# THE TREES OF WHITE COUNTY, INDIANA

## WITH SOME REFERENCE TO THOSE OF THE STATE

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A Thesis

Submitted to the Faculty of Purdue University

by

Louis Frederick Heimlich

Candidate for the Degree of Master of Science

June, 1916

is paper was submitted for publication in the 1916 Proceedings, but the publication was deferred one ear on account of the many long papers submitted n 1916.—Editor

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# The Trees of White County, Indiana, with Some Reference to Those of the State.

For a long time botanists have been busy describing species and working out their distribution over the surface of the earth. Dendrologists, more particularly, have been contented with the description and distribution of trees. From studies and reports made thus far, the general ranges of trees and most flowering plants are fairly well known. One might well suspect what plants grow in a certain area, but definite reports are to be preferred.

Now the significant way to study vegetation is from an ecological standpoint. Completeness is not attained by noting the species of a certain group within any political boundary. Armed with the reliable information of a geologist, the distribution and number of species and individuals, from unicellular plants in the soil and water to the most complex flowering types, should be worked out by the taxonomist-ecologist. This of course would take time, but taking each county, or stream and then working in the intervening spaces, as a unit for the working field, the completed report would show a new natural map with a far greater meaning than isolated and incomplete reports coming from various sections. This would become very far-reaching, taking into account plant diseases, and, being but a step to animal parasites on plants, an account of the complete fauna of the region as well as a complete flora as hinted at above, would be still more desirable. We should then have some really effective Life Zones.

A complete flora for the State is the aim of the committee on the Biological Survey of the Indiana Academy of Science. To my knowledge there is no similar committee or thought of a complete fauna for the State.

The Indiana State Board of Forestry is interested in determining just what species of trees grow in Indiana and just what their ranges in the State are. In the Eleventh Annual Report of the State Board of Forestry, 1911, is to be found the most authentic record of Indiana trees up to the present time. There is no pretense that the report is complete either for the total number of species in the State, or much less so for the ranges of those reported. Some counties have been very thoroughly worked, others only partly, and some not at all—at least

reports are lacking. White County happens to fall into this last category.

Under these circumstances the general aim of this thesis has been a systematic report on the Native Trees of White County, their species and relative numbers. Other related features have been included as the result of a growing interest in the subject. The matter of ecology was thought of seriously, but due to the lack of time and the as yet unavailable soil report of the county*, this part has been reduced to a very brief review of the physical and geographical aspects of the county, and a consideration of the Tippecanoe River trees, with the general distribution of trees over the county. As regards the economic phases of White County trees, some isolated but interesting figures were obtained. In this connection some historical data attaches another bit of interest. Comparisons with State and national distribution by the use of maps, illustrate clearly among other things the need for further work as well as the correction of past limits or errors. Attention is also called to a new list of Hickories for the State according to Sargent's latest determinations. Besides other minor features which need not be mentioned here, I have been fortunate enough to include a new variety of willow for the State, and possibly a new species of that same genus.

## Geographical and Physical Aspects of White County.

Before proceeding at once to the primary aim of this thesis, the report of species and relative numbers, I have deemed it desirable to point out certain other features, giving a general notion of the county, topography, fertility of soil, drainage, transportation facilities, etc.

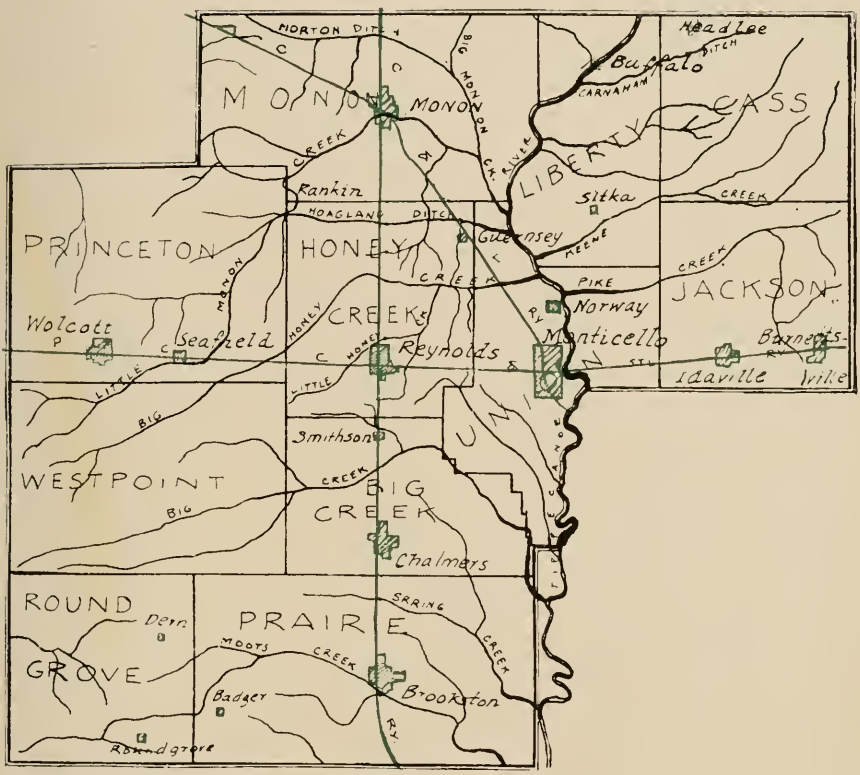
White County is located in the northwestern part of Indiana and possesses some of the best agricultural land in the world. The soil is especially fertile in the southwestern half of the county, which is prairie land. Black, rich soil in this area produces monster crops of corn and oats, with nearly all the ground surface taken up in cultivation. Comparatively less timber is to be found in this region and very likely the region has always been the less wooded part of the county—being formerly a vast sea. Boulders of the glacial age in many cases have been removed to the fence rows.

