

THE NUT TREES of LAND BETWEEN THE LAKES®



A Curriculum Guide for
Science Teachers and Students



THE NUT TREES OF LAND BETWEEN THE LAKES®

Edward W. Chester

Richard J. Jensen

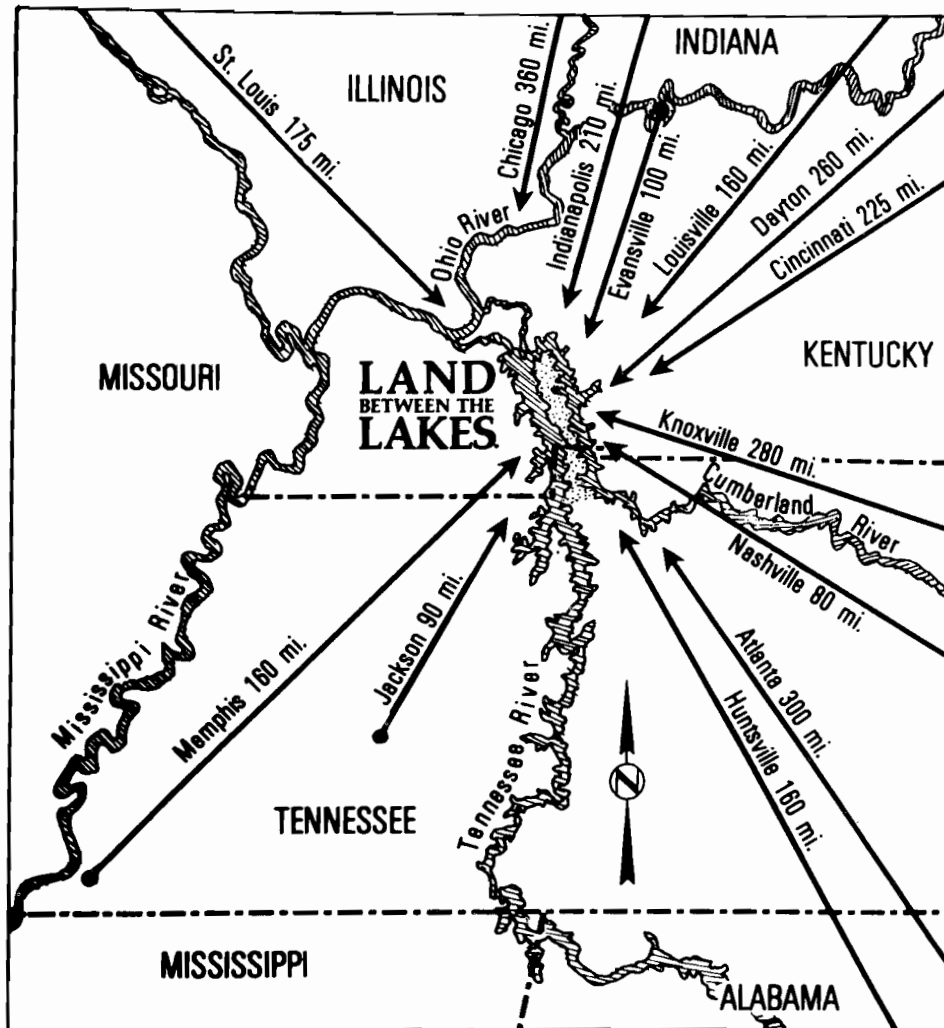
Louis J. Schibig

Suzanne Simoni



An Educational Service of
The Center of Excellence
for Field Biology

Austin Peay State University
Clarksville, TN 37044
1987



USED WITH PERMISSION FROM TVA-LBL

® This is a service mark registered in the United States Patent and Trademark Office for the exclusive use and benefit of the Tennessee Valley Authority.

Austin Peay State University is an equal opportunity employer committed to the education of a non-racially identifiable student body.
 AP-567/1-87

PREFACE

This publication is an educational service of the Austin Peay State University Center for Field Biology of Land Between the Lakes (LBL). It is essentially a curriculum guide for identifying and learning about the nut trees (American beech, American chestnut, hickories, oaks, walnuts) of LBL and the surrounding region. The included material should be readily useable by middle and high school students and will be of value to college students and others interested in the subject.

We have avoided excessive usage of scientific terminology but have provided a glossary for terms required in the keys and descriptions. Notes on habitats and community occurrences apply only to

LBL. For this reason, and since other species of nut trees occur in other areas, we urge caution when using this material outside of the LBL region. Manuals covering those areas should be consulted.

The illustrations are scientifically accurate and drawn from representative specimens. Even though most species are so variable that a single sketch cannot include all of the variants, we are confident that these illustrations and descriptions will enable you to identify the LBL nut trees.

Good luck! Write to us or contact LBL interpreters if you need assistance or if you find new or unusual specimens.

THE AUTHORS

Edward W. Chester, from Blooming Grove, Tennessee, is Professor of Biology at Austin Peay State University. He holds degrees from Austin Peay and the University of Tennessee and did additional graduate work at Peabody College. Dr. Chester taught secondary school in Tennessee and has authored numerous publications on the flora of Tennessee and Kentucky. He wrote the introductory material, family introductions, and coordinated production.

Richard J. Jensen, from Shelbyville, Tennessee, is Associate Professor of Biology at St. Mary's College, Notre Dame, Indiana. He holds degrees from Austin Peay and Miami (Ohio) University. He taught elementary and secondary school in South Carolina and Tennessee and instructed at Wright State University. Dr. Jensen has studied and published extensively on the oaks of eastern North America and was responsible for the material on oaks and other members of the Fagaceae.

Louis J. Schibig, from Clarksville, Tennessee, is Associate Professor of Biology at Volunteer State Community College, Gallatin, Tennessee. He holds degrees from Austin Peay and has done extensive graduate work at the University of Tennessee. Mr. Schibig taught secondary school in Georgia and Tennessee and has studied the woody flora of the region for more than 20 years. He authored the section on hickories and other members of the Juglandaceae.

Suzanne Simoni, from Dillsburg, Pennsylvania, attended Indiana University of Pennsylvania and is presently completing her undergraduate degree in science education at Austin Peay. Mrs. Simoni did all of the art work and contributed to the organization, design, and layout of the project.

NOTICE

Parts or all of this publication may be reproduced for free distribution in educational programs, provided that credit is given to the Austin Peay State University Center of Excellence for Field Biology of Land Between the Lakes. Parts or all of this publication may not be reproduced for sale, nor incorporated within another publication for sale, without written permission from and arrangements with Austin Peay State University.

Old Cabin on the Headwaters of Panther Creek



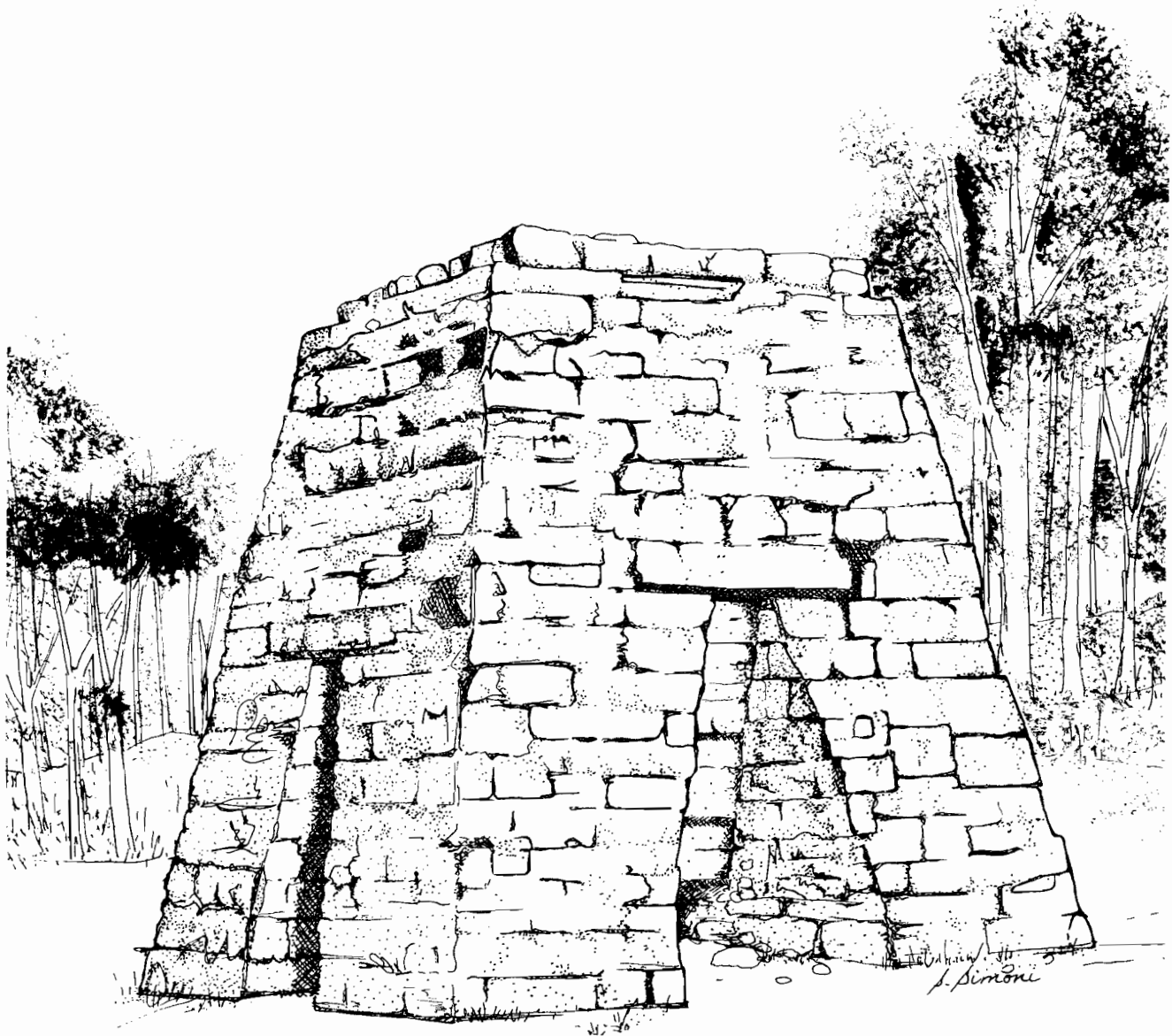
*An old log cabin, forlorn, decaying, forgotten in a lonesome wood
Come, let us walk there again, you and I, and remember
the happy times, and the sad, when our tears fell like warm spring rain on the dooryard violets
when our souls touched, and communed, and love grew*

From "Remembering an Old Log Cabin"
Dusty Miller, 1985. By permission

CONTENTS

Preface	iii
Introduction	1
The Forests	1
Studying and Identifying the LBL Trees	1
The Beech Family, Fagaceae	3
The Beeches	4
American Beech	4
The Chestnuts	5
American Chestnut	5
The Oaks	7
Black Oak	12
Blackjack Oak	13
Bur Oak	14
Cherrybark Oak	15
Chestnut Oak	16
Chinkapin Oak	17
Northern Red Oak	18
Overcup Oak	19
Pin Oak	20
Post Oak	21
Sawtooth Oak	22
Scarlet Oak	23
Shingle Oak	24
Shumard Oak	25
Southern Red Oak	26
Swamp Chestnut Oak	27
Swamp White Oak	28
Water Oak	29
White Oak	30
Willow Oak	31
The Walnut Family, Juglandaceae	32
The Hickories	33
Bitternut Hickory	34
Mockernut Hickory	35
Pecan	36
Pignut Hickory	37
Red Hickory	38
Sand Hickory	39
Shagbark Hickory	40
Shellbark Hickory	41
Southern Shagbark Hickory	42
The Walnuts	43
Black Walnut	44
Butternut	45
Glossary	46

Limestone Stack of the Great Western Iron Furnace, Built in the 1850s



During the 1800s an iron industry flourished in LBL. Large quantities of charcoal, made mostly from local oaks and hickories, were required to feed the furnaces and as a result, many forests were heavily harvested. The above stack is beside the Trace at the former site of Model (Stewart County, Tennessee), just south of the Homeplace.

INTRODUCTION

Land Between the Lakes (LBL) is a 170,000-acre isthmus between the Tennessee Valley Authority's Kentucky Lake (the impounded lower Tennessee River) and the U.S. Army Corps of Engineers' Lake Barkley (the impounded lower Cumberland River). Located in western Kentucky (parts of Lyon and Trigg counties) and Tennessee (part of Stewart County), this major conservation, education, and recreation facility has been managed by TVA since the early

1960s. With about 300 miles of shoreline, hundreds of water-acres including small ponds, lakes, and the massive reservoirs, and extensive forests (about 80 percent of LBL is forested), opportunities for outdoor activities abound. Camping, picnicking, swimming, boating, fishing, hunting, hiking, and educational facilities make LBL a favorite place for more than two million visitors each year.

THE FORESTS

Early settlers called the area "Land Between the Rivers" and found the hills, valleys, and ridges clothed with forests of oaks, hickories, maples, gums, poplar, and many other species. These diverse, mostly deciduous forests were impressive in spring with their array of flowering crabapples, dogwoods, plums, and redbud. Likewise, autumn was brilliant as the green wilderness changed to various shades of red, orange, yellow, and brown.

While the settlers appreciated the beauty of the forests, they also knew that many of the necessities of frontier life would be provided by these extensive timber tracts. For example, they readily found the long, straight logs needed for homes, stables, barns, corncribs, and smokehouses, as well as durable wood for fenceposts, rails and palings, and tough, strong wood for implement handles, plow tongues, sleds and wagons. In addition, the forests yielded beautiful and easily-worked wood for furniture, gunstocks, pews, pulpits and coffins. Some species, such as wild black cherry and sassafras, were used

for medicines and tonics while several nut trees provided food for the family, wild game, and domestic animals. Fuel wood for heating and cooking was always abundant.

In short, life on the Kentucky-Tennessee frontier would have been very difficult if not impossible without the forests. As a result, settlers learned quickly to identify most trees, especially those best suited for their different needs, and usually had a descriptive name for each.

Today we still can appreciate the spring and autumn beauty of the LBL forests and a visit to the Homeplace or Empire Farm will show how important the forests were to the former residents. But, as you stroll through the woodlands, walk the trails, fish in a quiet bay, or study nature by yourself or with a group, can you identify and name the trees as the settlers did? If not, you might find dendrology, or the study of trees, to be a fascinating and enjoyable field, one encompassing scientific, cultural, economic, and aesthetic aspects.

STUDYING AND IDENTIFYING THE LBL TREES

There are a number of ways to identify the LBL trees. Some trails have marked or tagged specimens; an excellent color guide that includes almost all LBL trees and shrubs is available and various interpretive events are held regularly. Since the majority of trees encountered in LBL belong to only two families, this guide will be an excellent starting point.

The beech family (beeches, chestnuts, and oaks) and the walnut family (walnuts and hickories) include not only the most abundant trees in LBL, but are frequently the most difficult to identify. Oaks and hickories are especially variable and many trees bear some leaves or fruits which do not fit textbook descriptions. However, these trees are so numerous and have been so important in the cultural history of the area that any tree study should begin with them.

While members of both families are true flowering plants, the tiny individual flowers are not showy and usually not important in identification of species. In-

stead, mature leaves and fruits are necessary (botanically, acorns, beechnuts, chestnuts, hickory nuts, and walnuts are fruits); bark and bud characteristics are often useful as well, especially in winter.

The included "keys" make use of easily observed characteristics in a series of choices that should enable you to identify LBL members of the beech and walnut families. Of course, you must select the correct choice from each pair in the key and this will require some knowledge of botanical terminology. First, scan the text, descriptions, sketches, and the glossary; become familiar with general features of leaves, fruits, buds, and bark. Measurements are given in metric units, which are explained in a special section of the glossary if you are not familiar with this system. Then select typical leaves and fruits from an unknown species and use the key and species descriptions to determine its identity. You might begin with a "known" species and practice.

For each species of the beech and walnut families known from LBL, the generally used com-

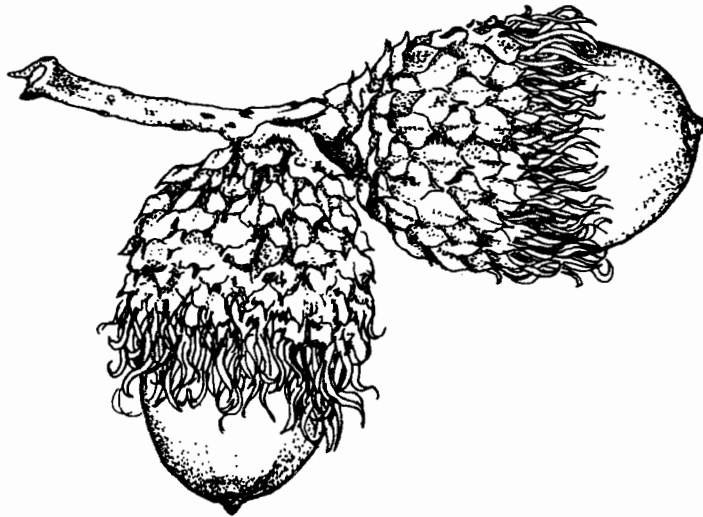
mon name (or names), the scientific name (genus, species, and authority, or the person(s) who named the species), descriptions, and sketches are given. The known distribution and habitat in LBL and other notes of interest are included also. Species are presented alphabetically, by common name, within each genus and family.

Some words of caution: remember that leaves (especially of oaks and hickories) vary greatly in size and shape, even on the same tree. When comparing your specimens with this (or any) text, select only mature leaves from branches growing in the sun. Avoid juvenile plants, sprouts, and shade leaves; even the experts have trouble identifying these atypical forms. Keep notes on the habitat (dry ridges, swampy bottomlands, etc.) and the associated

species. Habitat and associated species are rarely chance occurrences; plants have specific ecological requirements and knowing these will be important.

An individual or group collection of dried, carefully identified leaf and fruit specimens (be sure they are typical and mature) is very valuable for scientific and educational purposes. Each collection should include the date of collection, place, habitat, and collector(s). Notes on the economic and cultural values of the species, usage by wildlife, and the role of the species in the forest community will increase the value of the collection.

Please remember that plant, animal, historical, and geological features of LBL are protected; obtain permission from officials before collecting.



Bur or Mossycup Oak (actual size)

THE BEECH FAMILY, FAGACEAE

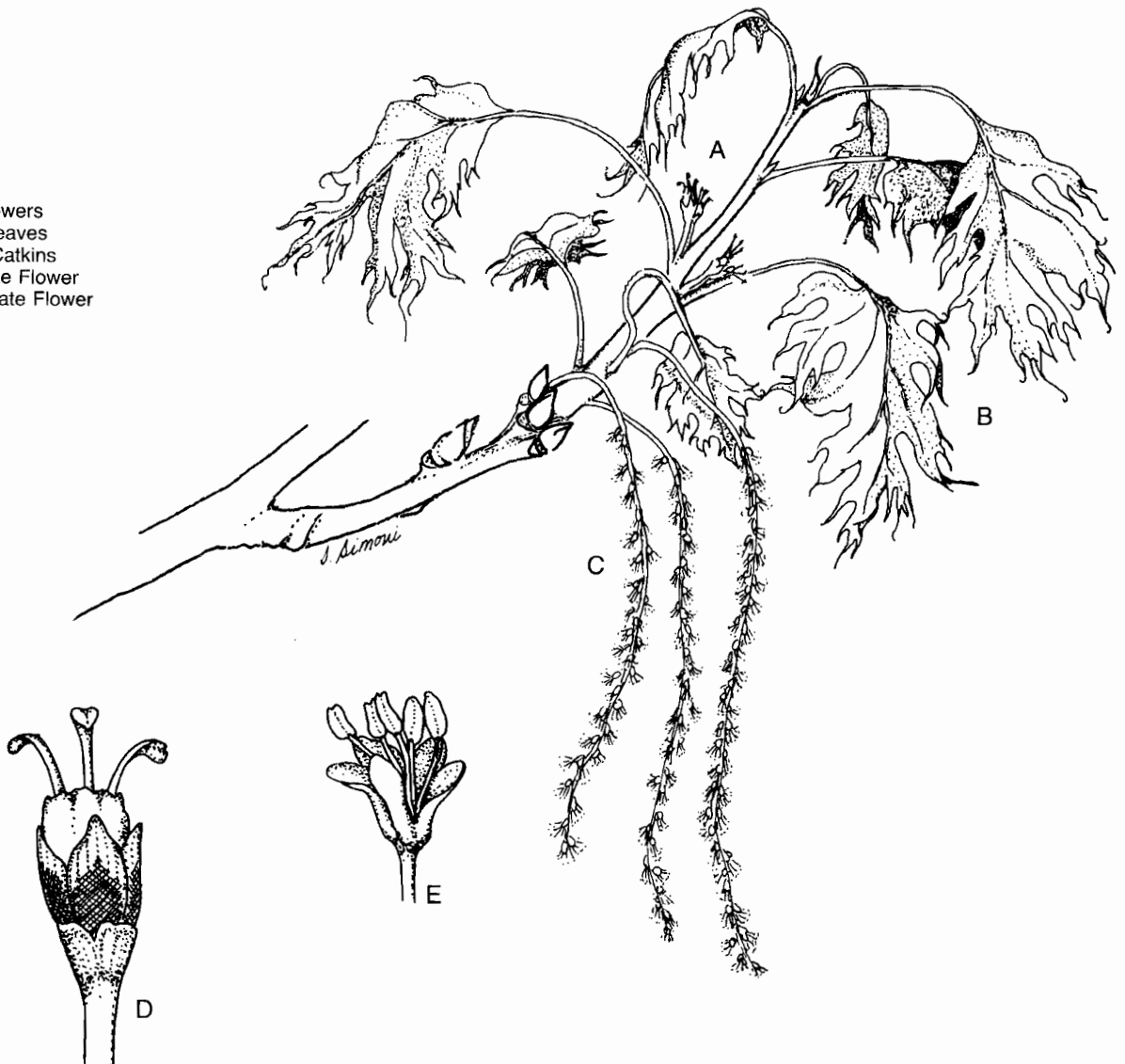
The Fagaceae (from *Fagus*, the generic name of beech) is one of the most important families of trees in the world and includes about 600 species of beeches, chestnuts, and oaks scattered throughout both hemispheres. Five genera and nearly 100 species occur in North America and 22 species, representing three genera, are known from LBL. This is the most dominant and important tree group in the entire region. Members are highly prized for their wood, fruits, and stately beauty.

Flowers of all species are unisexual (one sex per flower), but both flower types occur on each tree and

appear in the spring while leaves are young. Staminate (the pollen-producing) flowers are borne in catkins (an elongated flexuous spike so-named because of its resemblance to a cat's tail) which are elongated and drooping in oaks, upright in chestnut, and in small drooping heads in the American beech. Pistillate (pistil-producing) flowers are solitary or in groups of two or three and enclosed in a group of leaf-like bracts, the involucre, which hardens and partially or completely surrounds the fruit (the nut) at maturity (see sketch of representative flowers below).

Flowers of *Quercus shumardii*, Shumard Red Oak
(flowering branch actual size; individual flowers 10 times actual size)

- A. Pistillate Flowers
- B. Immature Leaves
- C. Staminate Catkins
- D. One Pistillate Flower
- E. One Staminate Flower



SUMMER OR WINTER KEY TO THE LBL GENERA OF THE BEECH FAMILY

1. Twigs with 2 to 4 leaves clustered at the tips; fruit a single nut which is circular in cross-section and enclosed 1/4 to almost completely in a scaly, but not spiny or prickly, involucre **Oaks (*Quercus*)**
1. Twigs with 1 leaf at the tip; fruit a spiny or prickly involucre enclosing 2 to 4 nuts, the latter triangular or lenticular in cross-section 2
 2. Nuts distinctly triangular in cross-section; terminal buds cylindric, more than 1 cm long; bark smooth and gray **American Beech (*Fagus*)**
 2. Nuts distinctly lenticular in cross-section; terminal buds ovate, less than 1 cm long; bark dark brown, rough and fissured **American Chestnut (*Castanea*)**

THE BEECHES, *Fagus*

About ten species of *Fagus* (from the Greek *phagein*, to eat, in reference to the edible nuts) occur in the Northern Hemisphere but only one is found in the United States. The name beech is an ancient

one and some think that "beech" and "book" had the same origins since some early writings were inscribed upon tablets made from this wood.

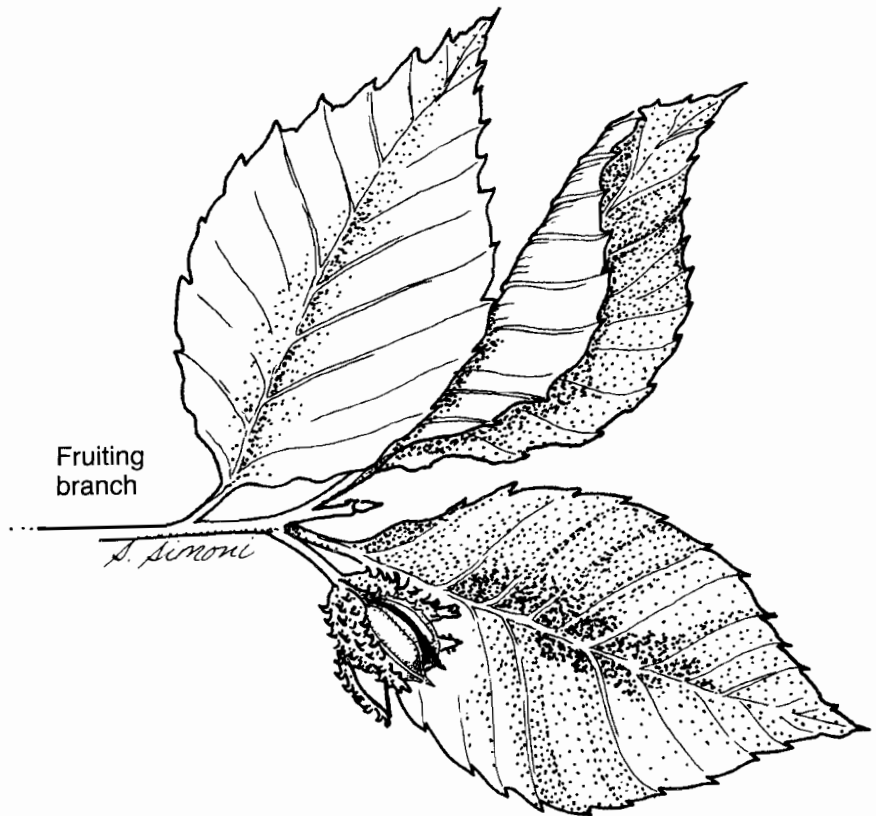
AMERICAN BEECH *Fagus grandifolia* Ehrh.

