

HYBRIDS OF THE LIVE OAK AND OVERCUP OAK

Even the Forest Trees Hybridize and the Forestry of the Future May Have to
Take This Fact into Consideration

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IT IS a fact, long known to botanists, that the systematic assignment of several species of our American oaks presents difficulties and doubts, because of variations that seem to confuse the characters of some of the neighboring species. It is also well known that several natural hybrids occur among the oaks—the number of which would certainly be greatly increased, if their characters merged less with those of one or the other of the parent species.

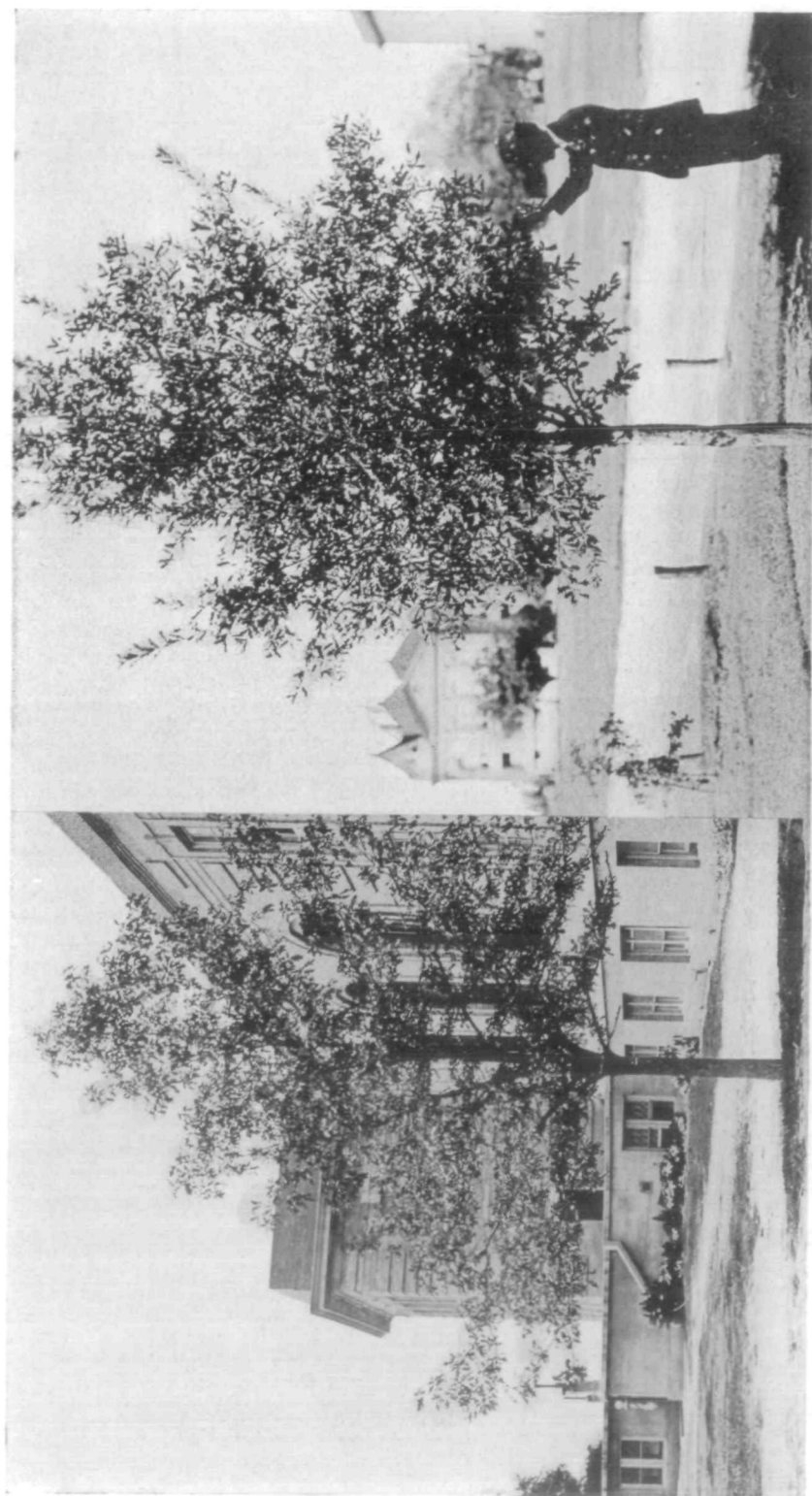
In a little hybridizing work, which I carried on with the Overcup Oak (*Q. lyrata*) as father and the Live Oak (*Q. Virginiana*) as mother, I have become impressed with the ease with which fertile hybrids may arise between species of oaks, even though the relationship be apparently quite distant. These two species agree in ripening their acorns in one season, hence belong to the same subdivision of the genus, which is called *Lepidobalanus*. But there is still a strong systematic difference, since they belong to the opposite extremes of that group of species.