* Soil Survey made by U. S. Bureau of Soils. Summer 1915.

PLATE I.

WHITE COUNTY.

507 Square Miles—324,480 Acres.




Low sand ridges are especially characteristic of Honey Creek and Monon townships and also parts of Princeton. This area is very densely covered with forests of oak (almost exclusively Q. alba, palustris, velutina, coccinea).

In the environs of the Tippecanoe River and eastward the topography is rather more rugged. Very good farm lands are also found in this area. Formerly almost every foot of this region was heavily wooded.

The following statistics, taken from the U. S. 1910 Census, give some notion of the fertility and returns of White County soils.

(Table 1.)

| | | |
|---|---|---|
| Total land area in acres | | 324,480 |
| Acres under cultivation: | | |
| Cereals | 165,106 | |
| Hay | 28,550 | |
| Potatoes | 750 | |
| All other crops | 893 | |
| Small fruits | 35— | 195,334 |
| Per cent of total land area cultivated | | 60 |
| Number of farms | | 2,091 |
| Average number of acres per farm | | 150.4 |
| Value of all crops (except nuts, etc.) | | $2,951,637 |
| Expense: | | |
| Labor | $184,833, or 88% | |
| Fertilizer | 23,758, or 12%— | 208,591.00 |
| Net crop returns | | $2,743,146.00 |
| Net returns per acre | | 14.04 |
| Land value per acre | | 77.69 |
| Per cent of net per acre to value per acre | | 18.2 |

The total population in 1910 (U. S. Census) was 17,602 with only 6,511 as being included in towns.

Nearly all of the 507 square miles in White County are drained by the Tippecanoe River and its tributaries. The county as a whole is rather flat and much dredging and tile-ditching has been done in recent years. Parts of natural streams have been dredged several times and also extended. Possibly in this case more erosion would be gladly welcomed. The Tippecanoe is a geologically young and very beautiful watercourse, fed by clear lake-water at its head in Noble County and by numerous springs along its banks.

Since national and local interests are crystallizing more and more in the direction of natural beauty spots—parks and pleasure resorts—I suggest that very appealing tracts can be found along the Tippecanoe, especially north of Monticello, near Norway and up toward Buffalo.

Transportation facilities in the county are excellent. The Monon and Pennsylvania Lines cross the county. A system of good roads is in existence, about 400 miles of which are macadamized or made of gravel.

Limestone quarries are located at Monon and recently other deposits have been found several miles southwest of Reynolds. Good clay deposits and tile factories at Chalmers, Seafield and Wolcott have been in operation for a number of years.

A far more accurate and much more detailed statement covering the part here alluded to will be found in the forthcoming report of the U. S. Bureau of Soils for White County, which will be ready for distribution within a few months.

## The Native Species of Trees.

Parts of the summer of 1915 and the fall of 1914 were spent in making collecting trips over various parts of the county. The regular routine work was done single-handed, and the specimens disposed of and mounted according to standard methods now form a permanent part of my private herbarium.

Realizing very thoroughly that the work of determination, especially in some genera, is not such a self-satisfying matter to any careful botanist, I endeavored to make my collection as authentic as possible. Any specimen still remaining in doubt is either entirely omitted or expressly given as doubtful.