All parts actual size.

Spiny involucre and fruits (nuts)



Fruiting branch



Terminal bud in winter



next page for description

AMERICAN BEECH

Habit: large deciduous tree; the dead leaves often persistent through the winter.

Leaves: elliptic to ovate, 5 to 14 cm long, 2 to 8 cm wide, with 9 to 14 pairs of lateral veins, the margins serrate; petioles slender, 8 to 15 mm long, glabrous or sparsely strigose-pubescent; blades dark bluish-green and glabrous above, paler and glabrous or with axillary tufts beneath, bases cuneate to rounded or subcordate.

Fruits: two somewhat triangular and slightly winged nuts, about 2 cm long, enclosed in a two-bracted spiny involucre on a peduncle 5 to 25 mm long.

Bark: light gray and smooth.

Twigs: slender, reddish-brown, glabrous, often distinctly zig-zagged.

Winter Buds: narrowly elliptic, sharp-pointed, 20 to 25 mm long, lustrous brown and glabrous.

LBL Habitats and Distribution: perhaps the easiest species of Fagaceae to recognize, American beech is found almost exclusively on moist slopes and in ravines where it may be a dominant member of the forest community. However, it is infrequent in the north.

Notes: found throughout the eastern half of North America from Nova Scotia west to Wisconsin and south to western Florida and eastern Texas, this tree is an important component of many forest communities and is a valuable timber tree. Many older trees in LBL, as elsewhere, are hollow and provide homes for wildlife. Also, trees often are marred by carved initials, dates, words of wisdom, and amorous scratchings.

THE CHESTNUTS, *Castanea*

Although ten species of *Castanea* (from the Greek *castana*, meaning chestnut) are known, only

three species occur in eastern North America and one is found in LBL.

AMERICAN CHESTNUT *Castanea dentata* (Marsh.) Borkh.

Habit: formerly a large tree, now encountered only as small trees and stump sprouts.

Leaves: oblong-lanceolate, 15 to 28 cm long, 4 to 8 cm wide, with 10 to 20 pairs of lateral veins, the margins coarsely toothed; petioles stout, 10 to 15 mm long; blades dull yellow-green and glabrous above, paler and glabrous beneath, acuminate at the apex, rounded to cuneate at the base.

Fruit: a spiny bur 5 to 7.5 cm in diameter enclosing 2 or 3, rarely 5 nuts; the nuts 1.5 to 2.5 cm long, broadest near the base and pointed at the apex, flattened on one side.

Bark: dark brown with broad, flat ridges separated by shallow fissures.

Twigs: slender, reddish-brown to dark brown, glabrous.

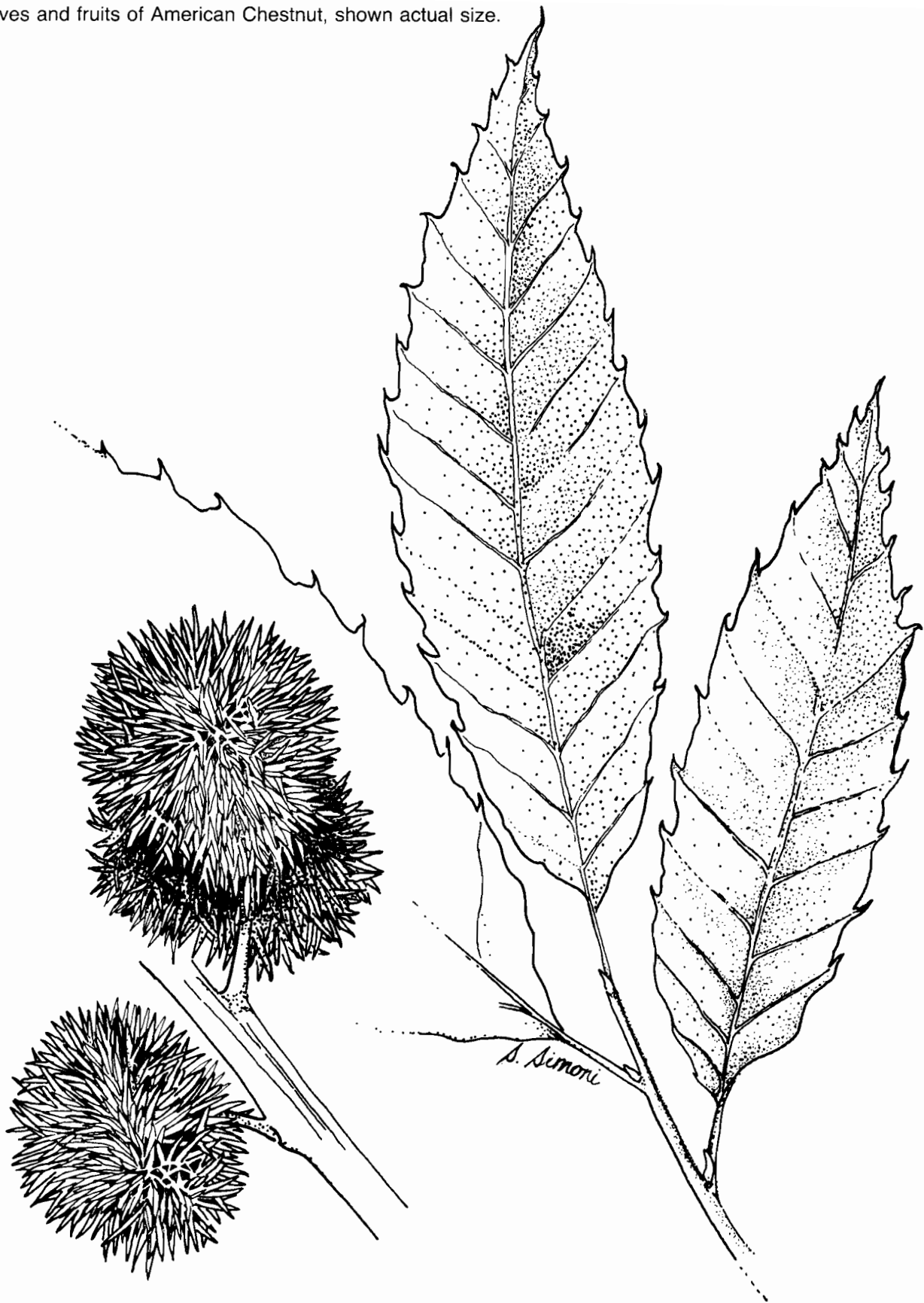
Winter Buds: dark reddish-brown, ovate, 4 to 7 mm long.

LBL Habitats and Distribution: the American chestnut once was a dominant member of the forest communities on many dry and well-drained sites; only a few stump sprouts remain today.

Notes: this was once a very important timber tree from New England southward through the Appalachian Highlands. It was driven almost to extinction by the introduction, in about 1900, of an Asian fungus to which it had no immunity. The wood is very durable and fences made of chestnut may still be found. The fruits were an important food for mankind and wildlife and were immortalized in a popular Christmas song.

next page for illustrations

Leaves and fruits of American Chestnut, shown actual size.



OAKS, *Quercus*

Quercus (the classical Latin name) is a large genus of more than 300 species distributed throughout the northern hemisphere. About 60 species occur in North America and 20 of these are known from LBL.

This is by far the most abundant and largest tree genus in LBL. Species occur in almost all habitats

and the importance of oaks to the former residents was tremendous. In addition to providing logs and lumber for almost all structures, some made excellent shade trees with brilliant autumn coloration and the acorns provided food for wildlife and livestock.

OAK HYBRIDS

The keys and descriptions provided in this booklet will allow identification of any species of oak found in LBL. However, don't be surprised if there are occasional trees which don't seem to fit any of the species descriptions. These trees may be of hybrid origin and, if they are, will have a mixture of the characteristics of the species which produced them.

Hybridization, here defined as the production of offspring from a cross involving trees from two different species, is fairly common in oaks. There is wide overlap in the flowering time of oaks and since they are wind-pollinated, it is very probable that pollen from one species will land on the receptive stigmas of another species. In such a case, if the pollen successfully germinates and fertilization occurs, the resulting seed will give rise to a hybrid plant.

Not all oaks can hybridize with each other. The oaks native to LBL belong to either of two subgenera. The subgenus *Lepidobalanus* contains the white oaks and chestnut oaks while subgenus *Erythrobalanus* contains the red and black oaks. Trees within a subgenus are known to hybridize with each other, but there is no known instance of natural hybridization involving trees of different subgenera. One explanation for this incompatibility may be that in *Lepidobalanus* the acorns are annual while in *Erythrobalanus* the acorns are biennial. This difference in rate and timing of flower and fruit development could act as a barrier to hybridization.

The biological importance of hybridization is not fully understood. Quite often, hybrid trees are reproductively sterile and may not survive as long as their parent trees. But it is not unusual for a hybrid tree to grow normally and produce seed giving rise to offspring. In such cases, the hybrid probably has crossed back to one or the other of its parents and the offspring of such crosses will tend to resemble the parent species more than does the original hybrid. When this occurs, it is unlikely that the hybrid population will be maintained as distinct from the parent species. On the other hand, it is possible that hybrid trees will not cross back to the parents but will cross with other hybrid trees having the same parentage. This circumstance could give rise to a new species, if the hybrid population maintains its reproductive integrity. This has happened in other plants and there are oak species which may have evolved in this fashion.

Some hybrid trees are fairly easy to recognize while others are very difficult to distinguish. For example, one of the more common hybrid oaks in eastern North America is *Quercus x leana* Nutt., which is produced when black oak and shingle oak hybridize. Shingle oak has entire leaves and black oak has lobed leaves. The leaves of their hybrid are asymmetric and unevenly lobed or wavy-margined. Thus, the most easily detected hybrids are those involving parent trees which are quite different in appearance. On the other hand, scarlet and black oak occasionally may hybridize. Such a hybrid has been reported from LBL, but it is very difficult to detect in the field: the two parent trees are quite similar and the hybrid may be very similar to one or the other. The hybrid between black and scarlet oak, called *Q. x fontana* Laughlin, was reported from the dry ridges above Ginger Bay, where both scarlet and black oak may be found.

A hybrid tree was found in 1986 at the Cravens Bay Lake Access area. Shingle oak is rather common in that area and the hybrid clearly was from a cross having shingle oak as one parent. The fact that the leaves were asymmetric and wavy-margined indicates that the other parent tree had lobed leaves. The most likely candidate is *Q. falcata*, which is also rather common in that area. However, both black oak and pin oak are found nearby and either could have hybridized with shingle oak.

A final word on hybrids: not all trees with unusual looking leaves are hybrids. As noted in the species descriptions, there may be a lot of variability within a tree. In addition, very young trees and stump sprouts often have leaves which are not like those of typical mature trees. Finally, oaks often produce lammas shoots. These arise when the lateral or terminal buds on a twig start to grow in the middle of the growing season, thus giving rise to a second set of leaves. Usually, lammas shoot leaves are distinctly different from the typical leaves. In such cases, examination of terminal buds and/or fruits will help clarify the identification of questionable specimens.

SUMMER KEY TO THE OAK SPECIES

1. Leaves with 5 to 20 pairs of teeth or shallow lobes; secondary teeth/lobes lacking (chestnut oaks and some white oaks) 2
1. Leaves entire or with 1 to 5 pairs of lobes; secondary teeth/lobes present 6
 2. Leaves with 5 to 8 pairs of lateral veins, not all ending in teeth or lobes . **Swamp White Oak (*Q. bicolor*)** 3
 2. Leaves with 9 to 20 pairs of lateral veins, all (except perhaps 1 or 2 at the apex or base) ending in teeth . 3
 3. Teeth of leaves blunt, not or slightly curving towards the apex; leaves mostly oval-obovate in outline 4
 3. Teeth of leaves sharp, mostly curved towards the apex; leaves mostly lanceolate-elliptic in outline . 5
 4. Bark dark, deeply furrowed; acorn cup scales fused; trees of dry habitats **Chestnut Oak (*Q. prinus*)**
 4. Bark light, scaly; acorn cup scales free; tree of moist habitats **Swamp Chestnut Oak (*Q. michauxii*)**
5. Lower surfaces of leaves green and glabrous except for axillary tufts . **Sawtooth Oak (*Q. acutissima*)**
5. Lower surfaces of leaves pale or silvery and pubescent **Chinkapin Oak (*Q. muehlenbergii*)**
 6. Leaves with 1 or more bristle tips; mature acorns on last year's twigs (red and black oaks) 7
 6. Leaves without bristle tips; mature acorns on this year's twigs (white oaks) 18
 7. Leaves entire to three-lobed, if lobed then widest near the apex 8
 7. Leaves 5 to 11 lobed; if lobes fewer than 5, then leaves widest near the middle or base 12
 8. Leaves entire, widest near the middle 9
 8. Leaves somewhat lobed to distinctly lobed, widest near the apex 10
9. Leaves pubescent beneath, 2 to 5 cm wide **Shingle Oak (*Q. imbricaria*)**
9. Leaves glabrous beneath, 0.5 to 2 cm wide **Willow Oak (*Q. phellos*)**
 10. Leaf bases cuneate; twigs slender, glabrous **Water Oak (*Q. nigra*)**
 10. Leaf bases rounded to cordate; twigs stout, pubescent 11
 11. Lower surfaces of leaves uniformly pubescent **Southern Red Oak (*Q. falcata*)**
 11. Lower surfaces of leaves glabrous or with scattered pubescence . **Blackjack Oak (*Q. marilandica*)**
 12. Lower surfaces of leaves uniformly pubescent/tomentose 13
 12. Lower surfaces of leaves glabrous (except for axillary tufts) or with scattered pubescence . 14
13. Leaf bases distinctly u-shaped, terminal lobe often falcate and decidedly longer than the lateral lobes **Southern Red Oak (*Q. falcata*)**
13. Leaf bases broadly acute to truncate, terminal lobe rarely falcate, not exceeding the lateral lobes in length **Cherrybark Oak (*Q. pagoda*)**
 14. Lower surfaces of leaves glabrous except for prominent axillary tufts 15
 14. Lower surfaces of leaves glabrous or with scattered pubescence; axillary tufts absent or minute . 16
 15. Twigs gray to gray-brown; buds grayish; leaves with 7 to 11 lobes . **Shumard Oak (*Q. shumardii*)**
 15. Twigs red-brown; buds red-brown; leaves with 5 to 7 lobes **Pin Oak (*Q. palustris*)**
 16. Leaves 7 to 11 lobed, lobes typically ovate; middle sinuses usually extending less than halfway to the midrib; leaves dull above, often glaucous beneath **Northern Red Oak (*Q. rubra*)**
 16. Leaves 5 to 7 (9) lobed, lobes typically obovate; middle sinuses usually extending more than halfway to the midrib; leaves shiny above, light green beneath 17
17. Petioles slender, glabrous, lower surfaces of leaves glabrous except for minute axillary tufts; inner bark pinkish in color **Scarlet Oak (*Q. coccinea*)**
17. Petioles stout, often somewhat pubescent; lower surfaces of leaves often with scattered pubescence; inner bark distinctly yellow or orange in color **Black Oak (*Q. velutina*)**
18. Twigs conspicuously pubescent, especially near the apex **Post Oak (*Q. stellata*)**
18. Twigs glabrous 19
 19. Lower surfaces of leaves glabrous **White Oak (*Q. alba*)**
 19. Lower surfaces of leaves pubescent 20
 20. Lower leaf sinuses almost reaching the midrib, the upper sinuses much more shallow; upper half of leaf broad, obtuse in outline; acorn cups conspicuously fringed, covering about 1/2 of the nut **Bur Oak (*Q. macrocarpa*)**
 20. Lower leaf sinuses not as deep, the upper and lower sinuses about equal; upper half of leaf acute in outline; acorn cups not conspicuously fringed, covering 2/3 to all of the nut **Overcup Oak (*Q. lyrata*)**

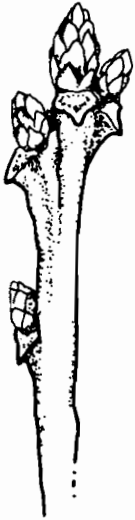
WINTER KEY TO THE OAK SPECIES

Reference to the sketches of representative buds on the following pages will be of value in using this key.

- 1. Twigs pubescent, especially near the apex 2
- 1. Twigs glabrous 5
 - 2. Buds mostly less than 6 mm long, typically blunt **Post Oak (*Q. stellata*)**
 - 2. Buds mostly more than 6 mm long, typically acute or sharp-pointed 3
 - 3. Acorn cups cup-shaped, covering about 1/2 of the nut; bark dark with rectangular blocks **Blackjack Oak (*Q. marilandica*)**
 - 3. Acorn cups saucer- or shallowly cup-shaped, covering less than 1/2 of the nut; bark gray or dark gray, not blocky 4
 - 4. Bark with narrow ridges, these often scaly; trees typically of dry slopes and ridges **Southern Red Oak (*Q. falcata*)**
 - 4. Bark with broad ridges, these with a distinct flaky appearance caused by curled edges; trees typically of moist slopes and lowland areas **Cherrybark Oak (*Q. pagoda*)**
- 5. Buds mostly less than 6 mm long 6
- 5. Buds mostly more than 6 mm long 14
 - 6. Buds blunt or rounded at the apex 7
 - 6. Buds acute or sharp-pointed 10
 - 7. Cups covering 1/2 or more of the nut 8
 - 7. Cups covering less than 1/2 of the nut 9
 - 8. Cups covering about 1/2 of the nut, conspicuously fringed at the rim . **Bur Oak (*Q. macrocarpa*)**
 - 8. Cups covering 2/3 to all of the nut, not conspicuously fringed at the rim . **Overcup Oak (*Q. lyrata*)**
- 9. Buds light-brown; peduncles usually 3 to 5 cm long **Swamp White Oak (*Q. bicolor*)**
- 9. Buds red-brown; peduncles usually 0.5 to 2 cm long **White Oak (*Q. alba*)**
- 10. Buds red-brown, scales with whitened margins; bark light gray and scaly **Chinkapin Oak (*Q. muehlenbergii*)**
- 10. Bud scales without whitened margins; bark dark and more or less furrowed 11
 - 11. Twigs greenish-brown to brown **Shingle Oak (*Q. imbricaria*)**
 - 11. Twigs red brown 12
 - 12. Inner surface of acorn cups glabrous except for a ring of hairs around the nut scar **Pin Oak (*Q. palustris*)**
 - 12. Inner surface of acorn cups pubescent 13
- 13. Buds 2 to 4 mm long, conic, glabrous **Willow Oak (*Q. phellos*)**
- 13. Buds 3 to 5 mm long, ovate, often pubescent near the tip **Water Oak (*Q. nigra*)**
- 14. Acorn cups 2 to 3.5 cm broad, the scales with long, recurved tips . **Sawtooth Oak (*Q. acutissima*)**
- 14. Acorn cups smaller or the scales lacking long, recurved tips 15
 - 15. Buds typically 7 to 12 mm long, pubescent throughout; inner bark of trunk yellow or orange **Black Oak (*Q. velutina*)**
 - 15. Buds typically 6 to 8 mm long, glabrous or only partially pubescent; inner bark of trunk not yellow or orange 16
 - 16. Buds silvery-pubescent on the upper half; nuts with one or more concentric rings at the apex **Scarlet Oak (*Q. coccinea*)**
 - 16. Buds glabrous or with a few rusty hairs at the apex; nuts without concentric rings at the apex . 17
- 17. Buds red-brown 18
- 17. Buds gray to brown 19
 - 18. Acorn cups glabrous within, covering 1/4 to 1/3 of the nut; bark dark, furrowed **Northern Red Oak (*Q. rubra*)**
 - 18. Acorn cups pubescent within, covering more than 1/3 of the nut; bark gray, scaly **Swamp Chestnut Oak (*Q. michauxii*)**
 - 19. Buds light brown, twigs orangish to reddish brown; trees of dry slopes and ridges **Chestnut Oak (*Q. prinus*)**
 - 19. Buds and twigs gray or grayish-brown; trees of moist slopes and lowland areas **Shumard Oak (*Q. shumardii*)**

Buds of the Black and Red Oaks
(*Quercus*, Subgenus *Erythrobalanus*)

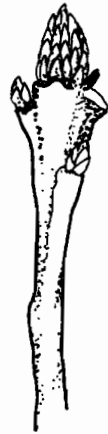
Each stem is two times actual size



Black



Blackjack



Cherrybark



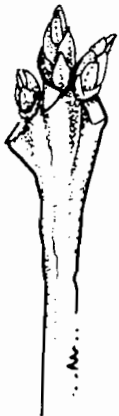
Northern Red



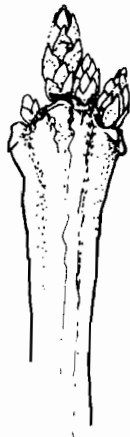
Pin



Scarlet



Shingle



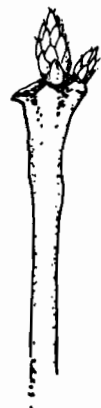
Shumard



Southern Red



Water



Willow

Buds of the Chestnut and White Oaks
(*Quercus*, Subgenus *Lepidobalanus*).

Each stem is two times actual size



Bur



Chestnut



Chinkapin



Overcup



Post



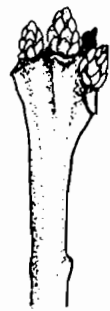
Sawtooth



Swamp Chestnut



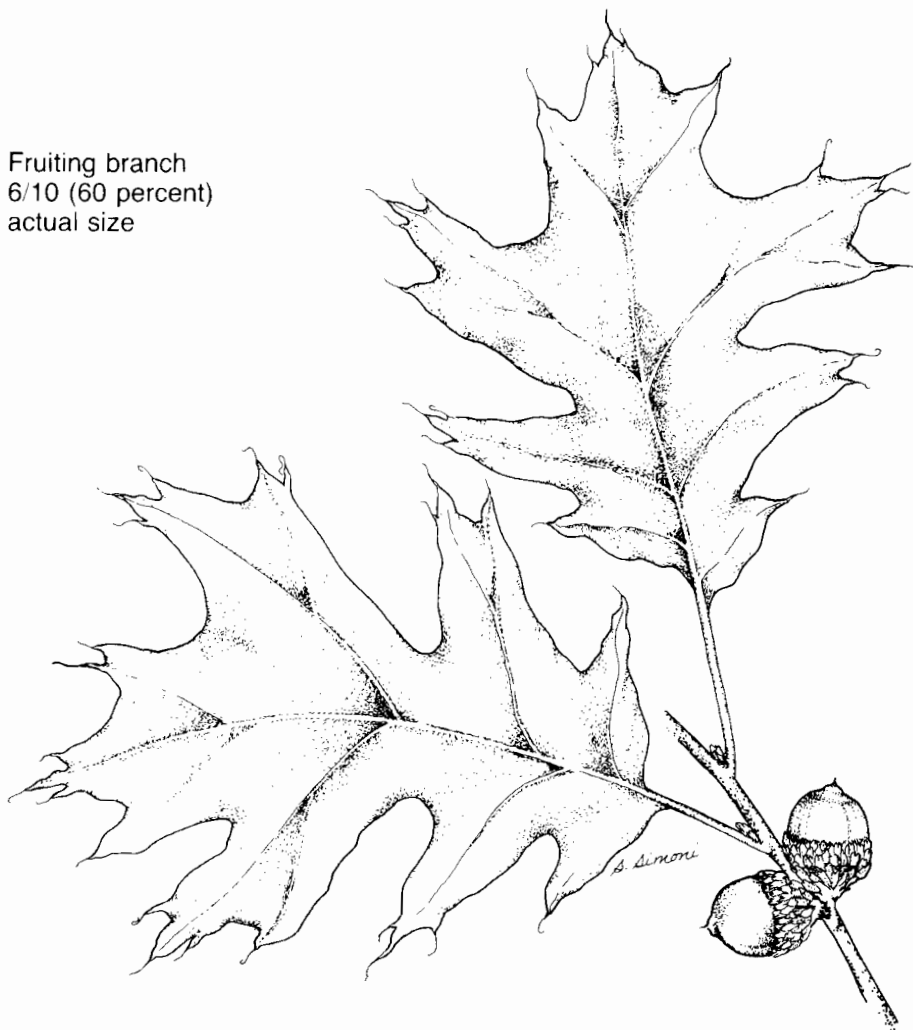
Swamp White



White

BLACK OAK *Quercus velutina* Lam.

Fruiting branch
6/10 (60 percent)
actual size



Habit: medium to large deciduous tree.

Leaves: ovate to obovate, 10 to 30 cm long, 8 to 15 cm wide, deeply 5 to 9 lobed; petioles stout, sometimes pubescent, 3 to 7 cm long; blades dark green, lustrous and glabrous above, yellow-green and glabrous except for small axillary tufts or rarely pubescent beneath, the base obtuse to truncate.

Fruits: biennial, acorns sessile or on peduncles to 8 mm long; the cups cup-shaped to turbinate, 12 to 20 mm broad, the scales puberulous with free tips forming a fringe at the rim, the inner surface light-brown and pubescent; the nuts ovoid to sub-globose, 10 to 20 mm long, covered for one-half their length by the cups.

Bark: dark brown to black, deeply furrowed, the ridges often broken into irregular blocks.