They differ widely in habit of growth, in which Live Oak is characterized by its low trunk and a broad, diffuse head of rather crooked limbs and shoots; while the Overcup Oak is of a tall, pyramidal form with straight branches and shoots. Its bark becomes strictly flaky, characteristic of the true white oak group, while in the Live Oak it becomes rough and divided by fissures into numerous narrow and irregular ridges. The foliage of the Live Oak persists throughout the winter until the succeeding spring, while the Overcup Oak is one of the first to shed its leaves

in the fall. The texture of the foliage in the Live Oak is strictly coriaceous; the form of the leaves vary from oblong to elliptical with entire or very remotely repand margins. In the Overcup Oak the leaves are four to five times larger than in the Live Oak and more papery texture, with deeply lyrate lobed in margins. But the greatest differences lie in the acorns and the cupules. In the Overcup Oak, the acorn is oblate and nearly covered by the cup, the scales of which are much thickened on the back. In the Live Oak the acorn is ovate, projecting about two-thirds of its length beyond that of the cupule, and the scales are thin, with membranaceous tips and margins.

Cross pollination for my first hybrids took place April 6, 1909, after all male flowers on the mother trees and other oak in their vicinity had withered—hence no danger of interference with the cross-pollination. From this cross-pollination nine acorns, of which three were less than normal size, were obtained. The seeds were planted in pots November 9 and gave rise to three young hybrid oaks which were reared in the nursery until March, 1912, when they were planted where they could receive the best care and observation. These trees are, at the present writing, August 28, 1917, about 16 feet tall and with a trunk diameter of about 5 inches, 1 foot from the ground.

On April 14, 1910, a new set of cross-pollinations were made, trees of the same species being again mated in the same order. The result of this is three very vigorous specimens, planted on the laws of the Experiment Station building



ARTIFICIALLY PRODUCED HYBRID OAK AND ITS FATHER

Professor Sargent of the Arnold Arboretum described and named after Miss C. C. Compton of Natchez, Miss., a hybrid oak which she has found in the forest. Mr. H. Ness of College Station, Texas, has by artificial pollination produced the above hybrid tree which is strikingly similar to the natural hybrid. The tree shown on the left is the male parent (*Quercus lyrata*). As an ornamental this hybrid (shown on right) is much superior to either parent because of the density and luster of its foliage. Its wood is hard, close grained and tough. (Fig. 6.)

THE LIVE OAK MOTHER OF THE HYBRID

The speed of growth of the Live oak (*Quercus virginiana*) is such that before the hybridizer who successfully crosses it with some other species can really judge of the success of his work his life is gone. He has the pleasure of seeing the young tree grow, and even of sitting in its shade but of its longevity, its ultimate size and its usefulness, others will probably be the judge. He is working for another generation. (Fig. 7.)



in March, 1913. These have during the present unfavorable season added an average of 3 or more feet to the length of every main limb. Of this second lot of hybrids there were originally planted four on the lawn of the Experiment Station building, the most vigorous and beautiful of which succumbed a year ago to the cottonroot rot, and a fifth was planted on the same ground as the first lot. Hence seven young hybrid oaks are growing on the campus, three planted in 1912 and four in 1913.

All these hybrid trees are so uniform in character that seedlings of pure parentage could not be more so. In all of them the father, or *Q. lyrata*, is easily dominant; especially is this true for the second lot, or those from the cross-pollination of 1910. Their pyramidal form and straight shoots are strictly characters of the father. The three of the first lot are less inclined to the pyramidal form of head, and show considerable proclivity to set short-jointed, more or less crooked, lateral branches, after the manner of the Live Oak. The leaves are very uniform in all of them, being intermediate in size of that of the parents. The general outline is oblanceolate with the margins dentately lobed. The texture is strictly cariceous and of a color of a much deeper green on the upper surface than that of the father species. The leaves commence falling in the winter, but many of them remain green until spring. In the fruit, the Live Oak is strictly dominant except in the size, which is larger and may be considered intermediate. The bark, as it now appears on the lower part of the trunks of the older trees, will be flaky as in the Overcup Oak.

The wood, so far as I have cut into it in pruning, seems to be extremely hard, close-grained, and tough.

As ornamental trees, these hybrids are much superior to the mother, the Live Oak, in form, and to the father, the Overcup Oak, because of the density and luster of their foliage.