Specimens in the Purdue Herbarium and many specimens of Oaks and Hickories, collected last summer by Mr. Deam and Prof. Hoffer and recently determined by Sargent, were available for comparison. Dr. Sargent has verified or determined all the specimens of Salix, Hicoria, Crataegus, Malus, and many Oaks. Mr. F. W. Pennell, Assistant Curator of the New York Botanical Garden, has determined specimens of Fraxinus and Cornus. Mr. W. W. Eggleston of the Bureau of Plant Industry was also consulted. I am permitted to add Salix longifolia variety argophylla (determined by Sargent) to my list, by the courtesy of Mr. C. C. Deam of Bluffton, Indiana, who was ever ready to help. Acknowledgments are also due Professor G. N. Hoffer of Purdue, not least of which are for a kindly interest in the work. Grateful appreciation to Dean Stanley Coulter, under whom this thesis was written, is here expressed, for help, encouragement and his stamp of approval.

Thanks are also tendered to Mr. Ed Newton of Monticello, Indiana, for historical accounts, and to my sister Frieda for data in connection with Part V.

As designated in the 1911 Report of the State Board of Forestry, "the number of trees included in this list is wholly arbitrary," so I have included some species—small trees, or large shrubs, not considered in that report. Further consideration of each species is deferred to another part of this paper.

The following is a complete list of all species collected:

(List 1.)

NATIVE WHITE COUNTY TREES.

Juniperus virginiana L.
Salix amygdaloides Anders.
interior Rowlee.
humulis Marsh.
discolor Muhl.
nigra Marsh.
missouriensis Bebb.
longifolia var. argophylla Sarg.
Populus alba L.
grandidentata Michx.
heterophylla L.
tremuloides Michx.
deltoides Marsh.
Juglans nigra L.
cinerea L.
Hicoria cordiformis (Wang) Britton.
ovata (Mill) Britton.
laciniosa (Michx) Sarg.
alba (L) Britton.
ovata var. fraxinifolia Sarg.
Corylus americana Walt.
Carpinus caroliniana Walt.
Ostrya virginiana (Mill) Willd.
Betula lutea Michx.
Fagus grandifolia Ehrh.

Quercus alba L.
macrocarpa Michx.
bicolor Willd.
Muhlenbergii Englm.
rubra L.
palustris DuRoi.
coccinea Muench.
ellipsoidalis E. J. Hill.
velutina Lam.
imbricaria Michx.
Ulmus americana L.
fulva Michx.
Celtis occidentalis L.
Morus rubra L.
Toxylon pomiferum Raf.
Liriodendron tulipifera L.
Asimina triloba (L) Dunal.
Sassafras variifolium (L) Karst.
Hamamelis virginiana L.
Plantanus occidentalis L.
Malus malus (L) Britton.
ioensis (Wood) Britton.
Amelanchier canadensis (L) Med.
Crataegus crus-galli L.
pruinosa (Wendl) Koch.
albicans Ashe. ?
calpedendron (Ehrh) Britton.
Prunus americana Marsh.
serotina Ehrh.
Cercis canadensis L.
Gleditsia triacanthos L.
Gymnocladus dioica (L) Koch.
Robinia Pseudo-acacia L.
Zanthoxylum americanum Mill.
Ptelea trifoliata L.

Rhus glabra L.
copallina L.
hirta (L) Sudw.
Ilex verticillata (L) A. Gray.
Staphylea trifolia L.
Acer negundo L.
saccharum Marsh.
saccharinum L.
nigrum Michx.
Aesculus glabra Willd.
Tilia americana L.
Nyssa sylvatica Marsh.
Cornus alternifolia L.
stolonifera Michx.
asperifolia Michx.
femina Mill.
florida L.
Fraxinus americana L.
pennsylvanica Marsh.
Cephalanthus occidentalis L.
Viburnam Lentago L.
prunifolium L.
Sambucus canadensis L.

It may and likely will be necessary to add a few species not included in the above to make the list complete. Such probable species occurring in the county are considered in the list dealing with the details of each species. The following is merely a suspected list of those species.

(List 2.)

Species Likely to Be Found in White County.

Salix alba L.
lucida Muhl.
Hicoria microcarpa (Nutt) Britton.
glabra (Mill) Britton.
Alnus rugosa (DuRoi) Spreng.
Crataegus margarette Ashe.
succulenta Schra.

Acer rubrum L.
Fraxinus quadrangulata Michx.
nigra Marsh.
Morus alba L.

It is stated in the 1911 Report (p. 87) that "it is believed that about one-half of our trees are found in nearly every county of the State." In that report forty-seven genera with 125 species of trees are considered. The following table compares the number of species for each genus as given in the report, with the number of the same species in the same genus for White County. Other species in the same genus not reported are added in a third column. Varieties and species of still other genera are included in other columns.

Recalling the statement referred to above, it will be seen that White County has representatives of over half the genera and about "one-half" the species, there being 33 out of 47 genera represented, with 62 species.

TABLE II.