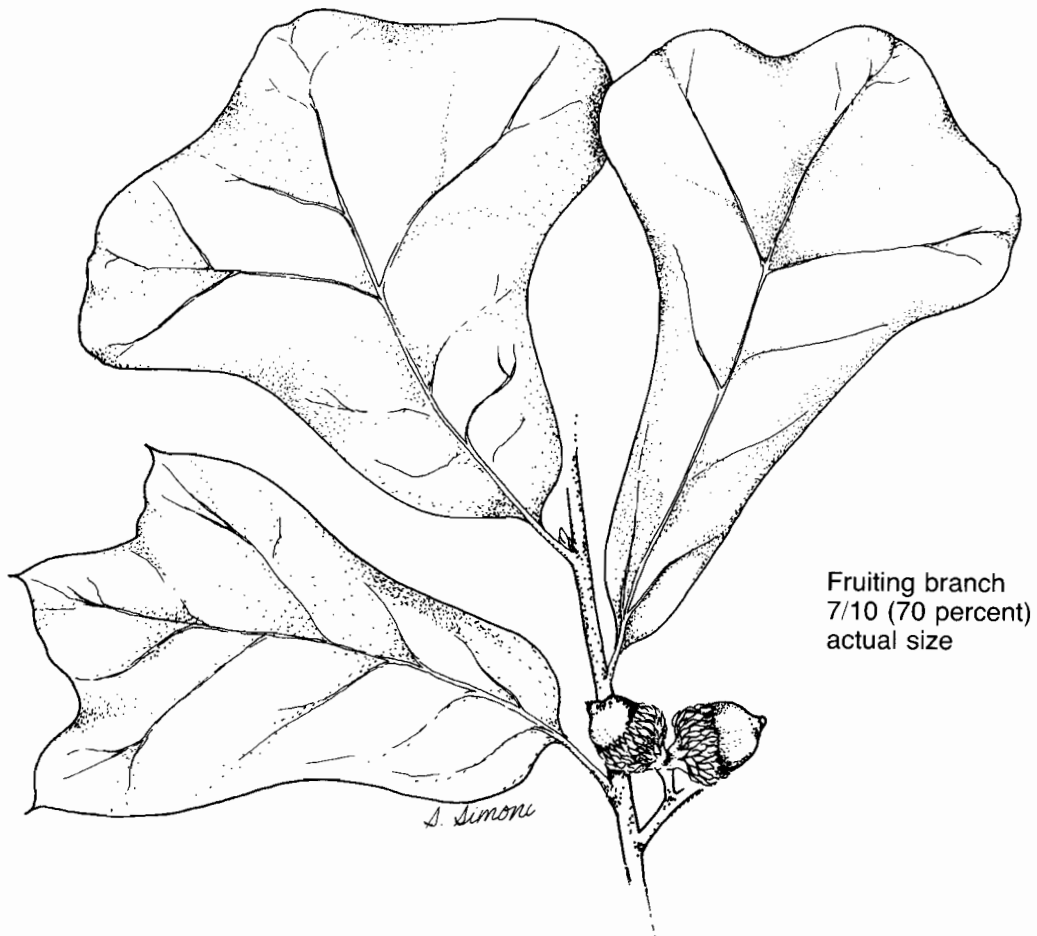
Twigs: stout, dark reddish-brown, glabrous or sparsely pubescent.

Winter Buds: ovoid to elliptic, strongly angled in cross-section, 6 to 12 mm long and covered with tawny hairs.

LBL Habitats and Distribution: black oak occurs in a variety of habitats from moderately moist slopes to very dry ridges. While it is not as common as white oak, the two are often found together. Several large trees grow in and around the Youth Station parking area and at Boyd Memorial Cemetery above Dry Fork Bay.

Notes: black oak, which is found from New England south to the Florida panhandle and west to southern Minnesota and eastern Texas, is an important timber tree but the wood is usually classed as "red oak". The bark is rich in tannins and was once a principal source of these chemicals used for tanning leather. The inner bark is yellow or orange and yields a natural dye.

BLACKJACK OAK
Quercus marilandica Muenchh.



Habit: small to medium deciduous tree.

Leaves: conspicuously broadest near the apex, 7 to 20 cm long and wide, with 3 to 5 broad lobes separated by shallow sinuses; petioles stout, 1 to 2 cm long, often pubescent; blades dark green above, lighter and often scurfy or with scattered pubescence beneath, rounded or cordate at the base.

Fruits: biennial, acorns sessile or with very short peduncles; cups turbinate, 12 to 20 mm broad, light reddish-brown and pubescent on the inner surface, covering about 1/2 of the broadly elliptic nut, the scales long-pointed, puberulous, often free at the rim; nuts 12 to 20 mm long.

Bark: almost black with irregular to rectangular blocks.

Twigs: stout, hairy and ashy-brown.

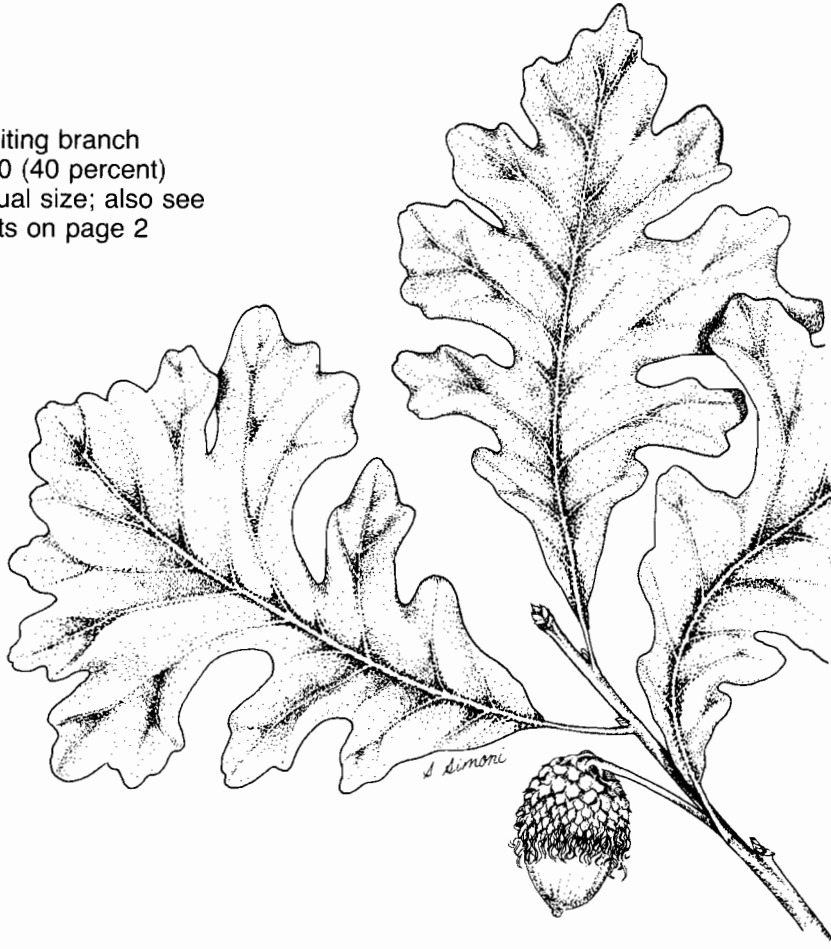
Winter Buds: conic, 5 to 9 mm long, noticeably angled in cross-section and covered with rusty hairs.

LBL Habitats and Distribution: a small and easily recognized tree, blackjack oak is found almost exclusively on very dry ridges and adjacent dry slopes, e.g., along Jenny Ridge Road and Blue Springs Road. It is found occasionally as secondary growth on open hillsides.

Notes: because of its small, often crooked trunks and wood that is difficult to cut, blackjack oak is not especially important as a source of timber, although the wood is very durable. Throughout its range, which extends from Long Island south to northern Florida and west through West Virginia and the southern portions of Ohio, Indiana, Illinois, and Iowa to the eastern half of Texas, it characteristically grows on poor, shallow soils.

BUR OAK
***Quercus macrocarpa* Michx.**

Fruiting branch
4/10 (40 percent)
actual size; also see
fruits on page 2



Habit: large deciduous tree.

Leaves: obovate to obovate-oblong, 12 to 30 cm long, 8 to 15 cm wide, commonly divided into upper and lower halves by a pair of broad, deep sinuses, the upper half more shallowly lobed than the lower half; petioles stout, 8 to 20 mm long, sparsely to densely pubescent; blades dark green and glabrous or rarely minutely hairy above, pale green or whitish and pubescent beneath, apex rounded, bases cuneate or occasionally rounded.

Fruits: annual, acorns sessile or on peduncles to 2.5 cm long; cups 2 to 5 cm broad, deeply cup-shaped or bowl-shaped, fringed at the rim, inner surface light brown and pubescent, covering 1/3 to 3/4 of the broadly ovoid or ellipsoid nuts which are 2 to 4 cm long.

Bark: brown and deeply furrowed, the ridges broken into elongate scaly plates.

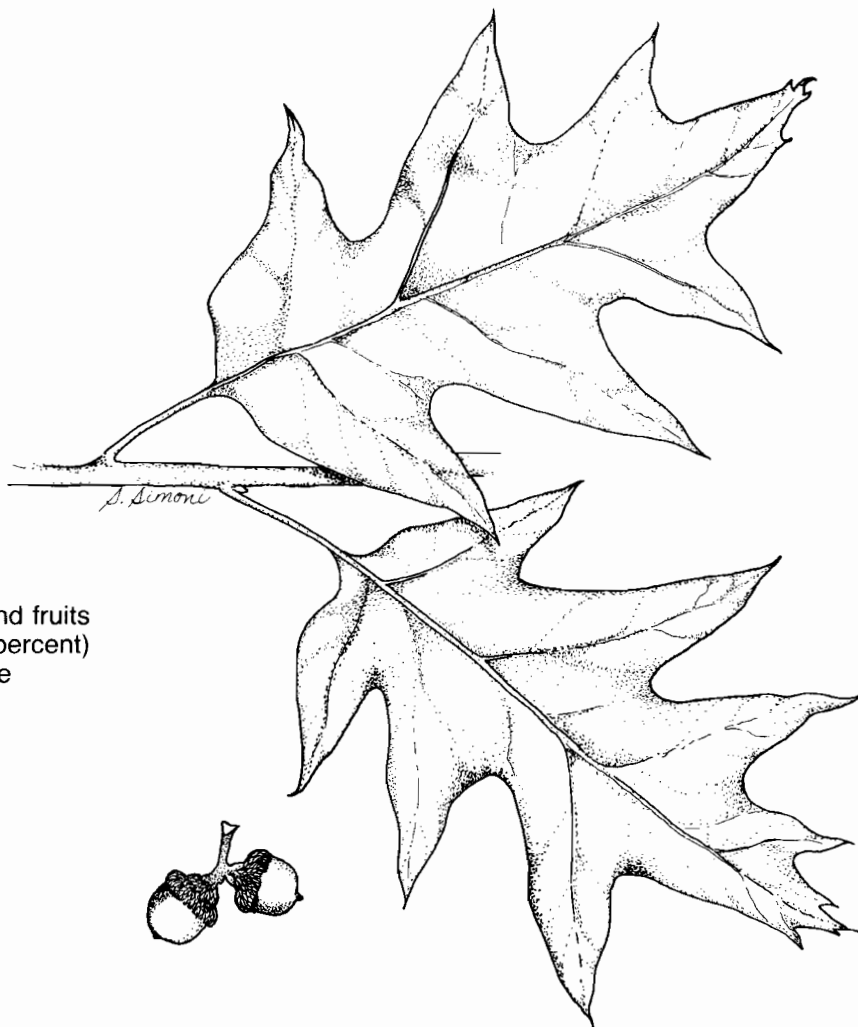
Twigs: stout, reddish-brown to brown, occasionally sparsely pubescent, older twigs often developing corky ridges.

Winter Buds: globose to ovoid, brown to reddish-brown, 3 to 6 mm long, puberulous.

LBL Habitats and Distribution: a very rare tree in LBL, bur oak is most likely to be encountered on streambanks and poorly-drained bottomlands near the Cumberland River (Lake Barkley).

Notes: the large acorns and their distinctively fringed cups clearly mark this species. LBL is near the southeastern edge of its range, which extends from eastern Texas northward through North Dakota into Canada and northeastward through Arkansas, West Tennessee, and Kentucky to Pennsylvania, Ontario, and Quebec. Trees having smaller, deeply divided leaves and smaller acorns with turbinate cups are sometimes classified as *Q. macrocarpa* var. *olivaeformis* (Michx. f.) Trel., but no attempt has been made to document the occurrence of this variety in LBL.

CHERRYBARK OAK, SWAMP SPANISH OAK
Quercus pagoda Raf.



Leaves and fruits
6/10 (60 percent)
actual size

Habit: large deciduous tree.

Leaves: ovate to elliptic or obovate, 10 to 20 cm long, 6 to 16 cm wide, with 5 to 11 ovate or rarely falcate lobes, the terminal lobe rarely exceeding the lateral lobes in length; petioles stout, often pubescent, 2 to 5 cm long; blades dark green, lustrous and glabrous above, paler and tomentose beneath, the bases cuneate to rounded or truncate.

Fruits: very similar to those of *Q. falcata*.

Bark: nearly black with narrow and noticeably flaky ridges resembling that of wild black cherry, hence the common name.

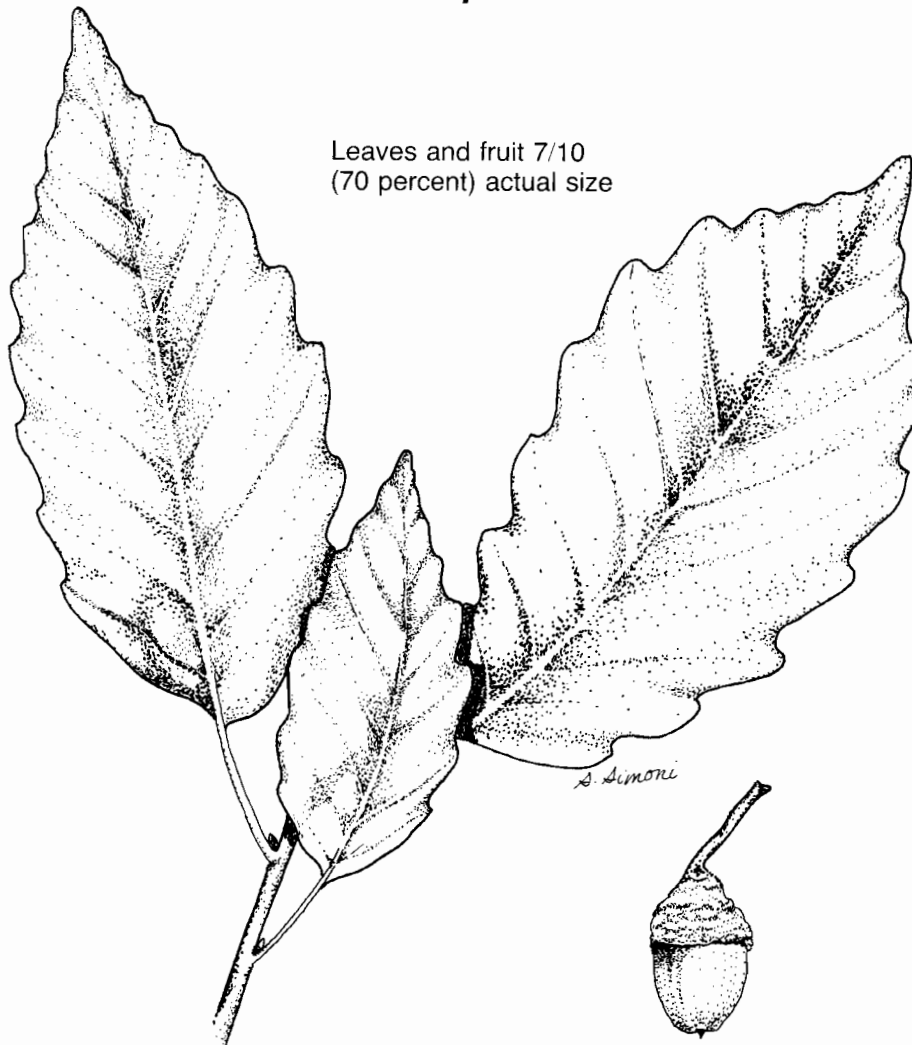
Twigs: stout, yellowish-brown and pubescent.

Winter Buds: ovoid, 5 to 9 mm long, strongly angled in cross-section, light reddish-brown and puberulous.

LBL Habitats and Distribution: a common species in LBL, this oak is typically found in moderately mesic habitats, from moist slopes to poorly-drained bottomlands. Excellent examples may be found at Neville Bay Lake Access, Cravens Bay Lake Access, and the Youth Station.

Notes: cherrybark oak may be treated as a variety of southern red oak. However, it appears that both morphological and ecological distinctions between these two are sufficient to warrant its recognition as a species. LBL is apparently near the limits of the range of cherrybark oak, which is found along the Coastal Plain from Virginia to eastern Texas and northward in the Mississippi Valley to southern Illinois and southern Indiana.

CHESTNUT OAK *Quercus prinus* L.



Habit: medium to large deciduous tree.

Leaves: elliptic to obovate, crenately toothed, 10 to 30 cm long, 3 to 10 cm wide, with 9 to 15 pairs of lateral veins, each ending in an obtuse tooth; petioles 0.5 to 1.5 cm long; blades yellow-green, often lustrous and glabrous above, paler and finely pubescent beneath, pointed at the apex, gradually narrowing to a cuneate or rounded base.

Fruits: annual, acorns on peduncles to 3 cm long; cups turbinate to deeply cup-shaped, 15 to 30 mm broad, inner surface pubescent, covering 1/3 to 1/2 of the oblong nuts, the cup scales appearing to be fused at their bases, especially towards the rim of the cup; nuts 20 to 35 mm long.

Bark: dark brown to nearly black, with continuous ridges separated by deep fissures.

Twigs: stout, orangish-brown to reddish-brown, glabrous.

Winter Buds: conic, 5 to 8 mm long, the bright chestnut brown scales ciliate on the margins.

LBL Habitats and Distribution: chestnut oak often dominates forests on the very driest ridges and slopes. It is common along the hiking trails where they traverse ridge crests.

Notes: this oak is native to the eastern United States north of the Coastal Plain from New England south to northern Georgia and Alabama and west through Ohio and southern Indiana to the Mississippi River.

CHINKAPIN OAK, YELLOW CHESTNUT OAK
Quercus muehlenbergii Engelm.



Leaves and fruit
5.5/10 (55 percent)
actual size

Habit: small to large deciduous tree.

Leaves: oblong-lanceolate to broadly obovate, 10 to 20 cm long, 3 to 12 cm wide, with 8 to 13 pairs of lateral veins, each ending in a tooth; petioles stout, 2.0 to 3.5 cm long; blades light yellow-green above, pale and finely pubescent beneath, acute or acuminate at the apex, usually rounded at the base.

Fruits: annual, acorns sessile or on peduncles to 1 cm long; cups cup-shaped, 12 to 18 mm broad, the scales gray puberulous, the inner surface pubescent, covering 1/3 to 1/2 of the ovate to elliptic nuts; nuts 1.5 to 2 cm long.

Bark: ashy gray, rough and flaking.

Twigs: slender, light orange-brown or reddish-brown, glabrous.

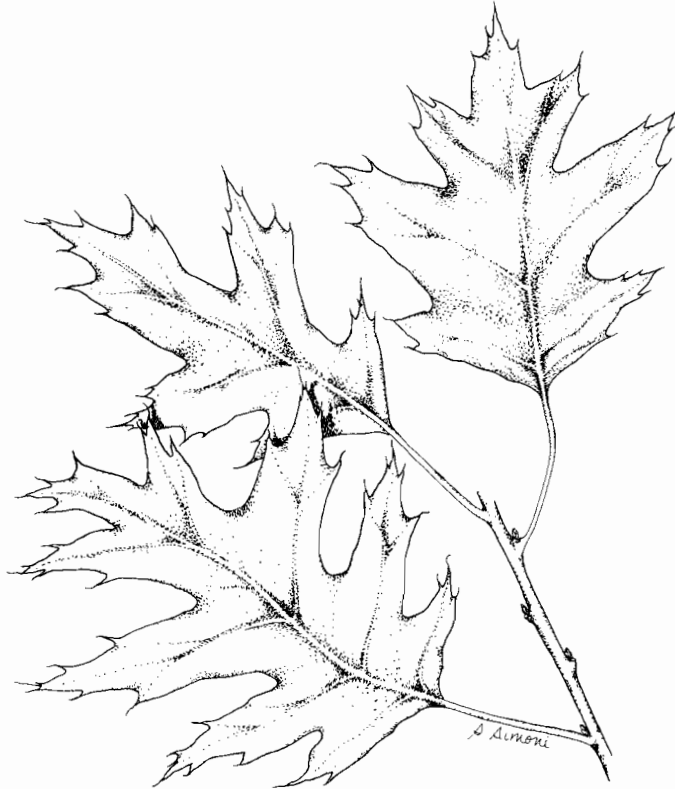
Winter Buds: ovoid, 3 to 5 mm long, reddish-brown, the scales with white, puberulous margins.

LBL Habitats and Distribution: chinkapin oak is not very common in LBL but is sometimes encountered on moderately moist slopes and ravines where there are limestone outcrops or bluffs, e.g., along the north side of Hematite Lake.

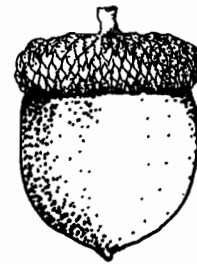
Notes: throughout its range, which extends north of the Coastal Plain from central Texas to Iowa and eastward to southern Ontario and New York, this oak is associated with limestone soils, especially on dry bluffs and mesic slopes.

A shrubby form of *Q. muehlenbergii*, differentiated by smaller leaves with only 3 to 7 pairs of teeth, is often treated as a separate species, *Q. prinoides* Willd. (dwarf chinkapin oak). The latter has not been encountered in LBL, although it might be expected based on its natural range.

NORTHERN RED OAK *Quercus rubra* L.



Leaves 4/10
(40 percent) actual size



Fruit actual size

Habit: medium deciduous tree.

Leaves: obovate or oblong, 12 to 20 cm long, 6 to 12 cm wide, with 7 to 11 ovate or oblong lobes, the sinuses rarely extending more than halfway to the midrib; petioles stout, glabrous, often red-tinged, 2.5 to 5 cm long; blades dull green and glabrous above, pale green or glaucous and glabrous or with minute axillary tufts beneath, bases broadly cuneate to almost truncate.

Fruits: biennial, acorns sessile or on peduncles to 8 mm long; the cups saucer-shaped to shallowly cup-shaped, 18 to 30 mm broad, scales puberulous, often with darkened margins, the inner surface light-brown to red-brown and glabrous or with a few hairs around the nut scar, covering 1/4 to 1/3 of the ovate to oblong nuts; nuts 15 to 30 mm long.

Bark: at first smooth with a greenish cast, becoming gray with shallow fissures and wide shiny ridges.

Twigs: stout, reddish-brown, glabrous.

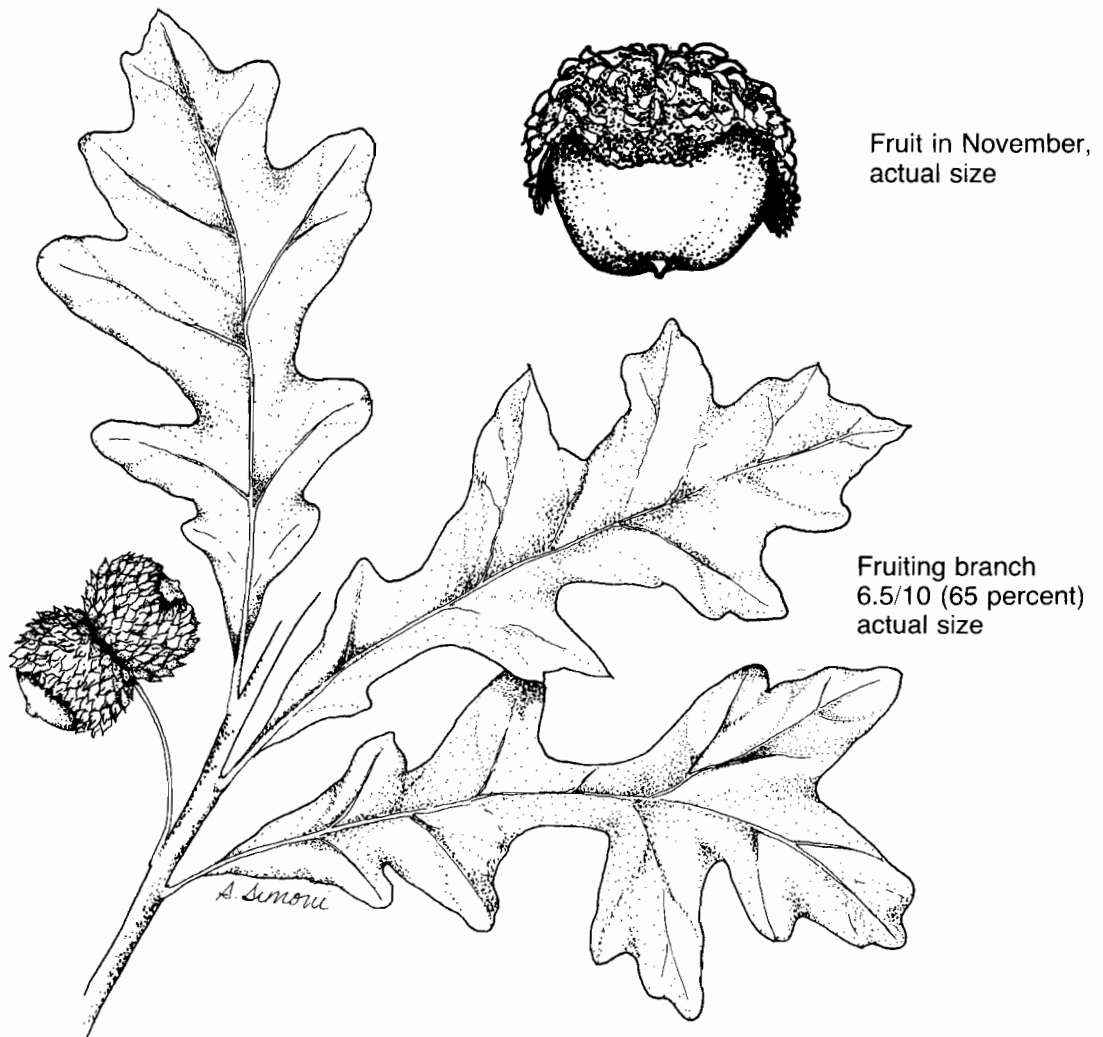
Winter Buds: ovate to elliptic, 4 to 7 mm long, dark reddish-brown, often with a tuft of reddish hairs at the apex.

LBL Habitats and Distribution: northern red oak is found in a wide range of habitats but is relatively uncommon in LBL. While it may be found on river bluffs or rarely on dry slopes and ridges, it is more often met on moist slopes and ravines, such as along Road 131 in Racetrack Hollow and along Tharpe Road in Jackson Hollow.