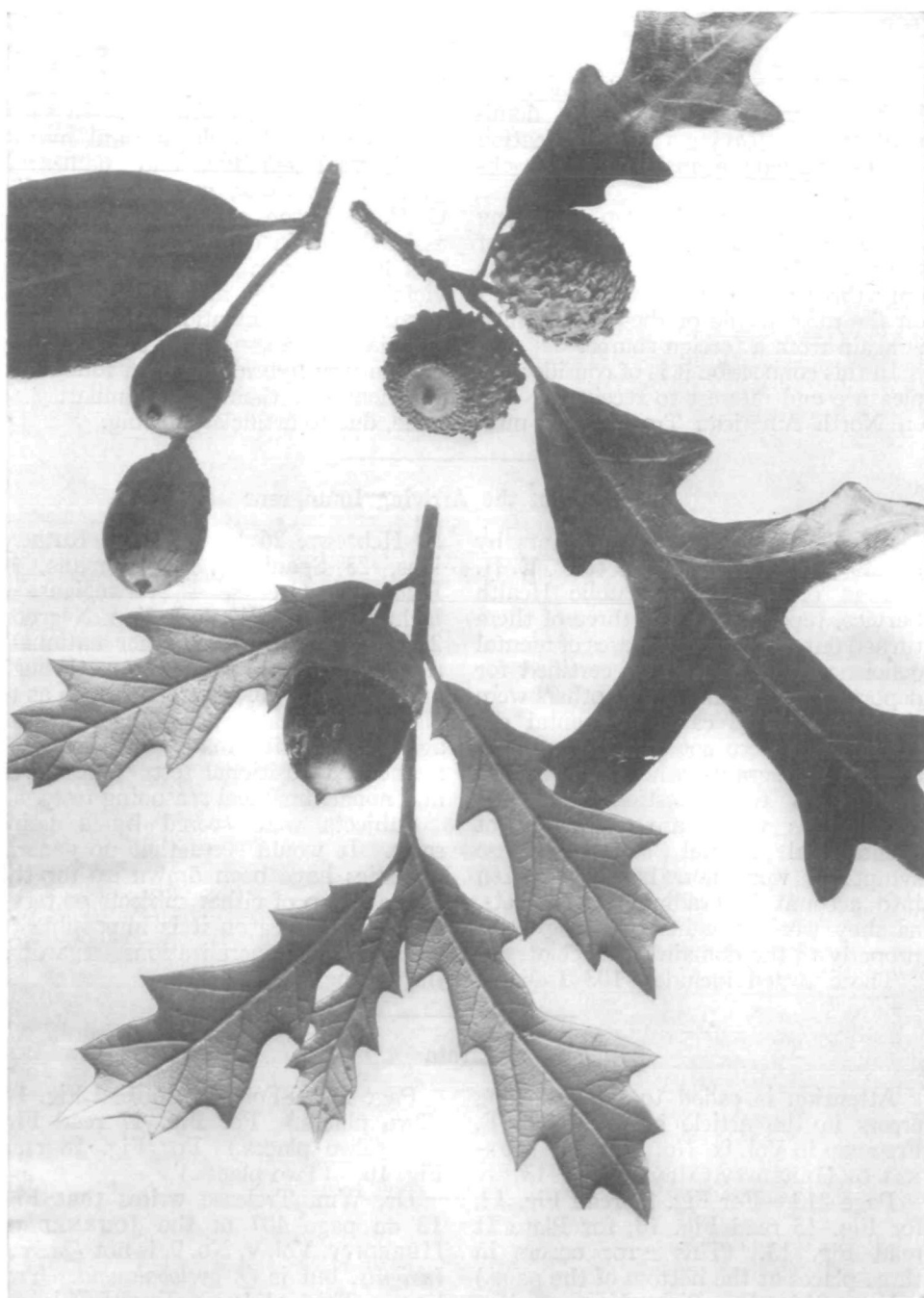
One of the three, planted in 1913 by the Experiment Station building, produced several female flowers in 1917, only four years after planting. One

of these developed a normal acorn, although no male catkins were produced. The pollen that fertilized this female could possibly come from only two sources, namely, from a Post Oak (*Q. minor*) standing less than 100 feet to the south; or from a Water Oak (*Q. nigra*) standing about twice that distance to the southwest from the hybrid tree producing this acorn. Both of those oaks produced abundance of pollen during the time proper for fertilization of my hybrid oak.

The acorn was planted as soon as ripe, and has at the time of this writing developed into a little tree about 12 inches tall with twelve full grown leaves. The stem is more short-jointed than in any of the individuals of the immediate mother form. The leaves are of the same texture, have similar lobations, but are longer in proportion to the width than in those of the mother type. One or two of the larger of these leaves are strangely similar to the form of leaves frequently borne by strong water shoots upon *Q. nigra*. (I am bearing in mind that *Q. nigra* belongs to that group of oaks, which ripens its fruit in the second season after flowering, namely, the black oaks, or the red oak division of the genus.) My attempts to cross *Q. nigra* with *Q. Virginiana* have up to the present time been fruitless.

