoid nuts, resembling those of *Q. bicolor* in shape, though somewhat larger than is usual in that species, are one half or less enclosed in the comparatively shallow cups, the lower scales of which are thickened and corky, as in *Quercus lyrata*. The leaves and fruit on some of the other specimens vary in different degrees between those of the two parent species. In the absence of fruit the hybrid may usually be identified by the close velvety pubescence on the under surface of the leaves, which may otherwise resemble those of the overcup oak.

HERBARIUM, ARNOLD ARBORETUM,
HARVARD UNIVERSITY.



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