Notes: this oak ranges from northern Minnesota east to Maine and south to eastern Oklahoma and southern Alabama. It is prized for its ornamental value and the wood is important in manufacturing flooring, furniture, and oak veneer.

Variability in fruit characteristics has led to recognition of two varieties by some authors. If the nuts are small and have a cup which covers 1/3 of the nut, the tree may be assigned to *Q. rubra* var. *borealis* (Michx. f.) Farw. Trees with large nuts covered only about 1/4 by the cup may be classified as *Q. rubra* var. *rubra*. It is our experience that both varieties may be found in LBL and no attempt has been made to treat them separately.

OVERCUP OAK
Quercus lyrata Walt.



Habit: medium to large deciduous tree.

Leaves: narrowly to widely obovate, 7 to 25 cm long, 3 to 12 cm wide, with 3 to 5 pairs of lobes divided by broad, irregular sinuses; petioles stout, 1.0 to 2.5 cm long, sparsely pubescent; blades dark green above, lighter and uniformly pubescent beneath or the lower surface hairy only on the veins, bases acute to cuneate.

Fruits: annual, acorns almost sessile or on peduncles to 3 cm long; cups hemispheric to spherical, 2 to 3 cm broad, light brown and pubescent on the inner surface, covering more than half to all of the sub-globose to ovoid nuts which are 1.5 to 2.5 cm long.

Bark: brownish-gray to reddish-gray with scaly irregular plates or ridges.

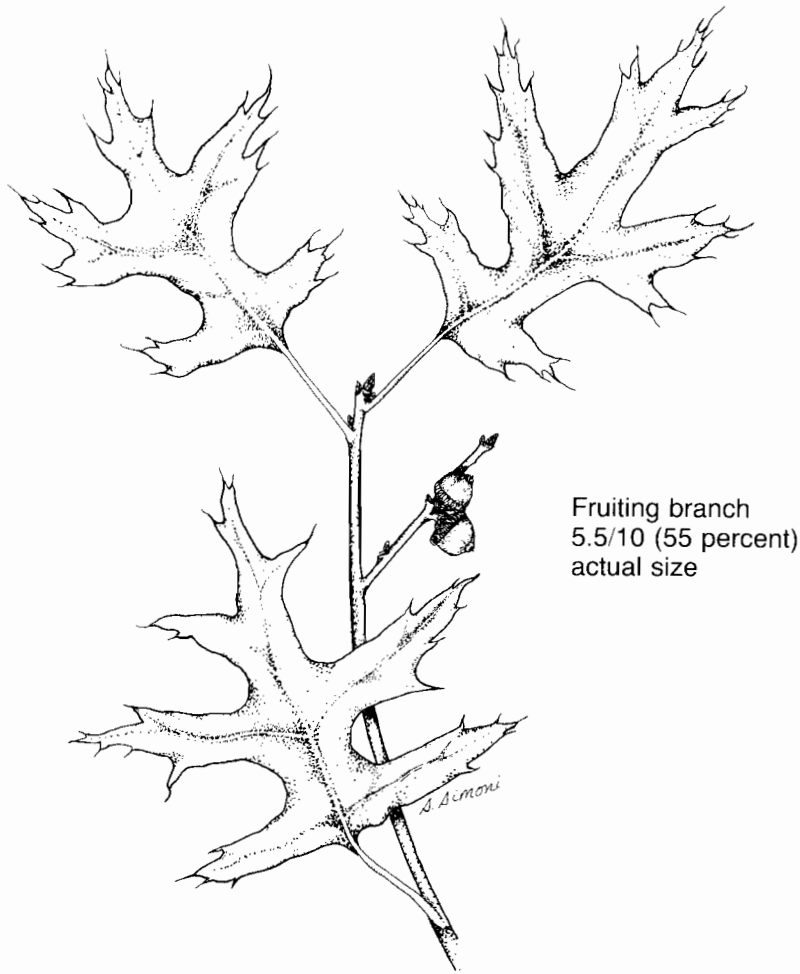
Twigs: slender, orangish-brown to reddish-brown or grayish-brown, glabrous.

Winter Buds: ovoid-globose, light brown, glabrous or somewhat puberulous, 2 to 4 mm long.

LBL Habitats and Distribution: overcup oak is not common in LBL; it is occasionally encountered along streambanks, along the reservoir margins, or in marshy or wet bottoms, such as around Duncan Bay.

Notes: this oak, which is always easily recognizable when in fruit, is primarily a Coastal Plain species. It ranges from New Jersey south to northern Florida, west to eastern Texas, and north in the Mississippi Valley to western Tennessee and Kentucky and the southern portions of Illinois and Indiana.

PIN OAK
Quercus palustris Muenchh.



Habit: small to medium deciduous tree, the dead leaves often remaining until late winter, especially on younger trees.

Leaves: elliptic to oblong, 7 to 16 cm long, 5 to 12 cm wide, 5 to 7 lobed, the center lobe on each side often almost at right angles to the midrib; petioles slender, glabrous, 2 to 6 cm long; blades bright green and glabrous above, paler and glabrous beneath except for prominent axillary tufts, the bases cuneate to broadly obtuse.

Fruits: biennial, acorns sessile or on peduncles to 5 mm long; the cups shallow, saucer-shaped, 10 to 16 mm broad, the inner surface light brown or red-brown with a ring of silvery hairs around the nut scar, covering about 1/4 of the ovoid to globose nuts; nuts 10 to 15 mm long.

Bark: grayish-brown and nearly smooth, developing broad, shallow fissures with age.

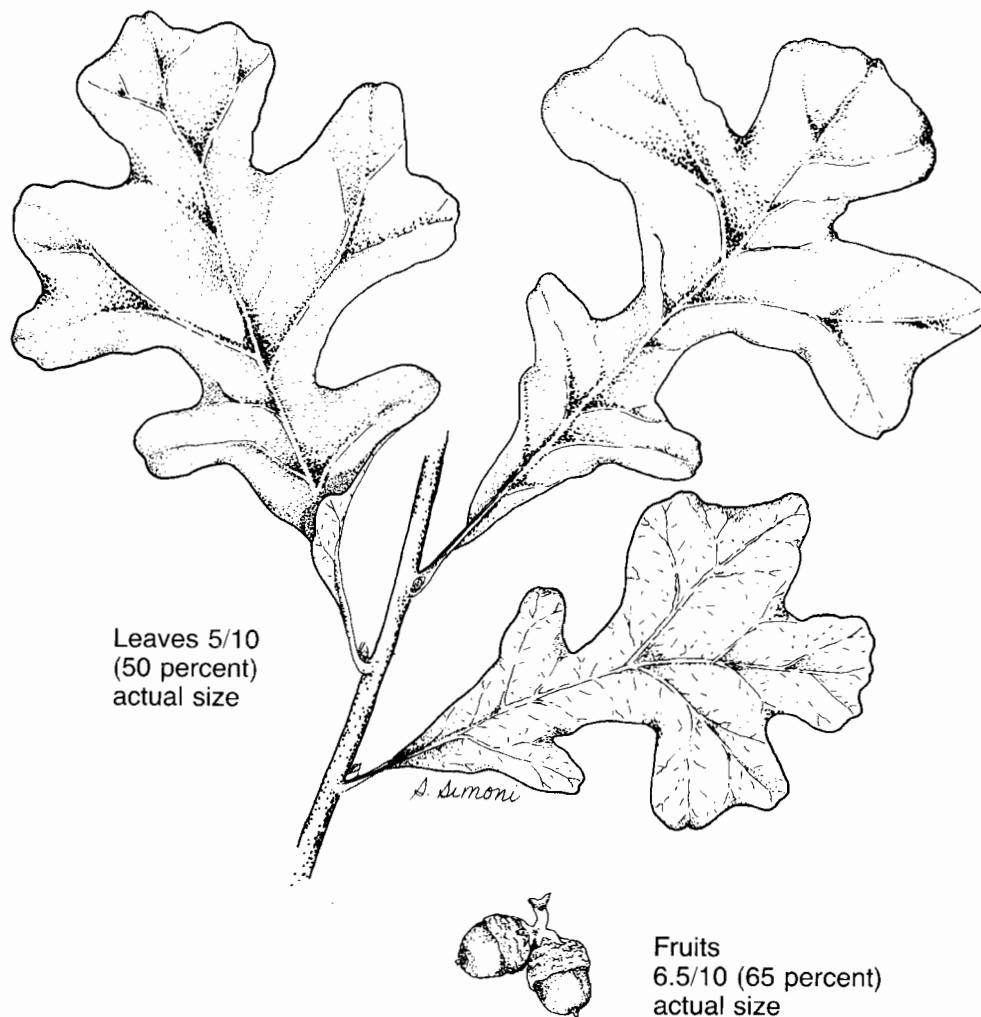
Twigs: slender, reddish-brown, glabrous.

Winter Buds: 3 to 5 mm long, brown to reddish brown, glabrous or with a few fine hairs at the apex.

LBL Habitats and Distribution: not a common tree in LBL, pin oak is most likely to be encountered in moist lowlands or on poorly-drained uplands. Good specimens may be found at Silo Overlook, at Brandon Springs Camp, and along the south side of Highway 68 near the Field Archery Range.

Notes: the common name of this oak, which has a range very similar to that of swamp white oak, derives from the persistent dead branchlets ("pins") common on the lower branches. The pattern of branching, drooping lower branches, horizontal middle branches, and ascending upper branches, is rather distinctive for pin oak. Fairly fast growth (for an oak) and attractive appearance, especially in the fall when the leaves often turn bright red, have led to this being one of the more popular ornamental trees in eastern North America.

POST OAK
Quercus stellata Wang.



Leaves 5/10
(50 percent)
actual size

Fruits
6.5/10 (65 percent)
actual size

Habit: medium to large deciduous tree.

Leaves: obovate, 8 to 15 cm long, 5 to 10 cm wide, 3 to 7 lobed, the lobes at the widest part of the leaf much broadened, giving the leaf a cruciform appearance; petioles stout, usually pubescent, 10 to 25 mm long; blades leathery, dark green and rough above, covered with yellowish to white pubescence beneath, rounded at the apex, acutely narrowed to rounded at the base.

Fruits: annual, acorns sessile or nearly so; cups top-shaped, 12 to 25 mm broad, the scales puberulous and the inner surface pale and pubescent, covering 1/3 of the ovate, elliptic, or oblong nuts; nuts 12 to 25 mm long.

Bark: reddish-brown to dark gray, with scaly ridges separated by deep fissures.

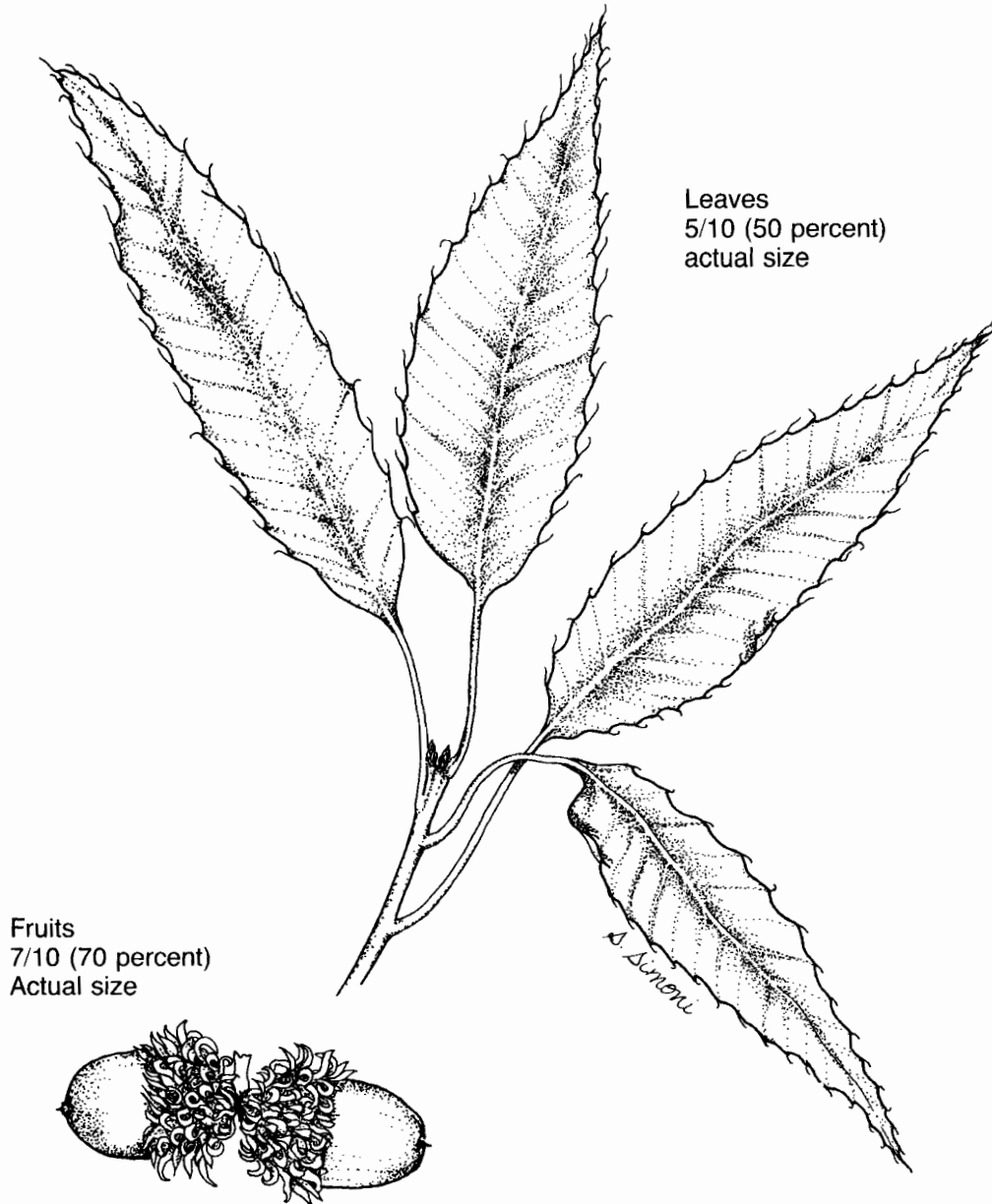
Twigs: stout, tomentose, yellow-gray or ashy-gray.

Winter Buds: ovoid or conical-ovoid, 3 to 5 mm long, reddish-brown and puberulous to pubescent.

LBL Habitats and Distribution: post oak is found almost exclusively on very dry ridges and slopes where it is often a dominant member of the community. It is common along Mulberry Flat and Jenny Ridge roads and on the dry ridges above Ginger Bay.

Notes: from New Jersey in the east, post oak is found throughout the southern two-thirds of the United States south to central Florida and west to southeastern Iowa and central Texas.

SAWTOOTH OAK
Quercus acutissima Carruthers



Habit: small deciduous tree, but retaining leaves into winter.

Leaves: ovate to oblong or obovate, 8 to 18 cm long, 3 to 8 cm wide; margins serrate, blade with 12 to 20 pairs of lateral veins; petioles 0.5 to 1.5 cm long, sparingly pubescent or glabrous; blades lustrous green and glabrous above, light green and glabrous except for axillary tufts beneath, apex acute, base broadly cuneate or rounded.

Fruits: annual, acorns sessile, cups puberulous on the inner surface, 2.0 to 3.5 cm broad with long spreading recurving scales, covering about 2/3 of the ovate/elliptic nuts; nuts 1.5 to 2.5 cm long.

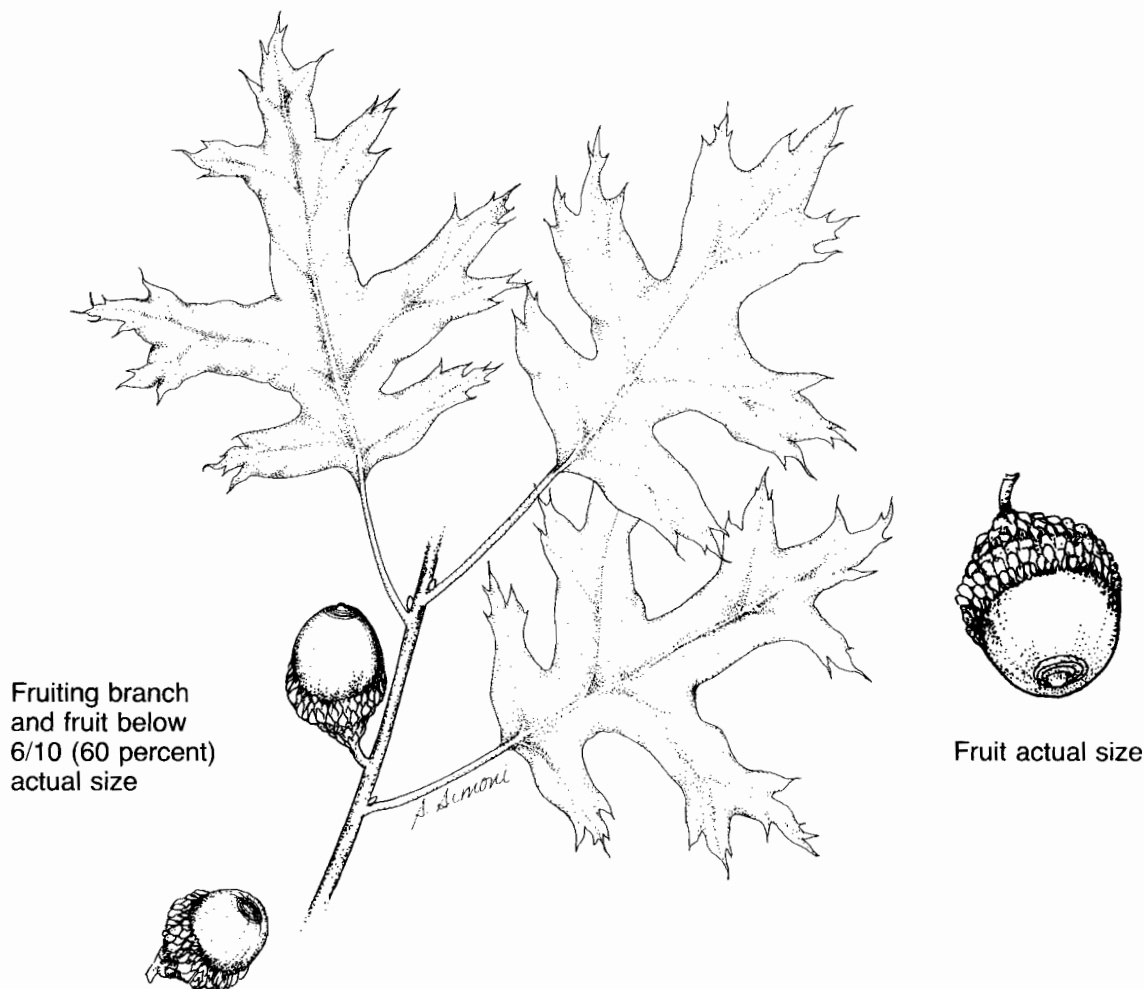
Twigs: slender, glabrous, brown.

Winter Buds: conic-ovoid, brown to dark brown, puberulous, 4 to 8 mm long.

LBL Habitats and Distribution: known from only a few localities, including a grove planted in the Barnes Hollow area south of Silver Trail and scattered along the Trace, especially in Trigg County.

Notes: native to eastern Asia, including China, Japan, and Korea, this oak was introduced to North America in the mid-1800s. The LBL plantings are mostly for wildlife food.

SCARLET OAK
Quercus coccinea Muenchh.



Fruiting branch
and fruit below
6/10 (60 percent)
actual size

Fruit actual size

Habit: small to medium deciduous tree.

Leaves: elliptic to ovate or obovate, 7 to 16 cm long, 8 to 13 cm wide, deeply 5 to 9 lobed; petioles slender, glabrous, 2.5 to 6 cm long; blades shiny and glabrous on both sides except for small axillary tufts beneath.

Fruits: biennial, acorns sessile or nearly so; cups turbinate to hemispheric, 2 to 3 cm broad, glossy, scales light to dark reddish-brown, inner surface light brown and glabrous, covering 1/3 to 1/2 of the oblong to sub-globose nuts; nuts 1.2 to 2.0 cm long, usually with one or more concentric rings at the apex.

Bark: dark gray to dark brown, irregularly fissured, the ridges with small scales.

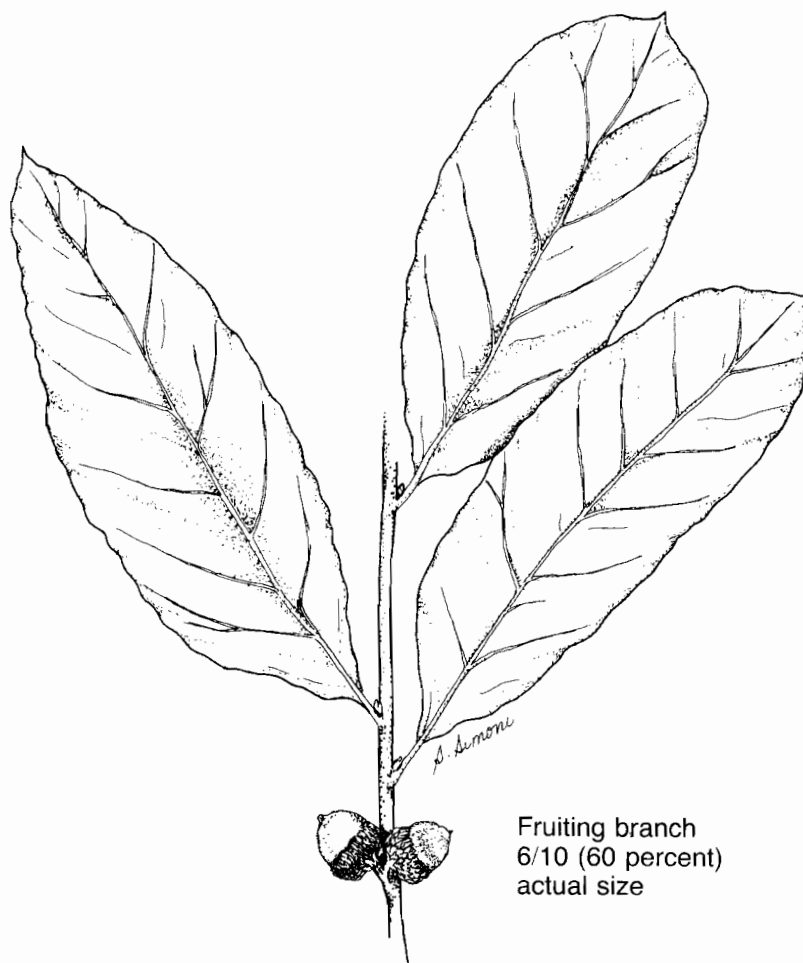
Twigs: stout, glabrous, reddish-brown.

Winter Buds: conic to ovate, 4 to 7 mm long, dark reddish-brown, usually silvery-pubescent above the middle.

LBL Habitats and Distribution: encountered most commonly on dry slopes and ridges, occasionally in more mesic sites such as north-facing slopes and ravines. It is fairly common along Mulberry Flat Road and along the ridge roads above Ginger Bay.

Notes: scarlet oak is an upland species found throughout the eastern United States from southern Missouri northeastward through Ohio to southern New England and southward along the Piedmont into middle Georgia and Alabama. Often confused with black oak, red oak, or Shumard oak, scarlet oak can be easily differentiated from those species by its red-brown buds which are pubescent on the upper half and by the concentric rings at the apex of the nut. Trees having acorns with broad, distinctly warty cups are sometimes classified as *Q. coccinea* var. *tuberculata* Sarg.

SHINGLE OAK
Quercus imbricaria Michx.



Fruiting branch
6/10 (60 percent)
actual size

Habit: medium to large deciduous tree.

Leaves: ovate, elliptic, or obovate, 8 to 20 cm long, 1.5 to 7.5 cm wide, the length 4 or less times the width, entire; petioles 1 to 2 cm long; blades dark green, lustrous, and glabrous above, pale green or brownish and pubescent beneath, apex acute to rounded, base acute to cuneate.

Fruits: biennial, acorns nearly sessile or on peduncles to 12 mm long; cups deeply saucer-shaped to cup-shaped, 10 to 15 mm broad, scales small and finely hairy, inner surface light brown to reddish-brown and glabrous or with a few hairs around the nut scar, covering 1/3 to 1/2 of the nut; nuts ovate to sub-globose, 1.0 to 2.0 cm long, often with one or more indistinct concentric rings at the apex.

Bark: brownish, shallowly fissured and ridged.

Twigs: greenish-brown to brown, usually glabrous.

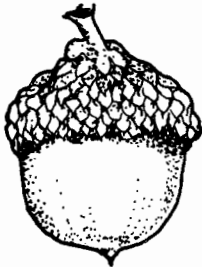
Winter Buds: ovate, 3 to 5 mm long, strongly five-angled in cross-section, brown to reddish-brown, the scales minutely ciliate on the margins.

LBL Habitats and Distribution: this oak generally prefers moderately mesic sites, such as moist slopes, but also may be found on open hillsides and along streambanks, fencerows, and roadsides. It is fairly common at Cravens Bay Lake Access and at Wrangler's Camp.