Since the above notes, made on August 24, 1917, a crop of twelve acorns from four mother plants have ripened, been planted, and at this time (June 14, 1918) made a growth varying from 6 to 14 inches in height. As to the immediate male parent of these, there is the same doubt as in the case of the first seedling of the second generation, referred to above. All of them are glabrous with the exceptions of one, which has pubescent stem and under surface of the leaves, strongly similar to a young seedling of a Post Oak. One has the *lyrata*-form of leaves to a very marked degree.

At the present writing, the form of the leaves seems to be in a state of transition, the later ones being somewhat different in form from the earlier. How-



ACORNS AND LEAVES OF THE HYBRID OAK AND ITS PARENTS

The small characteristic acorns and the entire unlobed leaf of the live oak is shown at the upper left. The Overcup Oak acorns with their nearly enclosing cups and much thickened scales, and the deeply lobed leaves, on the upper right. Below are the acorns and leaves of the hybrid which appear intermediate between those of its parents. They are dentately lobed, their texture is coriaceous and they are of a much deeper green than the father species. These leaves commence falling in the winter but many remain green until spring. (Fig. 8.)

ever, similarity to the first generation both in form and texture is a dominant feature, leaving the identification of the immediate male parent in obscurity.

At present a small crop of young acorns are in formation on some of the trees of the first generation; but as only three male catkins were observed on the most fertile of them, the pollen is again from a foreign source.

In this connection it is of considerable pleasure and interest to receive "Notes on North American Trees," just pub-

lished in the *Botanical Gazette*, vol. lxxv, No. 5, by Professor Sargent. In these notes he describes the natural hybrid *Q. lyrata Virginiana*, and names it *Quercus comptonae*, in honor of Miss C. C. Compton, of Natchez, who has assisted him in obtaining specimens of this hybrid from trees growing in her vicinity. Besides in Mississippi, Professor Sargent mentions localities in Louisiana, Alabama and Texas, where this natural hybrid has been found and comments on their great similarity to mine, due to artificial crossing.

Mentality of the Arriving Immigrant

After examining 296 immigrants by means of a series of mental tests, E. H. Mullan of the U. S. Public Health Service, reports that but three of them turned out to be positive cases of mental deficiency and had to be certified for deportation as such. Eight others were thought possible cases of mental deficiency but were not certified as such. Twelve immigrants who gave fair responses to test questions exhibited peculiarities which are suggestive of pathological mental states. These symptoms were not, however, taken into account in grading the subjects, as they were thought to belong more properly to the domain of psychiatry.

Those tested included 103 Italians,

50 Hebrews, 26 Russians, 26 Ruthenians, 25 Spaniards, 21 Germans, 11 Poles, 11 Greeks, 4 Norwegians, 3 Lithuanians, 3 West Indian Negroes, 2 Danes and eight of other nationalities. The tests were given through an interpreter and were not such as to allow a classification according to mental age to be easily made. Arithmetical, memory, transitional tests were given and nonarithmetical reasoning tests.

Subjects were scored by a point scale. It would seem that no general statistics have been drawn up for the entire group of either subjects or tests, and for this reason it is impossible to offer many generalizations regarding the findings.

Errata

Attention is called to the following errors in the article by Dr. Geo. F. Freeman in Vol. ix, No. 5, of the JOURNAL OF HEREDITY (May-June, 1918):

Page 213.—For Fig. 14 read Fig. 12, for Fig. 15 read Fig. 13, for Plate II read Fig. 13. (This error occurs in three places at the bottom of the page.)

Page 214.—For Plate III read Fig. 14. (This error occurs in 3 places.)

Page 215.—For (b) in legend read (c).

Page 217.—For Plate III read Fig. 14. (This error occurs in three places at the bottom of the page.)

Page 218.—Column two line, 29, for "tarch" read "starch."

Page 222.—For Fig. 16 read Fig. 14. (Two places.) For Fig. 17 read Fig. 15. (Two places.) For Fig. 18 read Fig. 16. (Two places.)

Dr. Wm. Trelease writes that Fig. 12 on page 407 of the JOURNAL OF HEREDITY, Vol. v, No. 9, is not *Quercus insignis*, but is *Q. cyclobalanoides* Trelease. This oak is a native of Chiapas, Mexico, not of Huatusco, as was stated. Dr. Trelease has illustrated these two species in his article on The Large Fruited American Oaks in The Proceedings of the American Philosophical Society, Vol. liv, No. 216, plate III, 1915.