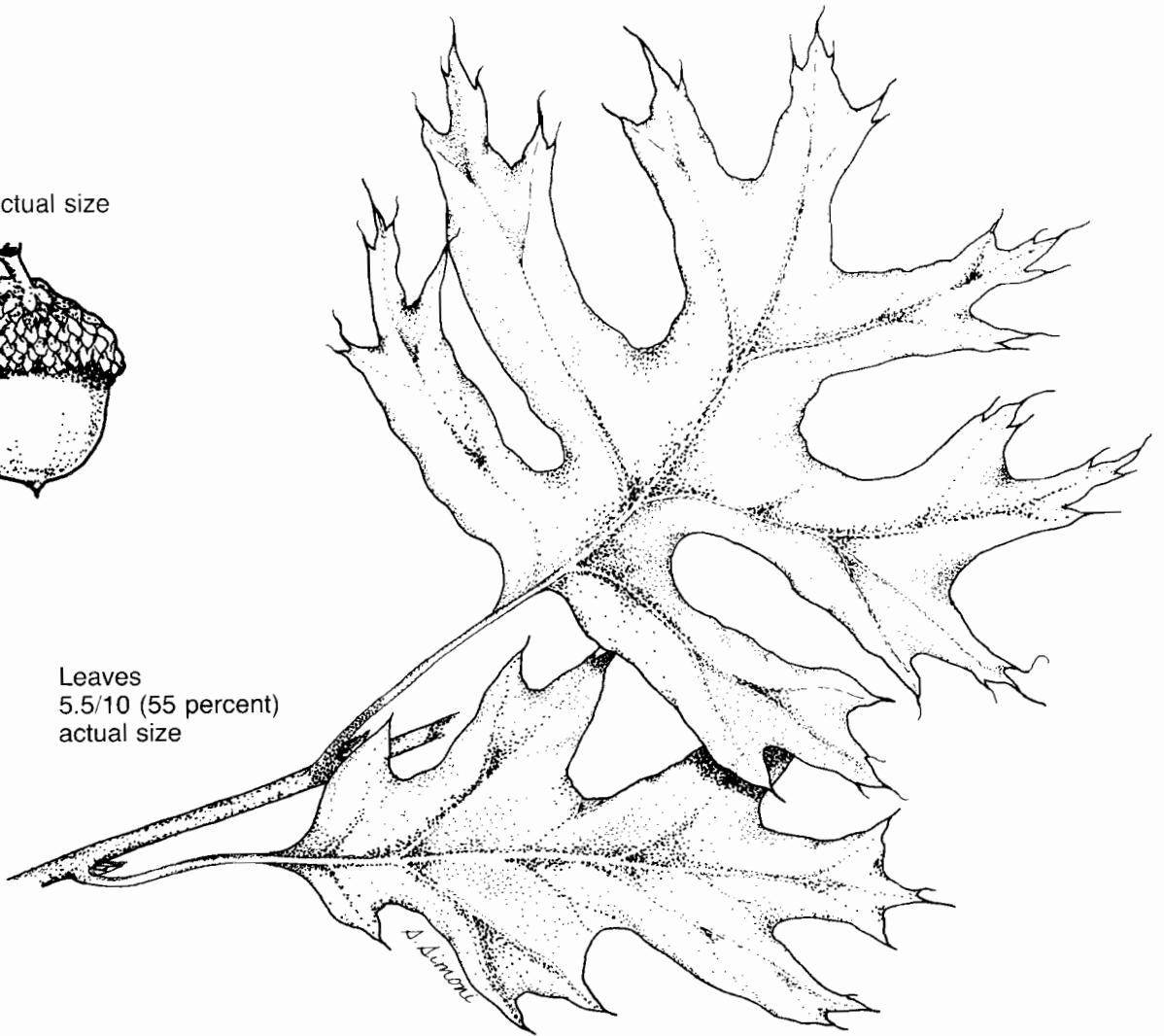
Notes: the scientific name, which means overlapping, refers to the fact that the wood of this tree was once an important source of shingles for houses, hence its common name as well. In the eastern United States, shingle oak occurs naturally from Pennsylvania west to southern Iowa and eastern Kansas and south to Arkansas and west Tennessee. There are numerous scattered reports in the Piedmont area from Maryland to Alabama.

SHUMARD OAK
Quercus shumardii Buckl.

Fruit actual size



Leaves
5.5/10 (55 percent)
actual size



Habit: medium to large deciduous tree.

Leaves: elliptic to obovate, 10 to 20 cm long, 6 to 15 cm wide, 7 to 9 lobed; petioles slender, glabrous, 2 to 6 cm long; blades bright green, lustrous and glabrous above, paler and glabrous beneath except for prominent axillary tufts, bases obtuse to truncate.

Fruits: biennial, acorns sessile or on peduncles to 1 cm long; cups saucer-shaped to shallowly cup-shaped, 15 to 30 mm broad, scales often with pale margins, the inner surface light-brown to red-brown and glabrous or with a ring of hairs around the nut scar, covering 1/4 to 1/3 of the ovate to oblong nuts; nuts 15 to 30 mm long.

Bark: gray brown to dark brown, shallowly fissured with scaly or light colored flat ridges.

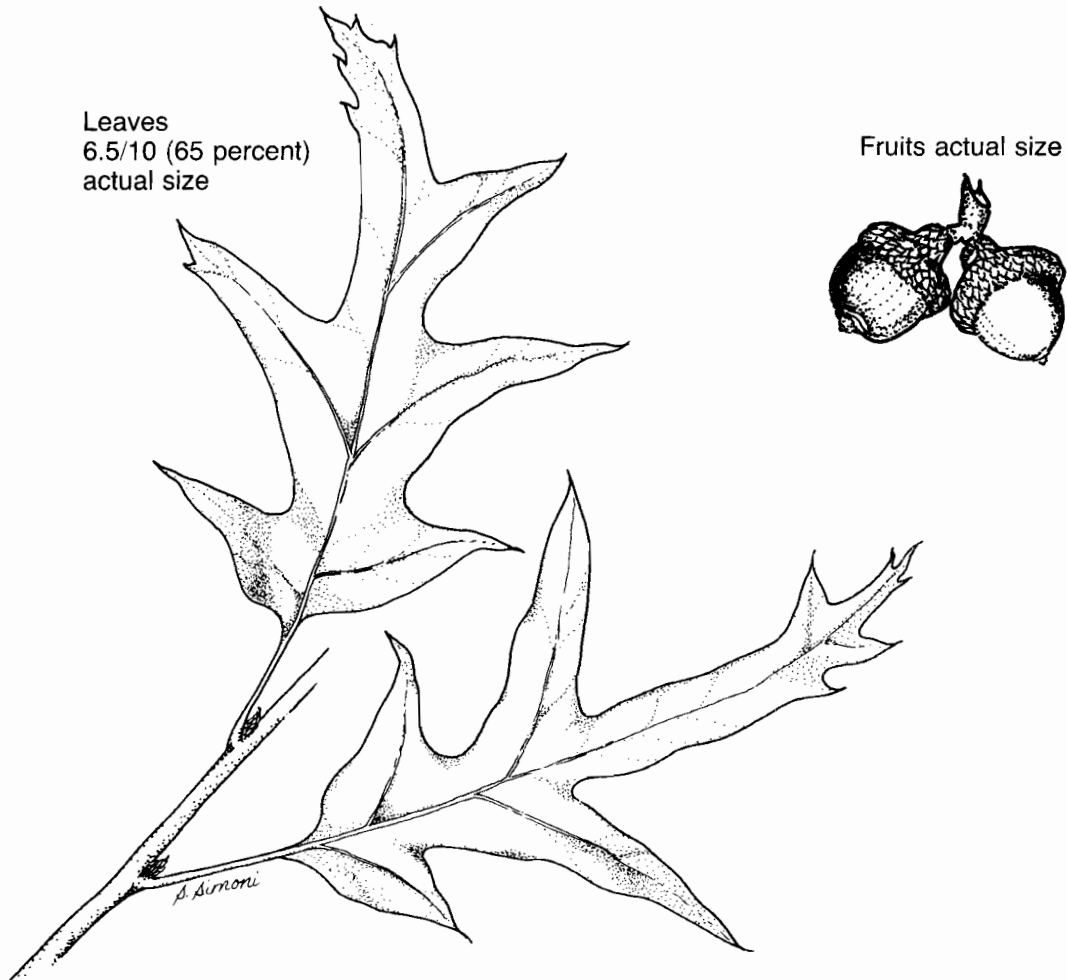
Twigs: slender to stout, gray or grayish-brown, glabrous.

Winter Buds: ovoid, 4 to 7 mm long, gray to grayish-brown and glabrous.

LBL Habitats and Distribution: this oak may be encountered in forests near streambanks or on mesic slopes and bottoms. Several large trees grow along the trail around Hematite Lake.

Notes: Shumard oak has a range similar to that of overcup oak except that it occurs farther north in Missouri and extends northward through the lower Ohio River Valley to northern Indiana. Several varieties of this oak have been recognized. In LBL one will encounter both the typical variety *shumardii*, characterized by acorn cups that are rather flat when viewed from the side and cover about 1/4 of the nut, and the smaller fruited var. *schneckii* (Britt.) Sarg., in which the cup is more rounded and covers about 1/3 of the nut.

SOUTHERN RED OAK, SPANISH OAK
Quercus falcata Michx.



Habit: medium to large deciduous tree.

Leaves: ovate to elliptic or obovate, 10 to 30 cm long, 8 to 16 cm wide, 3 to 7 lobed, the lateral lobes falcate, the terminal lobe often long acuminate; petioles moderately stout, 2 to 6 cm long, sparsely pubescent below, the bases rounded to u-shaped.

Fruits: biennial, acorns sessile or with peduncles to 1 cm long; cups saucer-shaped or cup-shaped, 12 to 16 mm broad, pubescent on the inner surface, covering 1/3 to 1/2 of the sub-globose nuts; nuts 10 to 15 mm long.

Bark: dark brown to black, narrowly fissured, the ridges often scaly.

Twigs: stout, reddish-brown, pubescent.

Winter Buds: ovoid, 4 to 8 mm long, brown, puberulous throughout.

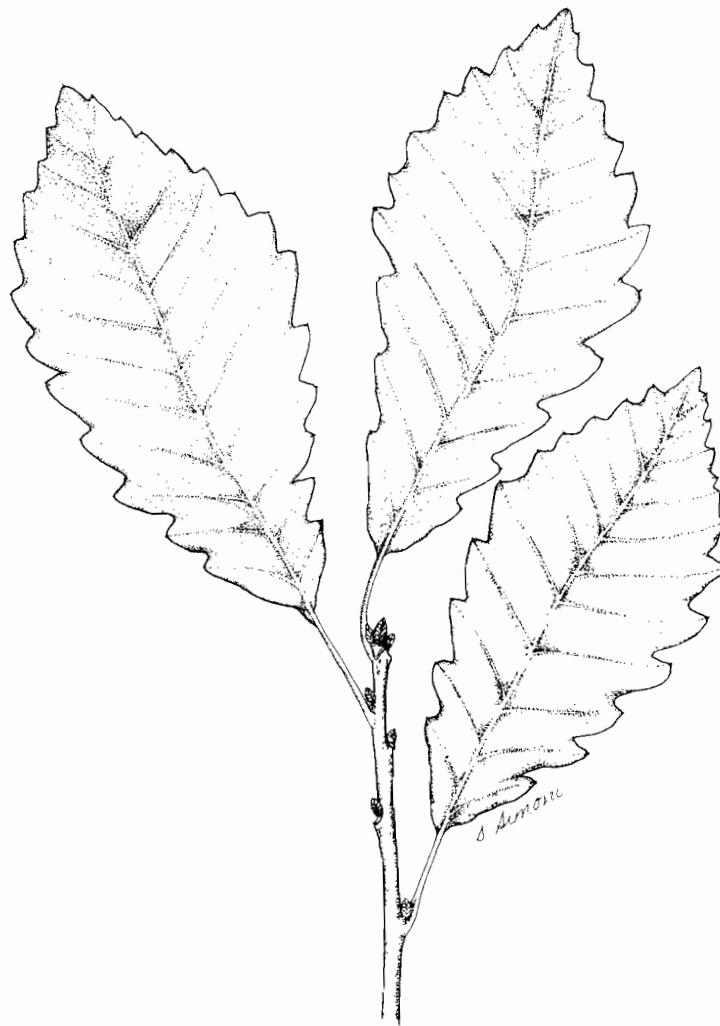
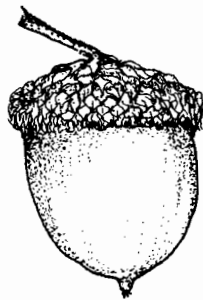
LBL Habitats and Distribution: although this species may be found in moderately moist habitats and occasionally on poorly-drained upland sites, it is most common on dry slopes and ridges, e.g., along Mulberry Flat Road and Blue Springs Road.

Notes: southern red oak is a morphologically variable species common to the Coastal Plain and Mississippi Valley. It ranges from southern New Jersey south to northern Florida and westward, except for the Appalachian highlands, through southern Ohio and Indiana to eastern Oklahoma and Texas. Several forms and varieties have been recognized, the most common of which is the cherrybark oak, here treated as a separate species, *Q. pagoda*. *Quercus falcata* var. *triloba* (Michx.) Nutt. has three-lobed leaves which may resemble those of blackjack oak. However, because leaves having this form may also be found on trees bearing typical leaves, its taxonomic status is questionable.

SWAMP CHESTNUT OAK, BASKET OAK
Quercus michauxii Nutt.

Leaves
5/10 (50 percent)
actual size

Fruit actual size



Habit: large deciduous tree.

Leaves: obovate to elliptic, 12 to 20 cm long, 7 to 13 cm wide, with 10 to 14 pairs of lateral veins, each ending in a tooth or shallow lobe; petioles stout, pubescent, 1.5 to 3.5 cm long; blades dark green and glabrous, rarely roughened by minute hairs above, paler and pubescent beneath with cuneate to rounded bases.

Fruits: annual, acorns on peduncles 0.5 to 2.5 cm long; cups cup-shaped, 1.5 to 3.0 cm broad, enclosing 1/3 to 1/2 of the nuts, the scales hairy and free to their bases, inner surface pale and pubescent; nuts ovoid-oblong, 2.5 to 3.5 cm long.

Bark: light gray with scaly ridges.

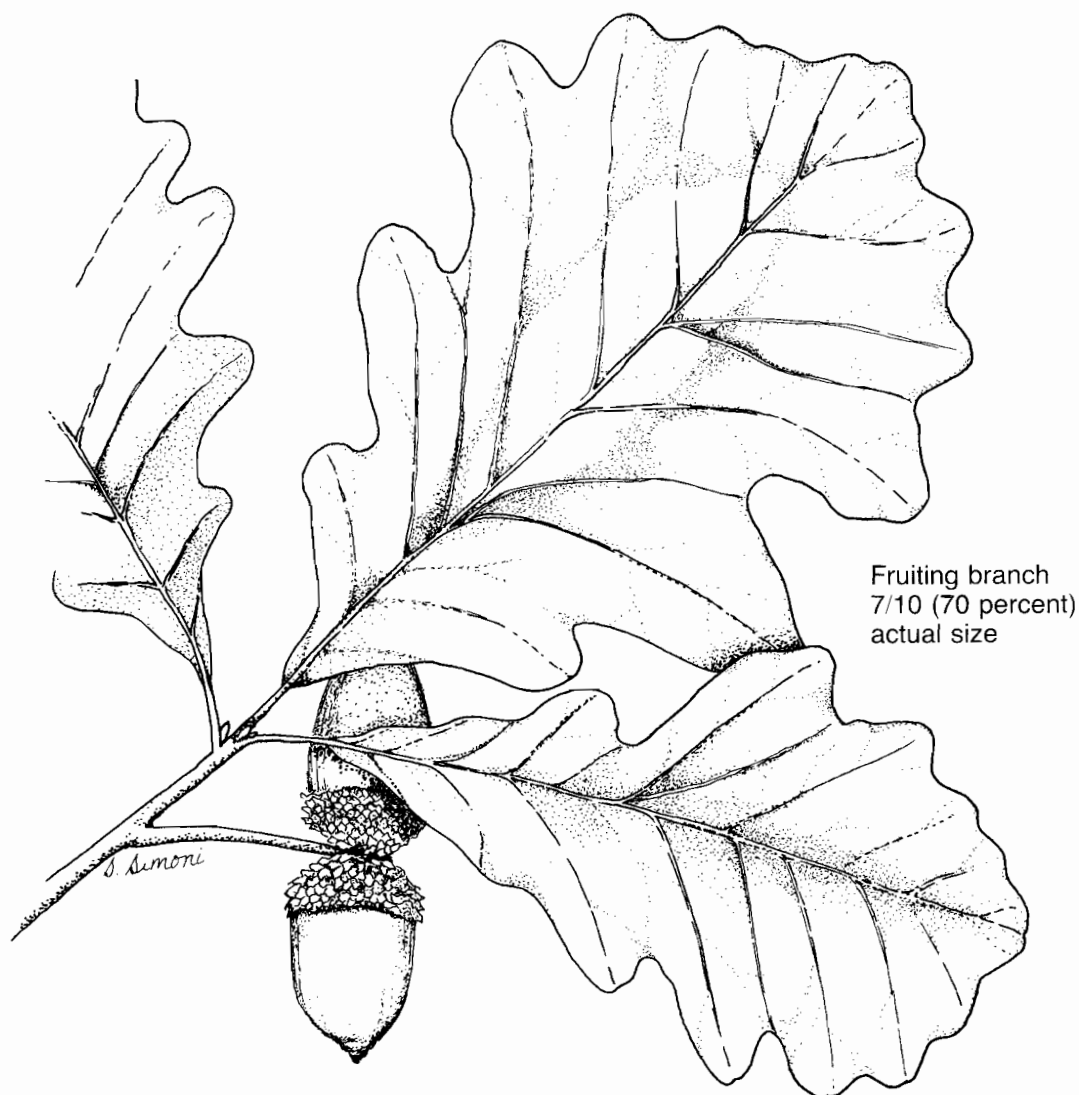
Twigs: stout, reddish-brown to orange-brown, glabrous.

Winter Buds: broadly ovate-oval, 3 to 7 mm long, red-brown and minutely hairy.

LBL Habitats and Distribution: generally rare in LBL but sometimes locally abundant, swamp chestnut oak is found occasionally in mesic habitats such as streambanks and swampy areas, e.g., around Hematite Lake and along the creek between Hematite Lake Dam and Honker Lake.

Notes: the leaves of this oak are very similar to those of chestnut oak and chinkapin oak. The latter two species, however, rarely if ever occur in the same habitats as does swamp chestnut oak, which differs from the former in bark characteristics and from both in fruit characteristics. Its range is almost identical to that of overcup oak.

SWAMP WHITE OAK
Quercus bicolor Willd.



Habit: medium to large tree.

Leaves: oblong-obovate to obovate, 8 to 20 cm long, 5 to 12 cm wide, margins irregularly coarsely toothed or lobed; petioles slender, 0.5 to 1.5 cm long, sparsely pubescent; blades with 5 to 8 pairs of lateral veins, not all ending in teeth or lobes, dark green and glabrous above, paler and pubescent beneath, with cuneate bases.

Fruits: annual, acorns on peduncles 2 to 7 cm long; cups hemispheric, scales often forming a fringed margin, inner surface pale and pubescent, covering 1/3 to 1/2 of the nuts which are 2 to 3 cm long.

Bark: gray and deeply furrowed with elongate scaly ridges.

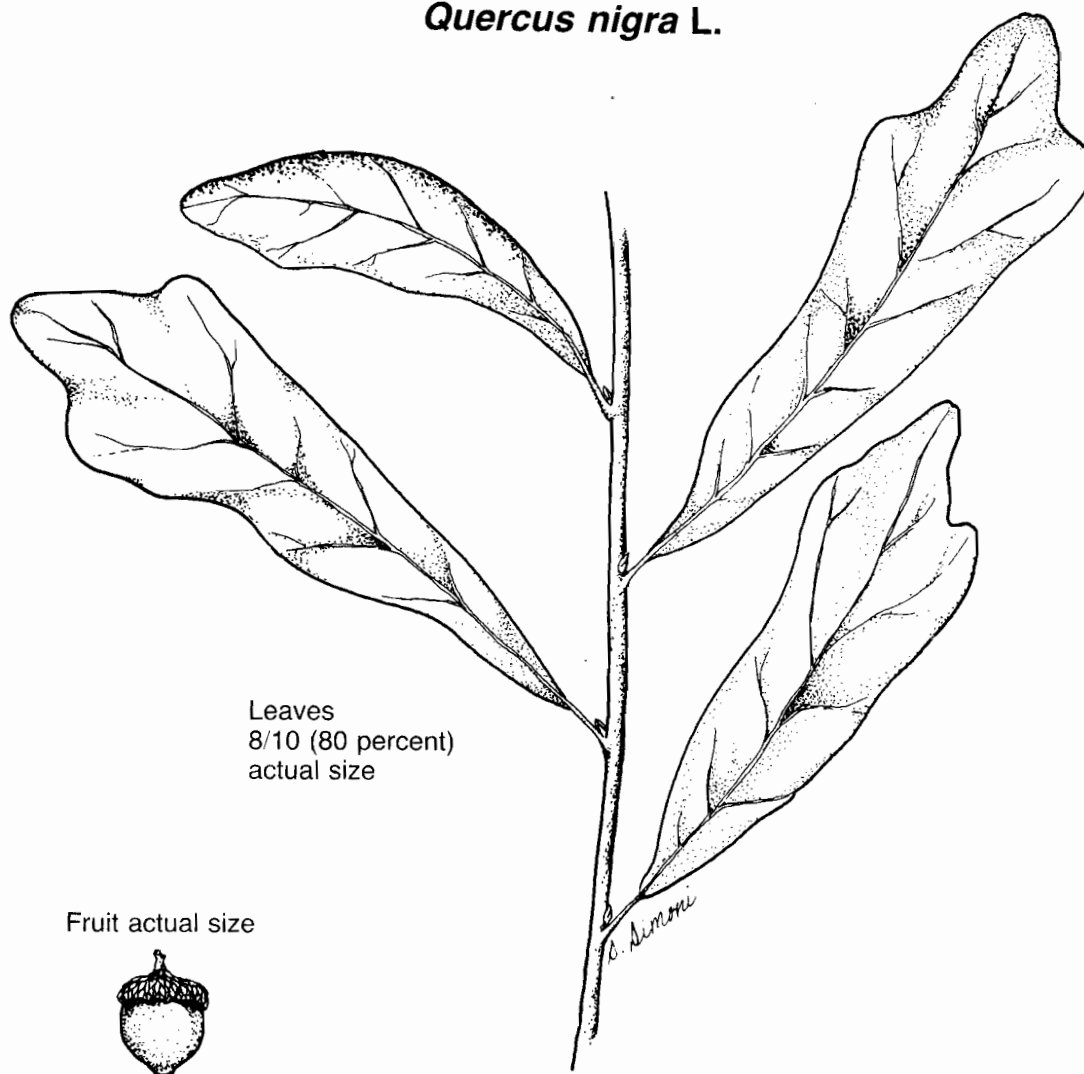
Twigs: stout, at first hairy, becoming glabrous and reddish-brown.

Winter Buds: light brown, globose, 2 to 4 mm long, glabrous or the scales with ciliate margins.

LBL Habitats and Distribution: this oak is very rare in LBL and is known only from a few isolated stations. It will most likely be found in wet bottomlands or on poorly-drained upland sites.

Notes: LBL is near the southern limit of the range of swamp white oak, which extends from eastern Kansas north to central Wisconsin and east to southern New England.

WATER OAK
Quercus nigra L.



Leaves
8/10 (80 percent)
actual size

Fruit actual size

Habit: medium deciduous tree.

Leaves: obovate, widest near the tip, 4 to 10 cm long, 2 to 5 cm wide, margin entire or with 3 rounded, rarely acute, lobes; petioles 0.5 to 1 cm long; blades dull green above, glabrous except for small axillary tufts beneath, tapering to cuneate bases.

Fruits: biennial, acorns sessile or on peduncles 1 to 3 mm long; cups 1.0 to 1.5 cm broad, saucer-shaped, inner surface pubescent, covering 1/4 to 1/3 of the ovoid to globose nuts which are 8 to 12 mm long.

Bark: grayish-black and nearly smooth, becoming irregularly and shallowly fissured with age.

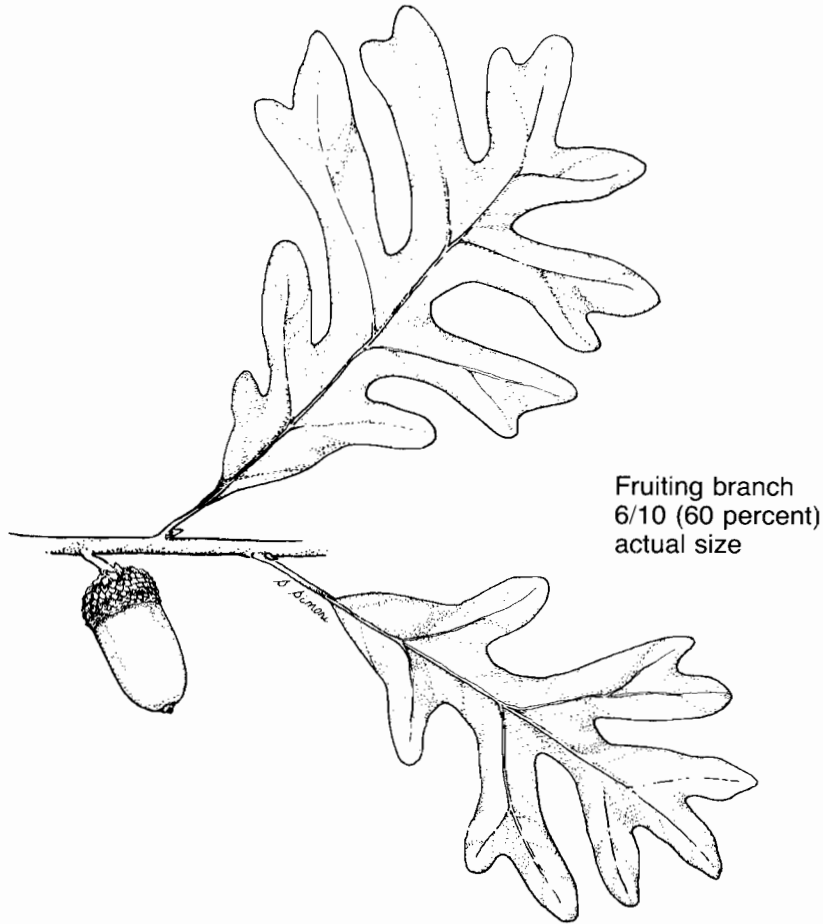
Twigs: slender, reddish-brown, glabrous.

Winter Buds: reddish-brown, pointed, nearly glabrous to finely pubescent, 4 to 6 mm long.

LBL Habitats and Distribution: this oak was formerly known from a single site on the Tennessee River at Hughes Bay where one small tree, now apparently dead, was last observed in 1971. Water oak is known from several localities just to our west and north and might reasonably be expected to occur elsewhere in LBL, especially along Kentucky Lake.

Notes: a tree of lowland areas, especially along streambanks, water oak occurs throughout the Coastal Plain from southern New Jersey to central Florida and eastern Texas and extends up the Mississippi Valley to eastern Missouri and western Kentucky.

WHITE OAK
Quercus alba L.



Habit: medium to large deciduous tree, the dead leaves often persisting into late winter.

Leaves: oval to oblong-obovate or obovate, 10 to 22 cm long, 5 to 10 cm wide, with 7 to 11 rounded lobes, the sinuses extending evenly and usually 1/3 or more to the midrib; petioles stout, 1 to 2 cm long, glabrous; blades green and glabrous above, paler, often glaucous and glabrous beneath, the bases narrowly to broadly cuneate.

Fruits: annual, acorns sessile or on peduncles to 2 cm long; cups with warty or corky appressed scales, 10 to 25 mm broad, inner surface pale or brown and pubescent, covering 1/4 to 1/3 of the ovoid-elliptic or oblong nuts which are 1.5 to 2.5 cm long.

Bark: typically light gray and flaky or scaly.

Twigs: stout, glabrous, reddish-brown.

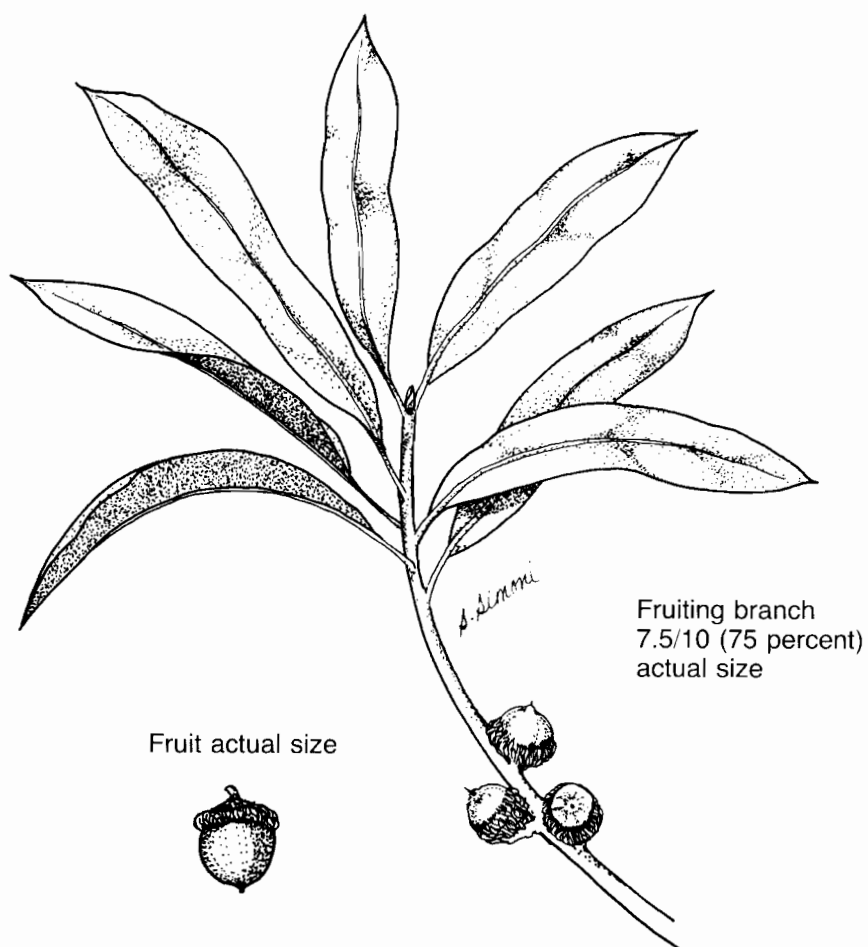
Winter Buds: globose to broadly ovoid, dark reddish-brown, glabrous, 3 to 5 mm long.

LBL Habitats and Distribution: while this oak occurs in a variety of habitats throughout LBL, it is infrequent on poorly-drained sites but grows on almost all of the well-drained slopes and ridges.

Notes: found throughout eastern North America, white oak is the most important of our native oaks. Its wood is highly prized for making furniture and barrels for aging distilled spirits. Prior to the development of steel-hulled ships, white oak was the chief source of wood for ship building.

Variations in leaf morphology have led to several varieties of white oak being described. Thus, trees with leaves having very shallow sinuses and broad lobes are classified as *Q. alba* var. *latiloba* Sarg., while those having very deep sinuses with narrow, toothed lobes are classified as *Q. alba* var. *pinatifida* Michx. It is our experience that leaf variation on a single tree may give rise to both extremes. That is, leaves growing in full sun are often deeply divided with narrow lobes while those growing in the shade are often very shallowly and broadly lobed. This phenomenon apparently is common in all oaks.

WILLOW OAK
Quercus phellos L.



Habit: medium to large deciduous tree.

Leaves: linear to narrowly elliptic, widest near the middle, 5 to 12 cm long, 1.0 to 2.5 cm wide, the length 5 or more times the width, margins entire; petioles glabrous, 2 to 4 mm long; blades light green and glabrous above, paler and glabrous or rarely softly pubescent beneath, acute at both ends.

Fruits: biennial, acorns sessile or on peduncles to 5 mm long; cups shallowly saucer-shaped, 8 to 12 mm broad, inner surface light brown and pubescent, covering 1/4 of the ovate to hemispheric nuts which are 8 to 12 mm long.

Bark: dark gray and smooth, becoming darker, irregularly fissured and scaly with age.

Twigs: slender, reddish-brown, glabrous.

Winter Buds: ovoid, acute, 2 to 4 mm long, the chestnut-brown scales glabrous with pale margins.

LBL Habitats and Distribution: this oak may be found occasionally along streambanks and on poorly-drained uplands. Several large trees are known from the area where Road 232 approaches the water's edge near Ft. Henry.

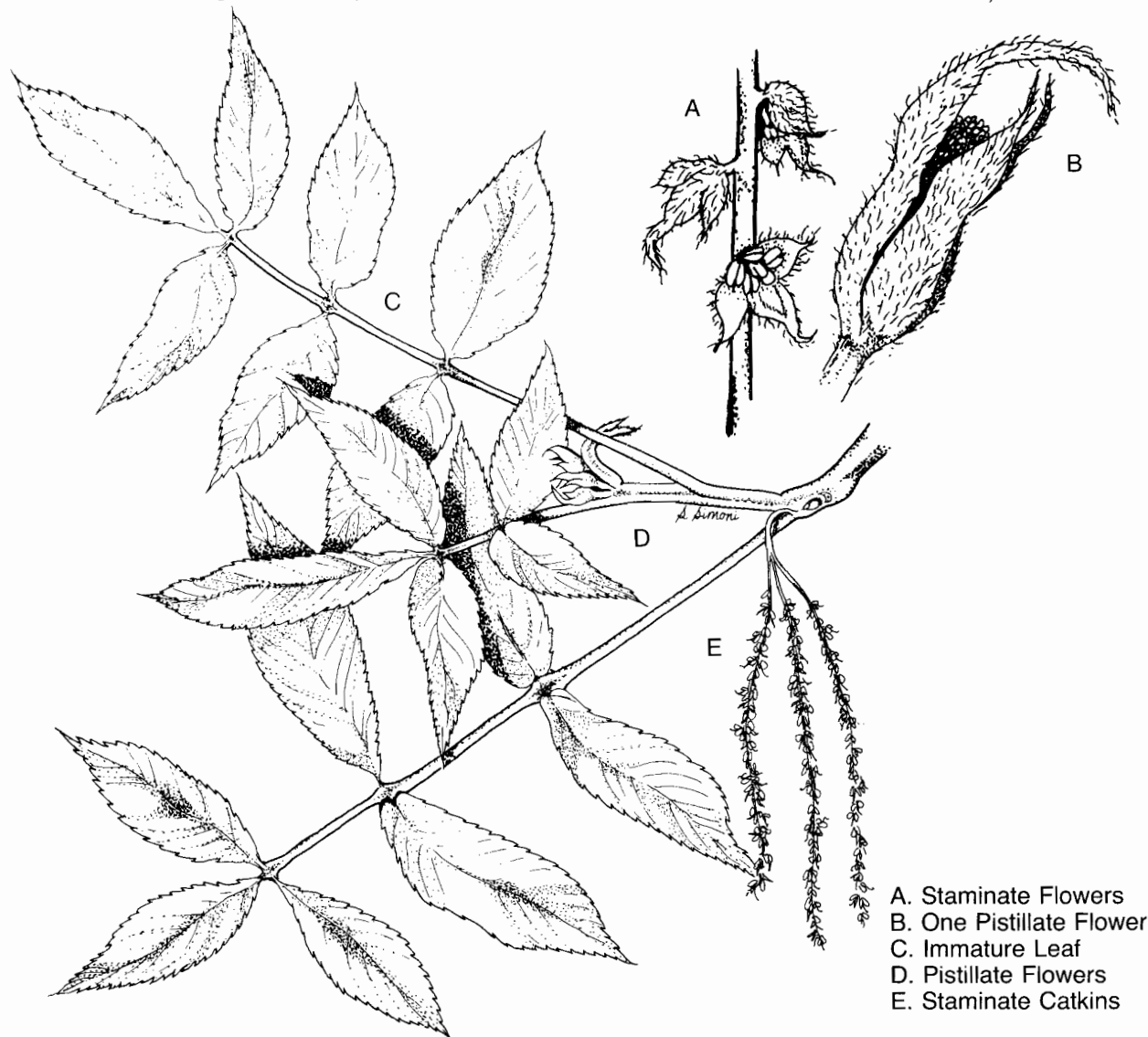
Notes: willow oak has a range very much like that of water oak except that it occurs farther north in Kentucky. It and shingle oak, the only entire-leaved oaks in LBL, can be separated primarily by the smaller and much narrower leaves of willow oak. There is a form of willow oak, which has not been reported from LBL, which has soft pubescence on the lower surface of the leaves. However, lammas shoot leaves of LBL plants are often softly pubescent on the lower surface.

THE WALNUT FAMILY, JUGLANDACEAE

Members of the Juglandaceae (from *Juglans*, the generic name of walnut) occur mostly in north temperate zones and include about 60 species. Only 20 species are found in North America, 11 in LBL. Characteristics include alternately arranged, pinnately compound leaves and a hard, leathery covering on the fruit (nut). As in the Fagaceae, flowers

are of two kinds. Staminate (pollen-producing) flowers appear in long, drooping catkins and the pistillate (pistil-bearing) ones are in groups of two-several (see sketch of representative flowers). Many species of this important family are valued for their strong, dark wood and edible fruits.

Flowers of *Carya tomentosa*, Mockernut Hickory
(flowering branch 45 percent actual size; individual flowers 10 times actual size)



A. Staminate Flowers
B. One Pistillate Flower
C. Immature Leaf
D. Pistillate Flowers
E. Staminate Catkins

SUMMER OR WINTER KEY TO THE LBL GENERA OF THE WALNUT FAMILY

1. Stem-pith solid; leaflets fewer than 11 (except pecan); nuts with a hard husk that divides into segments (except pignut hickory) **Hickories (*Carya*)**
1. Stem-pith chambered (segmented); leaflets 11 to 23; nuts with a fleshy husk which does not divide into segments upon ripening **Walnuts (*Juglans*)**

THE HICKORIES, *Carya*

The genus *Carya* (from the Greek *Karya*, the name given to the walnut tree) is geologically old and fossil remains indicate that many species no longer exist. Only about 17 species are extant today; the majority of these occur in North America but two species are known from China. All have alternately arranged, pinnately compound leaves and flowers in clusters on new growth. The outer layer of the

fruit (nut) is a woody husk which usually splits along four lines or sutures. Hickory wood is strong and shock-resistant and often used for lumber and to make handles for hand tools; the slow-burning wood was considered the best for firewood, curing meat, and cooking. Pecans and kingnuts were actively sought for their large, edible fruits.

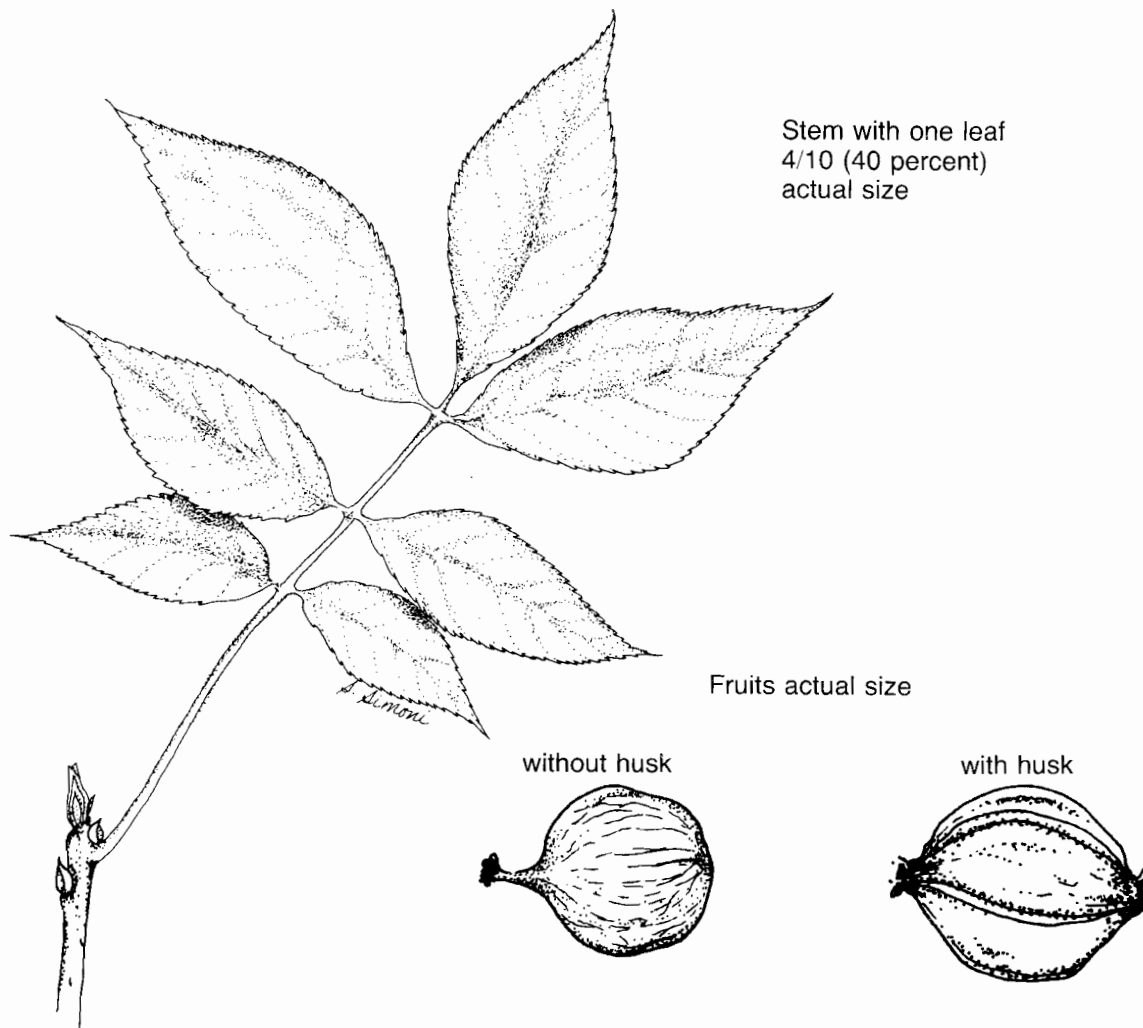
SUMMER KEY TO THE HICKORY SPECIES

1. Leaflets mostly more than 9 **Pecan (*Carya illinoensis*)**
1. Leaflets 9 or fewer 2
 2. Leaflets mostly 5 3
 2. Leaflets mostly 7 or 9 5
 3. Bark tight (ridged but not shaggy); leaflets without tufts of hairs along the margins **Pignut Hickory (*C. glabra*)**
 3. Bark shaggy (with long, loose strips); leaflets with tufts of hairs along the margins 4
 4. Terminal leaflets 1/3 to 1/2 half as wide as long **Shagbark Hickory (*C. ovata*)**
 4. Terminal leaflets about 1/4 as wide as long **Southern Shagbark Hickory (*C. carolinae-septentrionalis*)**
5. Leaves mostly more than 33 cm long; bark very shaggy **Shellbark Hickory (*C. laciniosa*)**
5. Leaves mostly less than 33 cm long; bark tight or slightly shaggy 6
 6. Leaf stalks conspicuously hairy 7
 6. Leaf stalks without hair or only slightly hairy 8
 7. Terminal leaflet less than 13 cm long; twigs slender **Sand Hickory (*C. pallida*)**
 7. Terminal leaflet more than 13 cm long; twigs stout **Mockernut Hickory (*C. tomentosa*)**
 8. Leaf stalks and lower surfaces of leaflets slightly hairy; leaflets 7 or 9; mature buds yellow; bark tight **Bitternut Hickory (*C. cordiformis*)**
 8. Leaf stalks and lower surfaces of leaflets without hairs; leaflets usually 7, rarely 5; mature buds red-brown; bark slightly shaggy **Red Hickory (*C. ovalis*)**

WINTER KEY TO THE HICKORY SPECIES

1. Bud scales paired, not overlapping 2
1. Bud scales not paired, overlapping 3
 2. Buds yellow; fruit rounded **Bitternut Hickory (*Carya cordiformis*)**
 2. Buds tawny or ashy; fruit elongated **Pecan (*C. illinoensis*)**
 3. Terminal bud more than 1.3 cm long; twigs stout 4
 3. Terminal bud less than 1.3 cm long; twigs slender 6
 4. Outer bud scales shed by late autumn; bark not shaggy **Mockernut Hickory (*C. tomentosa*)**
 4. Outer bud scales persisting; bark shaggy 5
5. Terminal bud 2 cm long or longer; nut, without husk, more than 3.8 cm long; shell about 6 mm thick **Shellbark Hickory (*C. laciniosa*)**
5. Terminal bud less than 2 cm long; nut, without husk, less than 3.8 cm long; shell less than 6 mm thick **Shagbark Hickory (*C. ovata*)**
6. Outer bud scales with short hairs; husk covered with yellow scales **Sand Hickory (*C. pallida*)**
6. Outer bud scales without hairs; husk not covered with yellow scales 7
 7. Bark very shaggy **Southern Shagbark Hickory (*C. carolinae-septentrionalis*)**
 7. Bark tight or only slightly shaggy 8
 8. Husk not splitting freely to the base; fruit narrowed toward the base, often with a pig-like snout; bark tight **Pignut Hickory (*C. glabra*)**
 8. Husk splitting freely to the base; fruit rounded at the base, without snout; bark often slightly shaggy **Red Hickory (*C. ovalis*)**

BITTERNUT HICKORY
Carya cordiformis K. Koch



Habit: up to 30 m tall and 1 m in diameter; shape narrow but spreading near the top with age; crown open and rounded.

Leaves: 15 to 25 cm long with 7 to 9 lanceolate leaflets which are 10 to 15 cm long, 2 to 3.2 cm wide and slightly hairy below; leaf stalks slightly hairy.

Fruits: 2 to 4 cm long, rounded, four-winged from the apex to the middle; the husk thin, covered with small yellow scales; nut often broader than long; shell thin; kernel red-brown and very bitter.

Bark: thin, shallowly fissured and forming flat ridges, light brown tinged with red, not shaggy.

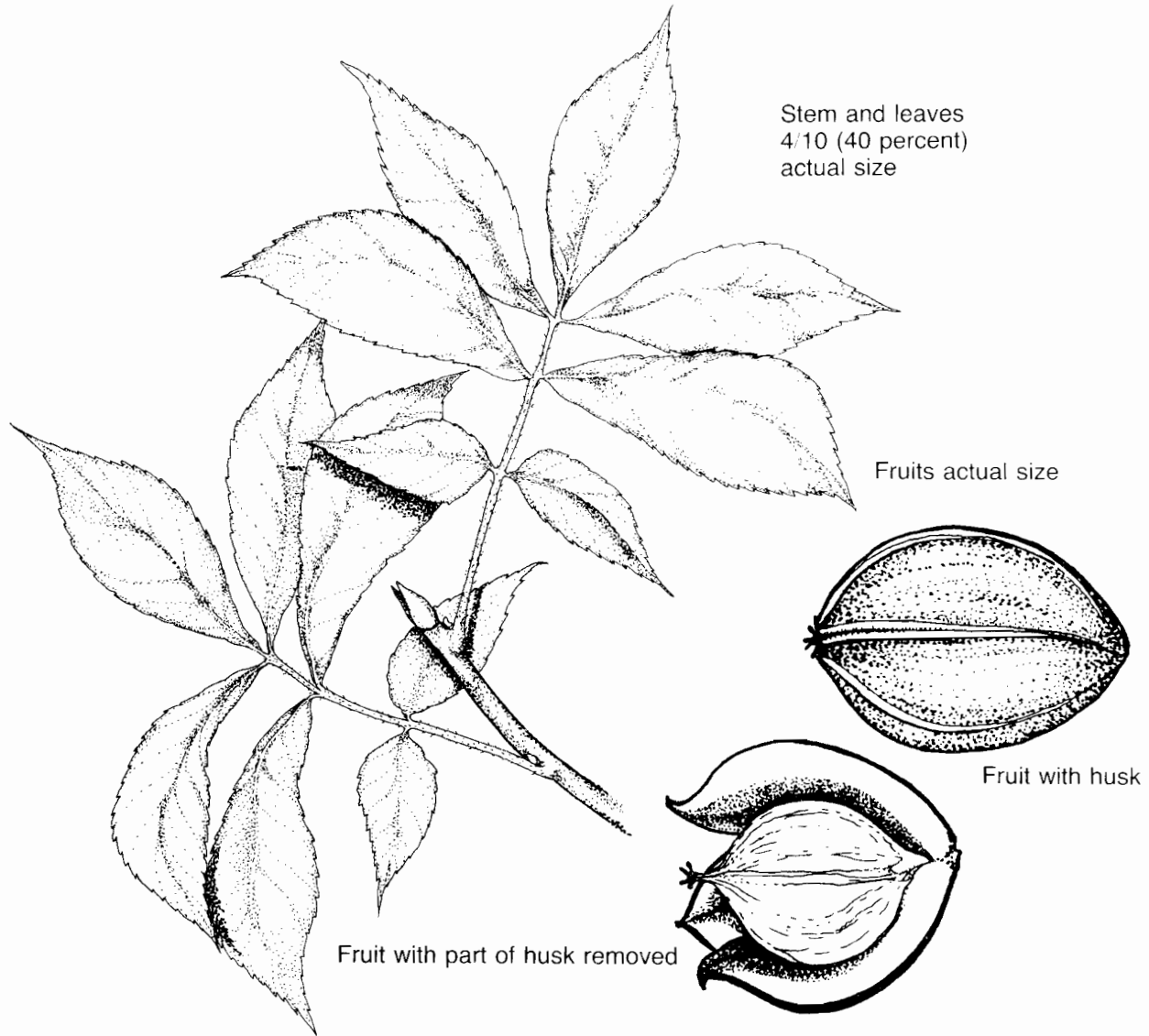
Stems: branches stout, ascending to spreading; twigs slender, green at first, then red-brown and ultimately light gray, older twigs hairless, leaf scars small, elevated, slightly three-lobed.

Winter Buds: terminal bud 12 to 20 mm long, flattened, yellow, the two outer scales not overlapping, with short hairs; lateral buds smaller, ovoid, yellow.

LBL Habitats and Distribution: abundant in streambank, ravine, and moist slope forests.

Notes: ranges over much of eastern United States and into southern Canada. Trees are long-lived and windfirm but shade intolerant. Bitternut is susceptible to fire damage and vulnerable to bark beetles, twig girdlers, and heart rot (a fungal disease.) The wood was used for tool handles and wooden wagon wheels while oil from kernels was used in lamps and in rheumatism medicines. The bitter kernels are not edible by humans.

MOCKERNUT HICKORY
Carya tomentosa Nutt.



Stem and leaves
4/10 (40 percent)
actual size

Fruits actual size

Fruit with husk

Fruit with part of husk removed

Habit: up to 30 m tall and 1 m in diameter; crown broad and open with large branches.

Leaves: 20 to 30 cm long with usually 7 (rarely 5 or 9) leaflets which have many resinous glands on both surfaces; upper leaflets 13 to 20 cm long and 7 to 13 cm wide; leaf stalks very hairy.

Fruits: 3.8 to 5 cm long; husk 3 to 6 mm thick, splitting nearly to the base when ripe; nut with thick shell and sweet kernel.

Bark: close (not shaggy), dark gray with shallow furrows and interlacing ridges on mature trunks.

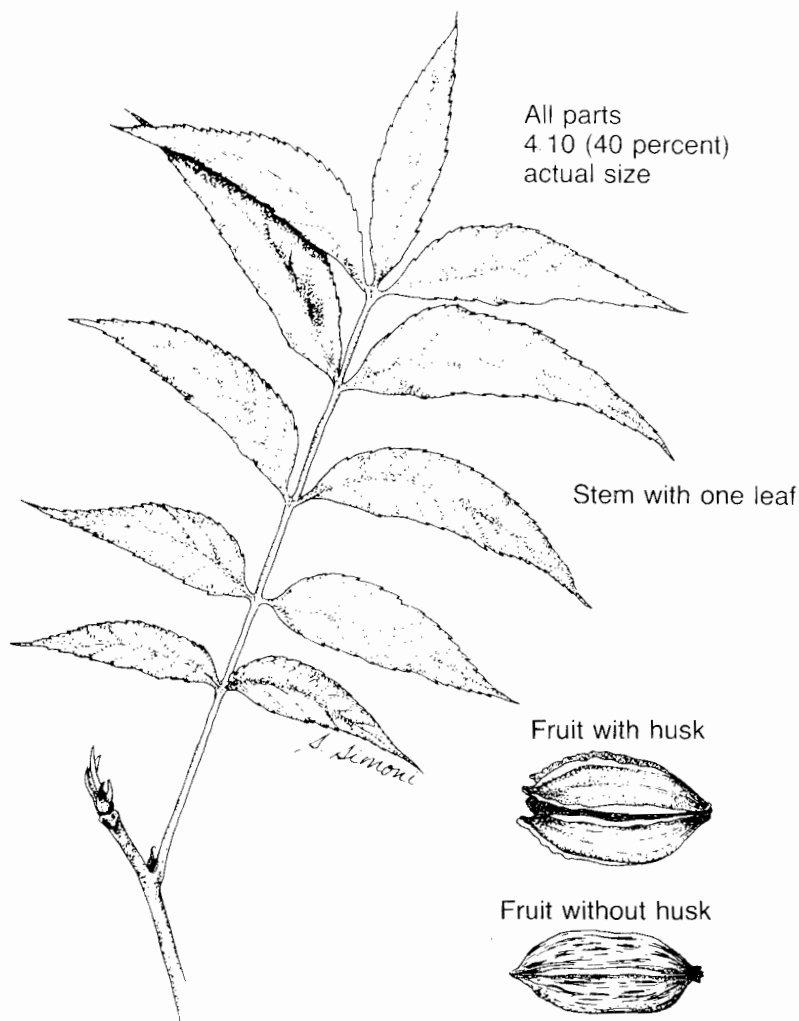
Stems: branches stout and spreading; twigs stout, gray to red-brown, slightly hairy when young with small pale lenticels; leaf scars small and oval to slightly three-lobed.

Winter Buds: terminal bud 13 to 19 mm long; outer scales red-brown and usually deciduous late in autumn.

LBL Habitats and Distribution: abundant on dry ridges and slopes but less frequent on the very driest sites; occurs only on well-drained sites.

Notes: found throughout eastern United States, this long-lived species produces fruit in large quantities. Nuts are actively sought by wildlife but are of little value for humans because of the thick shells and small kernels. Settlers extracted a black dye by boiling small pieces of bark in vinegar. The mockernut is intolerant to shade and flooding and like most hickories, is susceptible to fire and various insects, including the hickory bark beetle, the hickory spiral borer, and pecan carpenter worm.

PECAN
Carya illinoensis (Wang.) K. Koch



Habit: huge trees up to 55 m tall and about 2 m in diameter; narrow near the base but spreading near the top; crown open and rounded.

Leaves: 30 to 50 cm long with 9 to 17 leaflets; each leaflet 7 to 20 cm long and 3.5 to 7 cm wide, often bow-shaped with one edge straight and the other convex.

Fruits: 3.8 to 5 cm long, oblong, in clusters of 3 to 6; husk thin, narrowly four-winged, dark brown, hairy; nut elongate, rounded at the base and pointed at the tip, brown; shell thin; kernel oily and sweet.

Bark: thick, reddish-brown, deeply and irregularly divided into narrow, forked ridges.

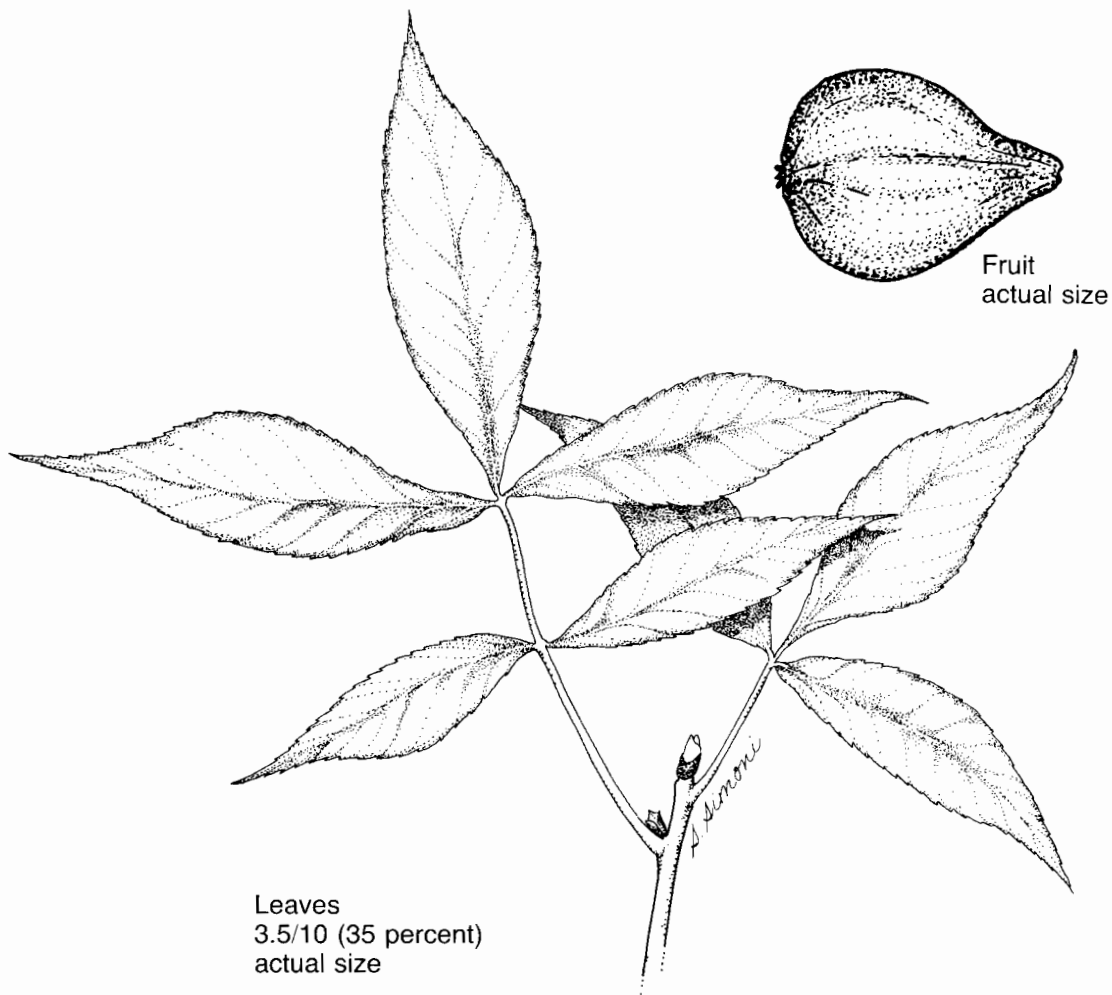
Stems: branches stout and erect to slightly spreading; twigs light brown and hairy when young, becoming hairless and red-brown by the second year with many elongated orange lenticels; leaf scars large, elongated and three-lobed.

Winter Buds: terminal buds flattened, about 13 mm long, yellow-brown, hairy; lateral buds smaller and ovoid.

LBL Habitats and Distribution: some planted trees on old homesites but a few native individuals on the floodplains of both reservoirs. A specimen near Barkley Reservoir, within the Bear Creek Waterfowl Management Area, has a diameter of almost five feet and is one of the largest LBL trees of any species.

Notes: the natural range of the pecan is mostly to the south and west of LBL but it has been planted extensively throughout America. The light, red-brown wood is used for floorings, cabinets, and as veneer for furniture. Pecan is long-lived, intolerant to shade, but quite tolerant of flooding. It is susceptible to fire and the various insects mentioned for other species.

PIGNUT HICKORY
Carya glabra (Mill.) Sweet



Habit: up to about 30 m tall and 1 m in diameter; cylinder-shaped with an open, rounded crown.

Leaves: 15 to 30 cm long with 5 (rarely 7) leaflets; the leaflets 8 to 15 cm long and 2.5 to 5 cm wide, hairless ("glabra" is Latin for hairless).

Fruits: approximately 2.5 cm long and 2 cm wide, pear-shaped (narrows at the base); husk thin, dark brown, only slightly splitting into segments if at all; nuts broadest near the apex, narrowed at the base; thick shell; kernel insipid or bitter.

Bark: thin, close with irregular furrows forming criss-crossing ridges, light gray.

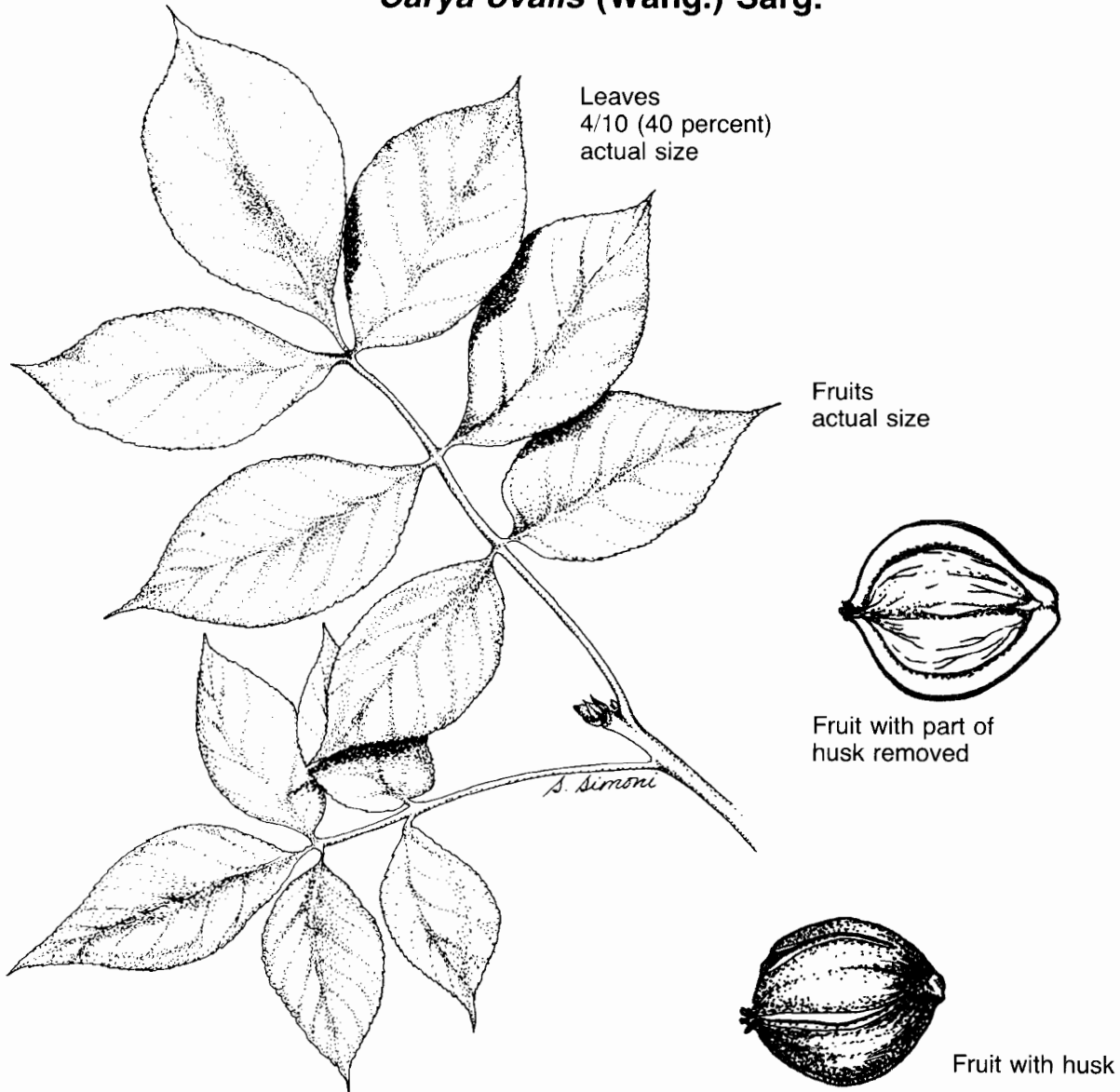
Stems: branches short, stout, and spreading; twigs red-brown to gray; leaf scars small, oval to almost three-lobed.

Winter Buds: terminal buds 6 to 12 mm long, brown, hairless, conical.

LBL Habitats and Distribution: the most abundant hickory in dry ridge and slope forests.

Notes: ranges from southern Canada to central Florida and into the midwest. Pignut wood is very heavy and used for tool handles, skis, and other equipment that must be tough and resistant to impact. It is sometimes called "broom hickory" since settlers used narrow strips of the wood to make brooms. The nuts are not generally edible by humans. This hickory shows considerable tolerance to shade but is intolerant to flooding and grows only on upland sites where it is one of the most windfirm species because of an extremely large and deep-penetrating tap root.

RED HICKORY
Carya ovalis (Wang.) Sarg.



Habit: up to 30 m tall and about 1 m in diameter; shape similar to that of pignut.

Leaves: 15 to 25 cm long with 7 (rarely 5) leaflets which are hairy when young but hairless when mature; terminal leaflet stalked, 15 to 18 cm long and 3.8 to 5 cm wide; lateral leaflets sessile.

Fruits: 2.5 to 3 cm long and about 2 cm wide; husk thin, about 2 to 2.5 mm thick, splitting freely to the base; nut with ridges extending from 1/3 to 1/2 its length; shell thin; kernel small and sweet.

Bark: pale gray, somewhat shaggy, broken into small strips on mature trees.

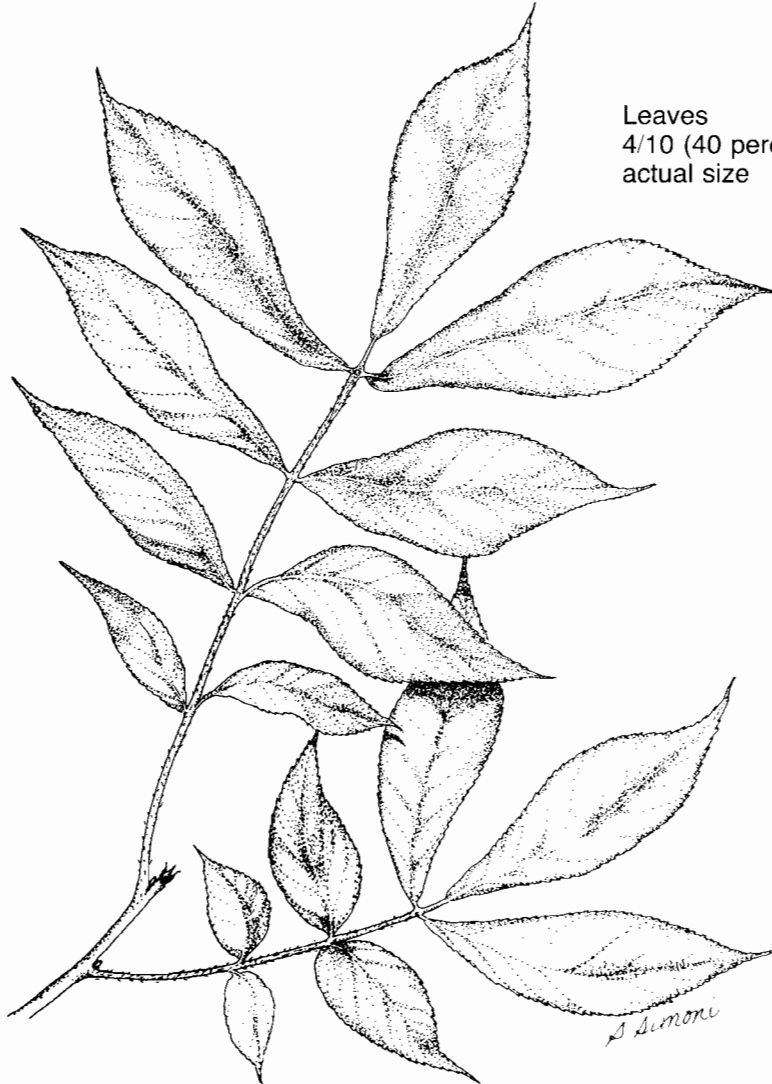
Stems: branches small and spreading; twigs red-brown and marked by pale lenticels.

Winter Buds: terminal bud ovoid, up to 13 mm long; outer scales hairless and red-brown, inner scales with hairs; lateral buds half as large as the terminal buds.

LBL Habitats and Distribution: abundant in ridge and slope forests.

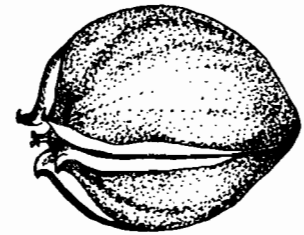
Notes: the red hickory is not always considered to be a distinct species from the pignut. The two are quite similar in habitat, range, and many other features.

SAND HICKORY
Carya pallida (Ashe) Engl. and Graebn.



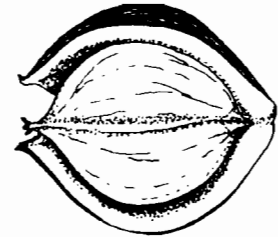
Leaves
 4/10 (40 percent)
 actual size

Fruits actual size



Fruit with husk

Fruit with part of husk removed



Habit: small to medium-size trees, maximum height about 30 m with a diameter about 1 m; usually less than 12 m tall and less than 45 cm in diameter; shape resembles pignut hickory.

Leaves: 15 to 33 cm long with 7 (rarely 9) leaflets; the terminal leaflet 7 to 13 cm long and 2.5 to 5 cm wide; each of the lowest pair of leaflets less than 5 cm long and 13 to 25 mm wide; the lower surfaces pale (hence the name "pallida") and very hairy.

Fruits: small, 13 to 37 mm long, somewhat rounded, slightly longer than broad, covered with short hairs and yellow scales; husk thin, 3 to 4 mm thick and splitting tardily to the base by 2 or 3 sutures; nut laterally flattened, ridged, light-colored; shell very thin, 2 to 3 mm thick; kernel sweet.

Bark: moderately thick with deep, irregular furrows and rough ridges, not shaggy; gray to nearly black.

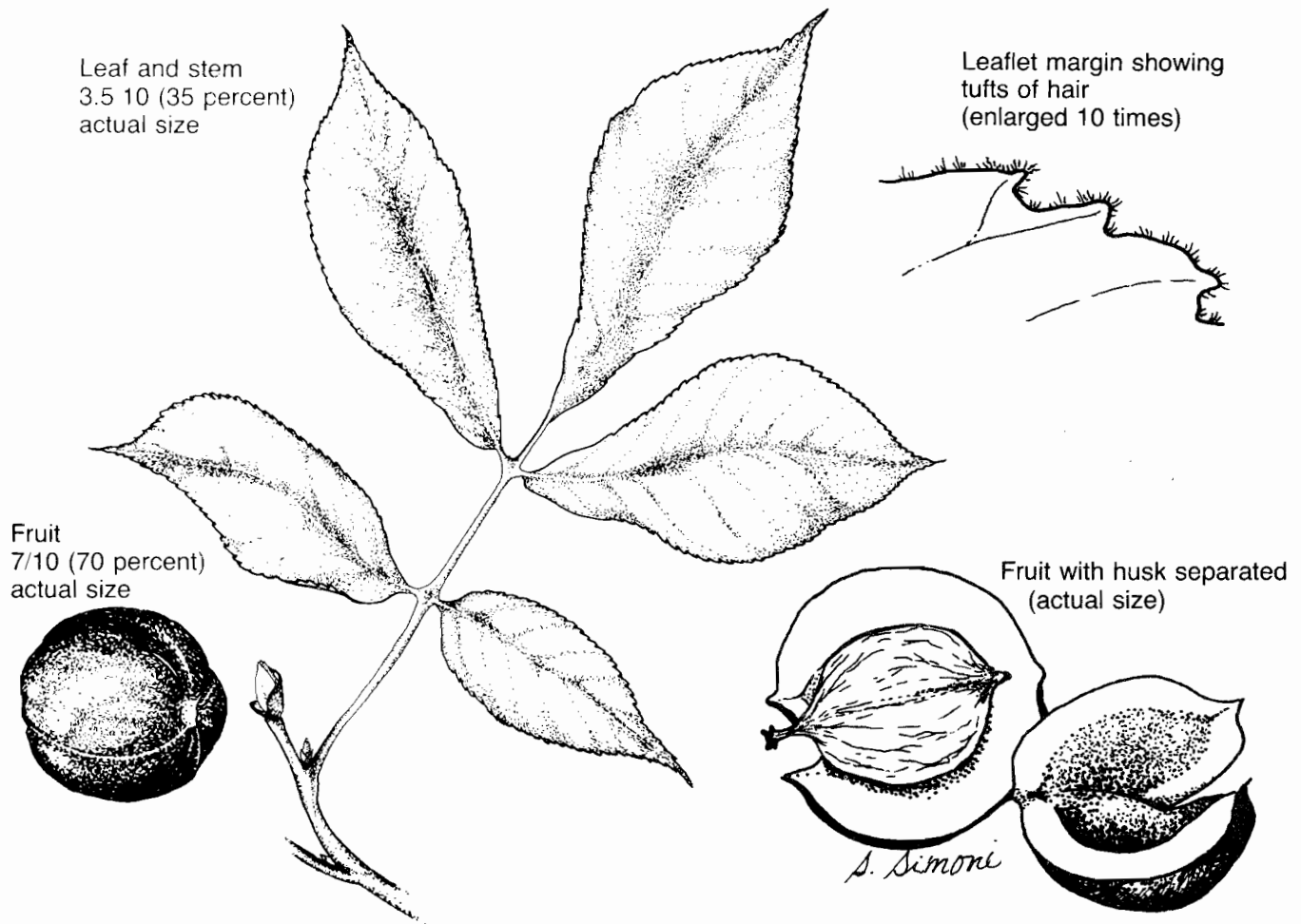
Stems: branches stout, upright to spreading; twigs slender, reddish-brown, becoming gray to nearly black with age, hairy when young, becoming hairless with age, covered with silvery to yellowish scales; leaf scars slightly elevated and three-lobed.

Winter Buds: terminal bud about 6 mm long with 6 to 9 bud scales, reddish-brown, with short hairs and covered with tiny silvery scales.

LBL Habitats and Distribution: infrequent and limited to the driest ridges and slopes. Several trees can be found within the Star campground and picnic area.

Notes: found mostly on the Coastal Plain from southern New Jersey to northern Florida and Louisiana. Somewhat like pignut hickory in characteristics, this species can be easily identified by the yellowish scales on fruits and the very hairy but pale lower leaf surfaces.

SHAGBARK HICKORY
Carya ovata (Mill.) K. Kock



Habit: up to about 40 m tall and 1.2 m in diameter; shape usually narrow, broadest above the middle; crown open and rounded.

Leaves: 20 to 36 cm long with usually 5 leaflets (rarely 7); terminal leaflet 13 to 18 cm long and 5 to 8 cm wide, larger than the upper lateral pair and much larger than the lower pair; leaflets with tufts of hairs on the margins.

Fruits: occurring in pairs or solitary; large, slightly longer than wide, 3 to 5 cm long; the dark brown to black, moderately thick husk splitting freely to the base when ripe; nut longer than wide, flattened, usually four-angled, light-colored, with a thin shell; kernel sweet.

Bark: fairly thick, gray, broken into long, loose, flattened plates with the ends curving away from the trunk giving it a shaggy appearance.

Stems: branches stout and spreading; twigs stout, reddish-brown and hairy when young but be-

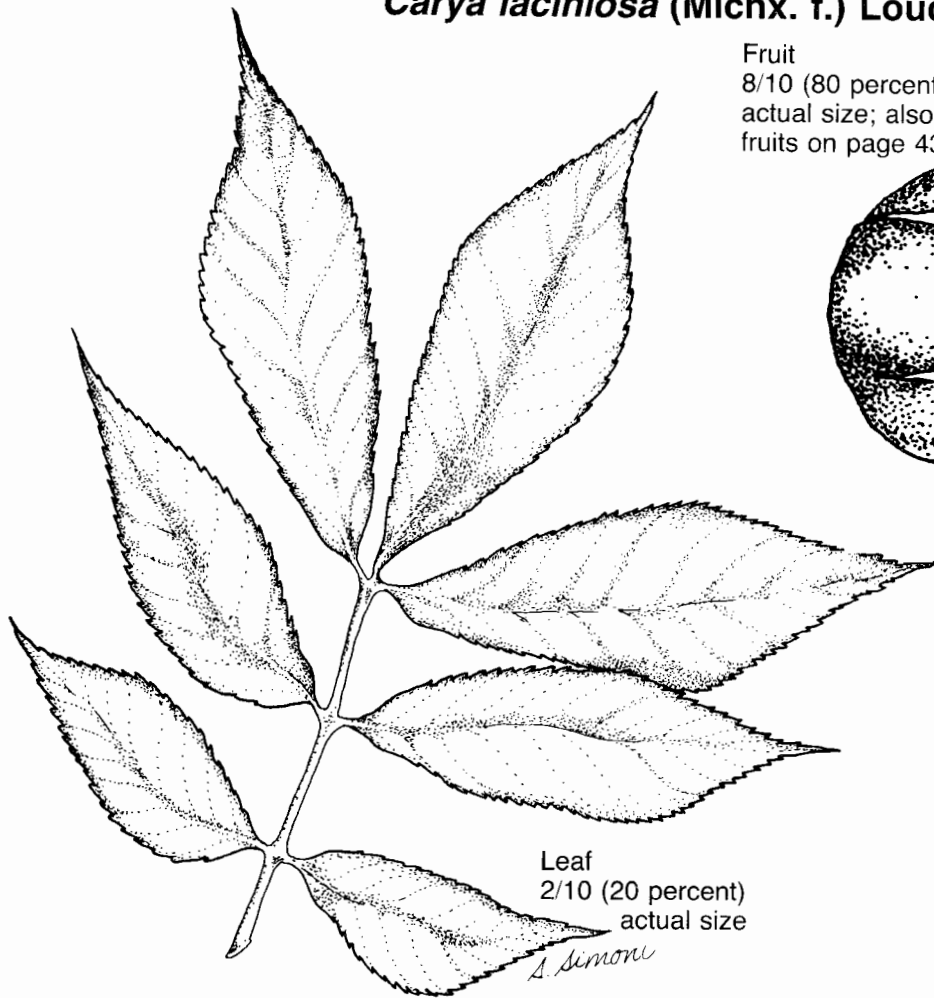
coming dark gray and hairless with age; lenticels small and numerous; leaf scars elevated and rounded to slightly three-lobed.

Winter Buds: terminal bud 13 to 20 mm long and 8 to 13 mm wide, the 3 or 4 outer scales dark brown and hairy.

LBL Habitats and Distribution: frequent throughout, mostly in well-drained slope forests.

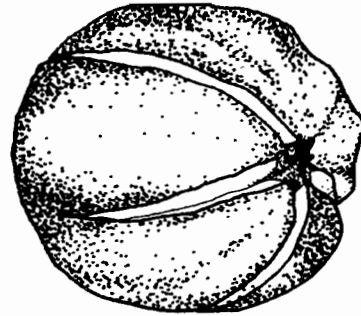
Notes: this shaggy-barked species ranges throughout eastern United States and into southern Canada but is not usually found on the Coastal Plain to the south. Although not as flood-tolerant as the shellbark or pecan, it is frequently found in bottomlands. The nuts were used by American Indians and settlers as a staple food, but the quality is not as good as that of pecan or shellbark. The wood provides high-quality charcoal and was important in the LBL iron industry.

SHELLBARK HICKORY, KINGNUT
Carya laciniosa (Michx. f.) Loud.

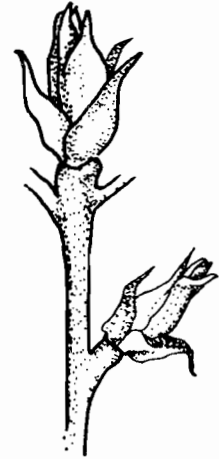


Leaf
 2/10 (20 percent)
 actual size

Fruit
 8/10 (80 percent)
 actual size; also see
 fruits on page 43



Buds 5/10 (50 percent)
 actual size



Habit: up to 40 m tall and 1 m in diameter; cylindrical-shaped; trunk often free of branches for more than half its height.

Leaves: 33 to 55 cm long, usually with 7 leaflets; upper leaflets 13 to 23 cm long and 7 to 13 cm wide, about twice to three times as large as the lowest pair and with soft, short hairs on undersurfaces.

Fruits: the largest of any hickory in LBL, 4.5 to 6.5 cm long and 3.8 cm broad, occurring singly or in pairs; thick husk splitting readily into segments when ripe; nut flattened, ridged; shell very thick and hard; kernel sweet.

Bark: fairly thick, light gray, forming long plates with the ends curving away from the trunk.

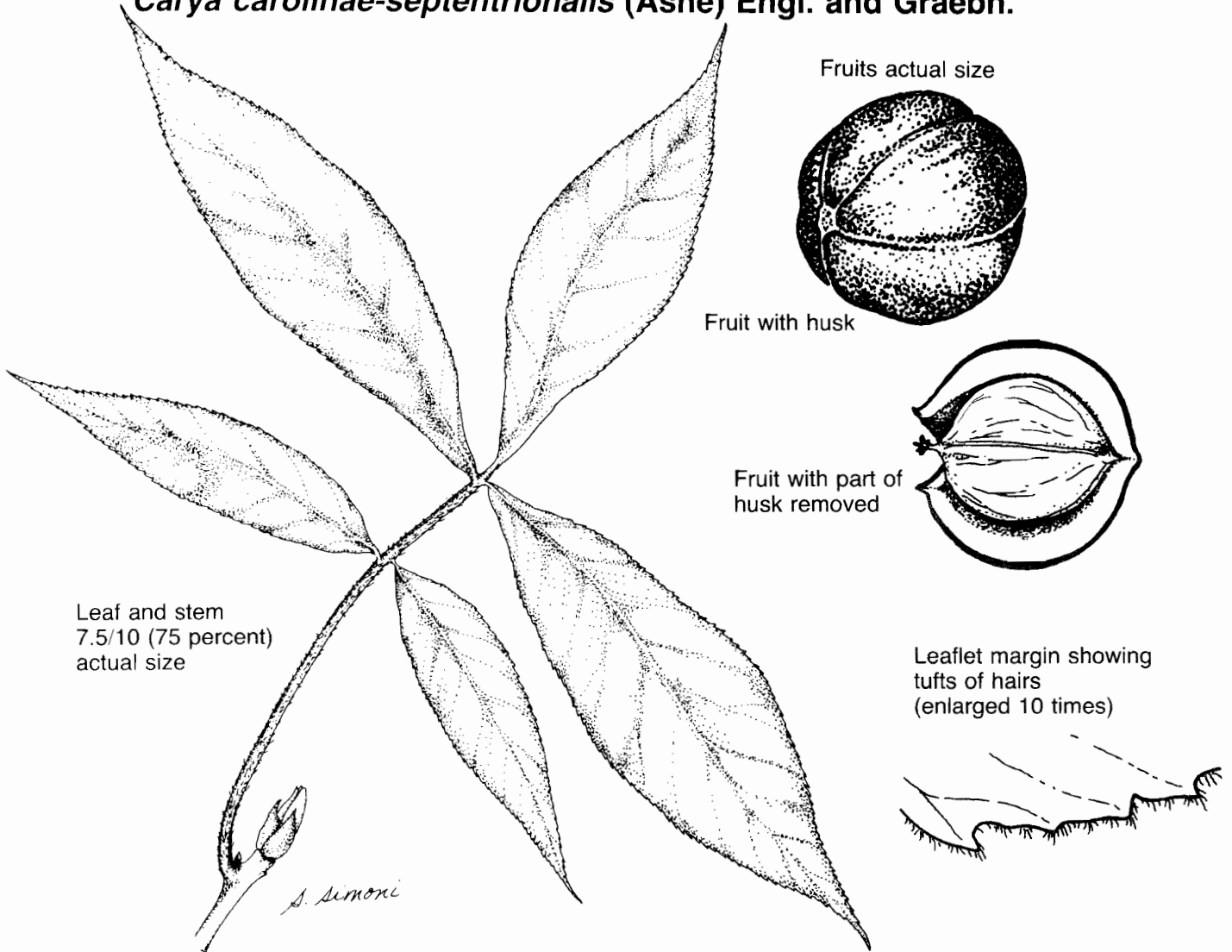
Stems: lowermost branches drooping, others spreading; twigs stout, hairy when young, losing hairs with age, orange-brown; lenticels slightly elevated; leaf scars conspicuous and three-lobed.

Winter Buds: terminal buds about 2.5 cm long with 11 to 12 overlapping, dark brown scales; lateral buds about 1/4 the size of terminal buds.

LBL Habitats and Distribution: infrequent in ravine, streambank, and other bottomland forests. Several large trees grow along Bear Creek just west of the Trace bridge near the South Information Station.

Notes: a species of middle America, the shellbark or kingnut is called "scalybark" in the LBL region and actively sought for the large, high-quality nuts. The large, shaggy trees are long-lived and a single tree will produce several bushels of shelled nuts per year. Settlers used the hard, tough, resilient wood for tool handles, baskets, and other products.

SOUTHERN SHAGBARK HICKORY
Carya carolinae-septentrionalis (Ashe) Engl. and Graebn.



Habit: up to 25 m tall on bottomland sites with a trunk 60 to 90 cm in diameter but only 6 to 9 m tall with a trunk less than 30 cm in diameter on dry hillsides; narrow, cylinder-shaped with a rounded crown.

Leaves: 10 to 20 cm long with 5 narrow, lanceolate leaflets that are about 4 times longer than wide; leaflets toothed with a tuft of hair on each tooth, hairy, dark green above and yellow-green below; upper leaflets 7 to 10 cm long and larger than the lower pair.

Fruits: often broader than high, 2 to 4 cm wide; the husk 3 to 9 mm thick, splitting freely to near the base; nut ovoid, prominently four-angled, with a thin shell; kernel light brown and sweet.

Bark: gray, 6 to 18 mm thick, separating into plates 30 cm or more long and 7 to 10 cm wide, giving it a shaggy appearance.

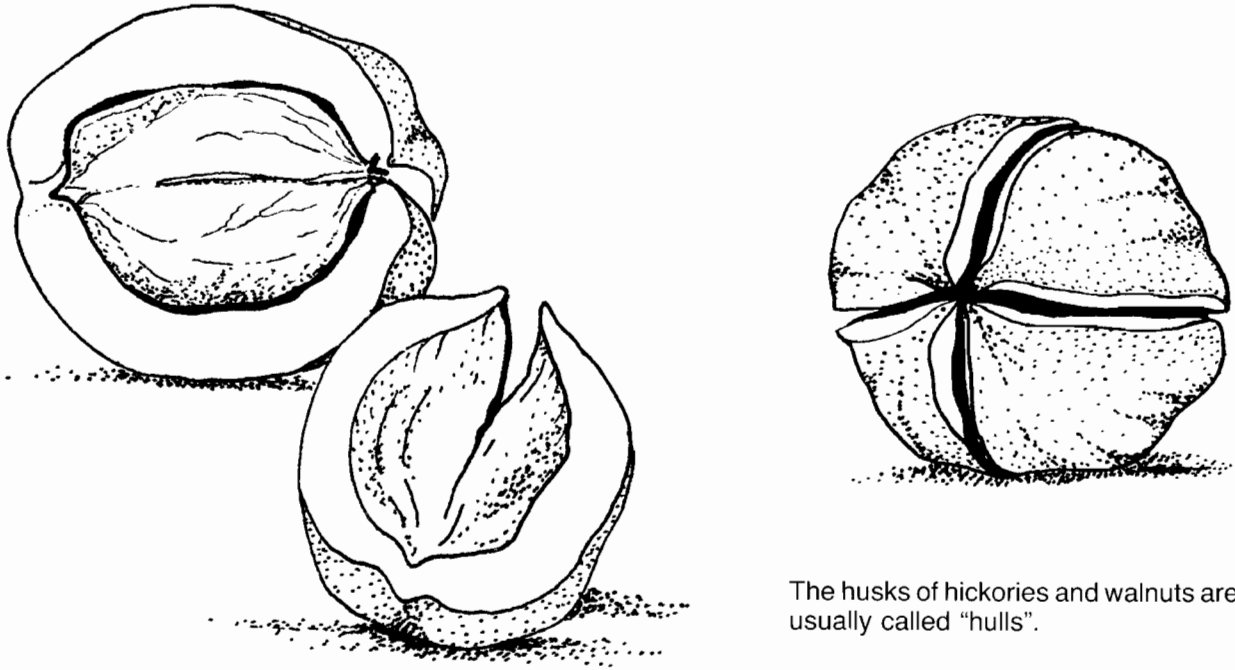
Stems: branches short and relatively small; branchlets slender, red-brown, with many small lenticels.

Winter Buds: terminal bud ovoid, about 6 mm long; outer scales red-brown and hairless; axillary buds oblong, less than 2 mm long.

LBL Habitats and Distribution: rare in a few slope forests; examples of mature trees can be found on the southern banks of the bay at the former Pleasure Island area, Kentucky Reservoir, Stewart County.

Notes: as the name indicates, this is a southern species that ranges from Virginia to Georgia, Alabama, and Mississippi. It may be confused with shagbark and is quite like it in most features.

Fruits of Shellbark of Kingnut Hickory, actual size; fruit on left opened to show nut and husk.



The husks of hickories and walnuts are usually called "hulls".



THE WALNUTS, *Juglans*

Juglans (from two Latin words, *Jovis*, Jupiter and *Glans*, nut) includes six species native to North America but only two occur in Kentucky and Tennessee. Walnuts are deciduous trees with large leaves which are aromatic when crushed.

Black walnut always has been a very important tree in LBL. The hard, blackish wood was used to

make gunstocks and fine furniture for homes and churches. The nuts provided food and spending money; many, both young and old, sported "walnut-stained" hands throughout autumn as a result of contact with the dark, greenish-black sap of the fruit husks or "hulls." The fruits were, and still are, important for wildlife food, especially squirrels.

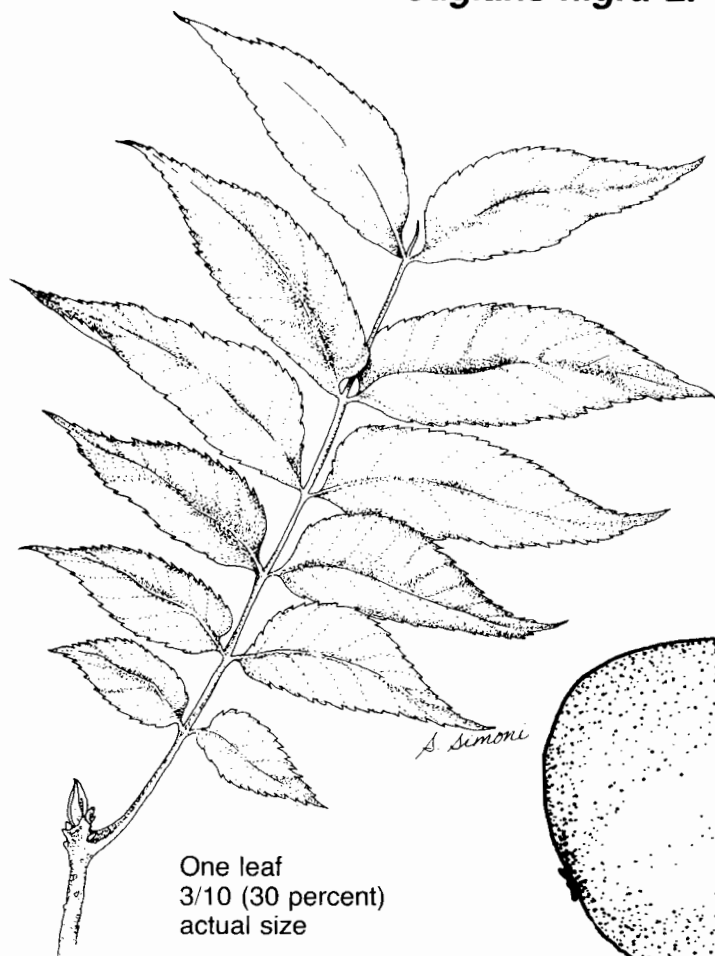
SUMMER KEY TO THE WALNUT SPECIES

- 1. Leaflets 11 to 17, sticky when young; terminal leaflet often long-stalked; bark with broad, light gray, smooth ridges between furrows **Butternut (*Juglans cinerea*)**
- 1. Leaflets 15 to 23, not sticky; terminal leaflet often absent; bark with dark brown to black, rough ridges between furrows **Black Walnut (*J. nigra*)**

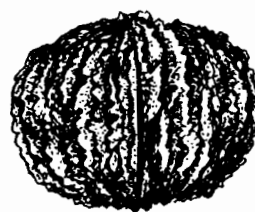
WINTER KEY TO WALNUT SPECIES

- 1. Fruit longer than wide; bark with broad, light gray, smooth ridges between the furrows **Butternut (*Juglans cinerea*)**
- 1. Fruit about as broad as long; bark with dark brown to black, rough ridges between the furrows **Black Walnut (*J. nigra*)**

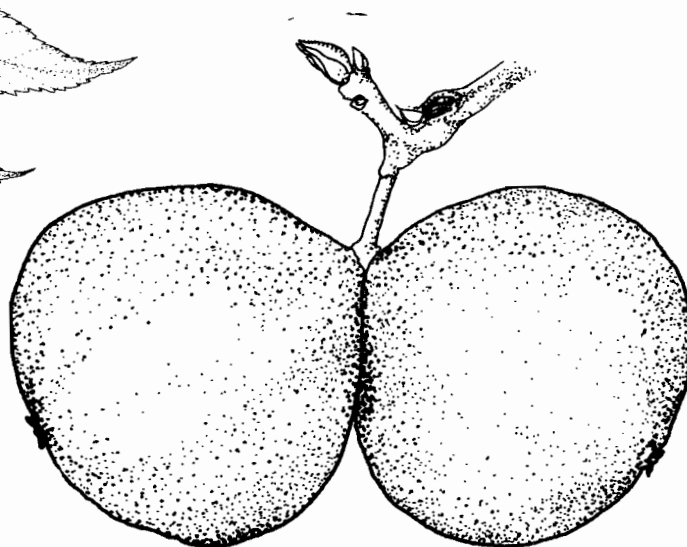
BLACK WALNUT
Juglans nigra L.



One leaf
3/10 (30 percent)
actual size



Fruits and "hulled" nut
8/10 (80 percent)
actual size



Habit: 30 to 45 m tall and up to 2 m in diameter on the best sites; often with a straight trunk free of branches for 15 m or more; crown open and broad.

Leaves: 30 to 60 cm long with 15 to 23 leaflets, the terminal one often absent; leaflets 7 to 10 cm long, ovate to lanceolate, finely toothed, yellow-green, hairless above but hairy below.

Fruits: spherical, 4 to 5 cm in diameter, single or in clusters of 2 to 3; husk thick, fleshy, black with stain when ripe, not dividing into segments; nut shell strongly grooved.

Bark: thick, dark brown to black, with rough ridges between the interlacing furrows.

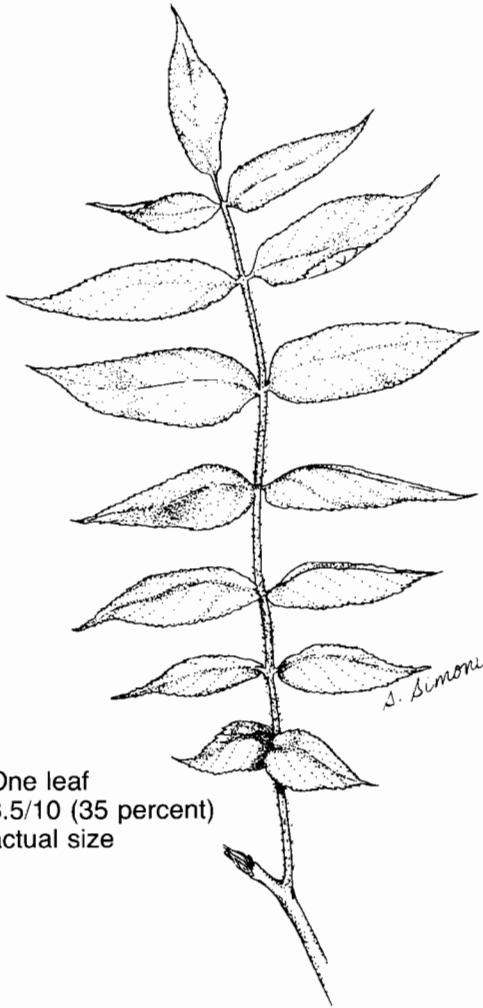
Stems: branches stout, rising and spreading; branchlets light brown, leaf scars shield-shaped with 3 bundle scars, top of shield indented in the middle.

Winter Buds: terminal bud 8 mm long, ovoid, blunt, slightly flattened, light brownish-gray, hairy; lateral buds smaller.

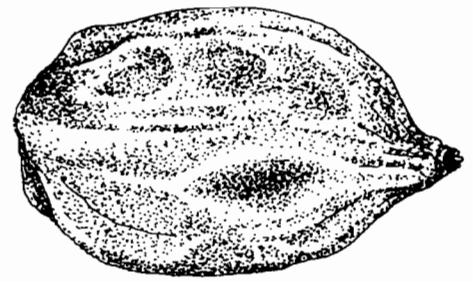
LBL Habitats and Distribution: frequent in well-drained bottomland and ravine forests, often persisting from plantings around old homesites.

Notes: ranges from western New England to Michigan, Minnesota and Nebraska south to Florida and Texas; planted extensively for the beautiful wood and nuts. Fruits are first produced at about 8 years with peak production from 30 to 130 years. Black walnut is intolerant to shade and prolonged flooding and is resistant to fire and insects. It is also windfirm and not easily damaged by ice or windstorms. Juglone, a chemical leached from older trees, inhibits seed germination of other species.

BUTTERNUT, WHITE WALNUT
Juglans cinerea L.



One leaf
 3.5/10 (35 percent)
 actual size



Stem, fruit, and "hulled" nut
 actual size



Habit: medium sized tree rarely over 18 m high and 60 cm in diameter; crown open and broadly rounded at the top.

Leaves: 30 to 76 cm long with 11 to 17 leaflets, the terminal one long-stalked; leaflets 5 to 11 cm long, oblong to lanceolate, finely toothed, yellow-green, hairy and sticky (when young) on the lower surfaces.

Fruits: ovate to oblong, 4 to 6 cm long, single or in clusters of 2 to 5; husk light brown when mature, with sticky hairs, not splitting into segments; nut four-ribbed, longer than wide; nut shell strongly grooved.

Bark: moderately thick, light gray, broad, with smooth ridges between the furrows.

Stems: branches stout, rising and spreading; branchlets mostly reddish-brown with white pores; pith chambered; leaf scars shield-shaped with 3 bundle scars, top of shield straight across.

Winter Buds: terminal bud 10 to 20 mm long, conical but flattened, whitish, hairy; lateral buds smaller, more rounded.

LBL Habitats and Distribution: rare in well-drained ravine and streambank forests.

Notes: rare over much of its range but found from New Brunswick to Ontario, northern Michigan and Minnesota, south to Virginia and Georgia and westward to Arkansas and Kansas. The wood is not as strong and durable as that of black walnut and hence not as valuable. The dried inner bark was used by settlers as a cathartic and the husks yield a yellow-orange dye. The butternut is short-lived, rarely exceeding 75 years, and is intolerant to shade and flooding. It is susceptible to fire and fungal diseases.

GLOSSARY

- Acuminate—describing a leaf apex which tapers to an extended point with the sides somewhat concave.
- Acute—sharp pointed; the angle formed by the sides being less than 90 degrees.
- Annual—requiring a single growing season to reach maturity.
- Axillary—found in a leaf axil; i.e., at the point where the leaf attaches to the twig. Also, the angle between the midrib and a secondary vein.
- Biennial—requiring two growing seasons to reach maturity.
- Blade—the flat, expanded portion of a leaf or leaflet.
- Bristle tips—narrow projections of veins extending beyond the margin of the leaf blade.
- Bundle scar—tiny marks on the surface of leaf scar where veins entered the petiole.
- Ciliate—bearing a fringe of hairs on the margin.
- Conic—essentially cone-shaped; widest at the bottom and tapering to the apex.
- Cordate—heart-shaped; having a sinus and rounded lobes at the base.
- Crenate—having shallow, rounded teeth.
- Cruciform—cross-shaped.
- Cuneate—wedge-shaped; tapering to a point, the sides almost straight.
- Ellipsoid—broadly elliptic.
- Elliptic—widest near the middle and tapering to rounded ends.
- Entire—with a continuous margin, without teeth or indentions.
- Falcate—sickle-shaped; narrowing to a sharp point and curved to one side.
- Glabrous—free of hairs.
- Glaucous—covered with a whitish substance which can be rubbed off.
- Globose—having the shape of a globe.
- Hemispheric—having the shape of half of a globe.
- Lanceolate—widest near the base and much longer than broad.
- Leaf scar—scar found on a twig after a leaf falls.
- Lenticel—pore on a twig which permits gas exchanges between the stem tissue and the atmosphere.
- Lenticular—lens-shaped; like a lens, with two opposite faces, either with both faces curved or with one face plane and the other curved.
- Linear—much longer than broad, with essentially parallel sides.
- Lobe—the portion of a leaf blade occurring between two sinuses; lobes usually have a mid-vein which departs from the midrib of the leaf.

Metric system—a decimal system of weights and measures in widespread use over the world and universally used in science. The following units are used here:

meter (m): 100 centimeters, 1000 millimeters, equal to 39.37 inches.

centimeter (cm): one-hundredth of a meter or about 0.4 inch (one inch = 2.54 cm).

millimeter (mm): one-thousandth of a meter or about 0.04 inch (one inch = 25.4 mm).

Midrib—the prominent vein extending from the petiole to the apex of the leaf blade.

Oblong—longer than broad, with essentially parallel sides.

Obovate—ovate, but wider near the apex than at the base.

Obtuse—blunt pointed; the angle formed by the sides being greater than 90 degrees.

Oval—broadly elliptic and widest near one end.

Ovate—egg-shaped.

Peduncle—the stalk of a flower cluster or of a single flower.

Petiole—a leaf stalk.

Pollen—a small spore (microspore) containing a mature or immature male gametophyte (sperm producer).

Puberulous—covered with very small, fine hairs.

Pubescent—covered with soft, downy hairs.

Scurfy—having a scaly or rough surface.

Secondary lobe—a division of a lobe.

Serrate—saw-toothed, the teeth pointing toward the apex.

Sessile—without a noticeable stalk.

Sinus—an indentation of a leaf margin which extends one-fourth or more of the distance to the midrib.

Species—a group of organisms sharing a common set of morphological characteristics; more precisely, a group of organisms capable of interbreeding and producing fertile offspring under natural conditions. Most species designations are made on the basis of morphological characteristics.

Spherical—shaped like a sphere.

Stigma—the pollen-receptive portion of the pistil of a flower.

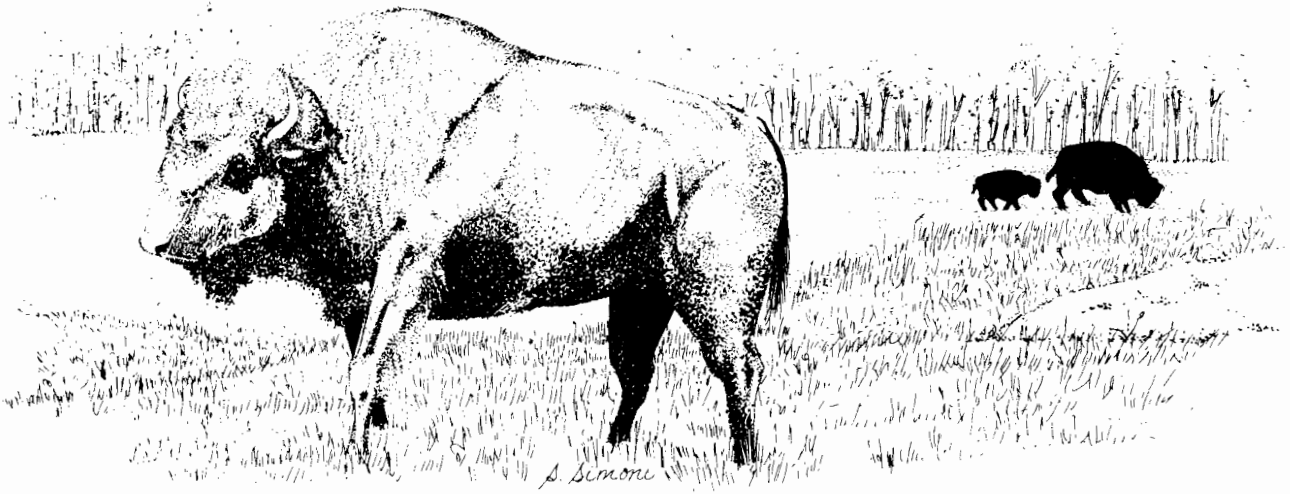
Strigose—covered with straight appressed hairs.

Tomentose—densely wooly pubescent.

Truncate—having an end which is almost straight across, as if having been cut.

Turbinate—top-shaped.

AMERICAN BISON



The Indians, Long Hunters, and settlers found American Bison or "buffalo" to be plentiful in the barrens and open woods of LBL and surrounding regions. This old cow and the distant cow and calf are part of a reintroduced herd now living beside the Trace, opposite the Homeplace.



NOTES

NOTES