Table Comparing Number of Genera and Number of Their Species Reported for Indiana, with Number of Same Genera and Same Species for White County.

| Genus. | Species for Indiana. | Species for White Co. | Other Species in White County not Given in 1911 Report. | Species of Other General Included. |
|---|---|---|---|---|
| Pinus | 3 | 0 | | |
| Larix | 1 | 0 | | |
| Tsuga | 1 | 0 | | |
| Taxodium | 1 | 0 | | |
| Thuja | 1 | 0 | | |
| Juniperus | 1 | 1 | | |
| Salix | 4 | 2 | 4 and 1 variety. | |
| Populus | 5 | 5 | | |
| Juglans | 2 | 2 | | |
| Hicoria | 7 | 4 | 4 and 1 variety. | Corylus 1 |
| Carpinus | 1 | 1 | | |
| Ostrya | 1 | 1 | | |
| Betula | 1 | 1 | | |
| Alnus | 2 | 0 | | |
| Fagus | 1 | 1 | | |
| Castanea | 1 | 0 | | |
| Quercus | 17 | 10 | | |
| Ulmus | 4 | 2 | | |
| Celtis | 3 | 1 | | |
| Morus | 2 | 1 | | |
| Toxylon | 1 | 1 | | |
| Magnolia | 1 | 0 | | |
| Liriodendron | 1 | 1 | | |
| Asimina | 1 | 1 | | |
| Sassafras | 1 | 1 | | Hamamelis 1 |
| Liquidamber | 1 | 0 | | |
| Platanus | 1 | 1 | | |
| Malus | 2 | 1 | 1 | |
| Amelanchier | 1 | 1 | | |
| Crataegus | 18 | 1 | | |
| Prunus | 4 | 2 | | |
| Cercis | 1 | 1 | | |
| Gleditsia | 2 | 1 | | |
| Gymnocladus | 1 | 1 | | |
| Robinia | 1 | 1 | | |
| | | | | Zanthoxylum 1 |
| | | | | Ptelea 1 |
| Ailanthus | 1 | 0 | | |
| | | | | Rhus 1 |
| Ilex | 1 | 0 | 1 | |
| | | | | Staphylea 1 |
| Acer | 5 | 4 | | |
| Aesculus | 2 | 1 | | |
| Tilia | 2 | 1 | | |
| Nyssa | 1 | 1 | | |
| Cornus | 2 | 2 | 3 | |
| Diospyrus | 1 | 0 | | |
| Fraxinus | 6 | 2 | | |
| Forestiera | 1 | 0 | | |
| Catalpa | 2 | 0 | | |
| | | | | Cephalanthus 1 |
| Viburnam | 2 | 2 | | |
| | | | | Sambucus 1 |
| Total | 125 | 62 | 9 and 2 varieties. | 8 |

Total number of Genera: Indiana, 47; White County, 34.

Below is appended a partial list of cultivated trees known to exist in White County.

(List 3.)

PARTIAL LIST OF CULTIVATED SPECIES OF TREES IN WHITE COUNTY, OMITTING THE USUAL ORCHARD TREES.

Gingko biloba .....Gingko or Maidenhair Tree.
Thuja occidentalis L. .....Arbor Vitae.
Chamaecyparis obtusa? .....Cypress.
Picea abies (L) Karst.....Norway Spruce.
Larix larcina (DuRoi) Koch.....Larch-Tamarack.
Populus nigra L.....Black Poplar.
var. italica DuRoi .....Lombardy Poplar.
Castanea dentata (Marsh) Borkh.....Chestnut.
Aesculus Hippocastanum L. .....Horse-chestnut.
Ailanthus glandulosa Desf.....Tree-of-Heaven.
Acer palmatum .....Japanese Maple.
Acer spicatum Lam.....Mountain Maple.
Rhus cotinoides Nutt.....Smoke Tree.
Pyrus americana (Marsh) DC.....American Mountain Ash.
Viburnam opulus L. var. americanum
(Mill) Ait. .....Cranberry Tree.
Diospyrus virginiana L.....Persimmon.
Catalpa speciosa Warder.....Catalpa.
catalpa (L) Karst. .....Catalpa.
Kaempferi. .....Japanese Dwarf Catalpa.
Betula alba L. .....European White Birch.

## IV. DISTRIBUTION.

### 1. GENERAL INTIMATION.

As noted previously, White County embraces 507 square miles or 324,480 acres. I have often been over much of this area and have in a general way for a long time known most of the trees. In making a definite report, however, a definite procedure seems to be desirable.

The map on page 402 shows the territory covered during the last summer. The red lines represent the actual highways travelled, mostly by bicycle, some by automobile. Many side trips were made on foot.

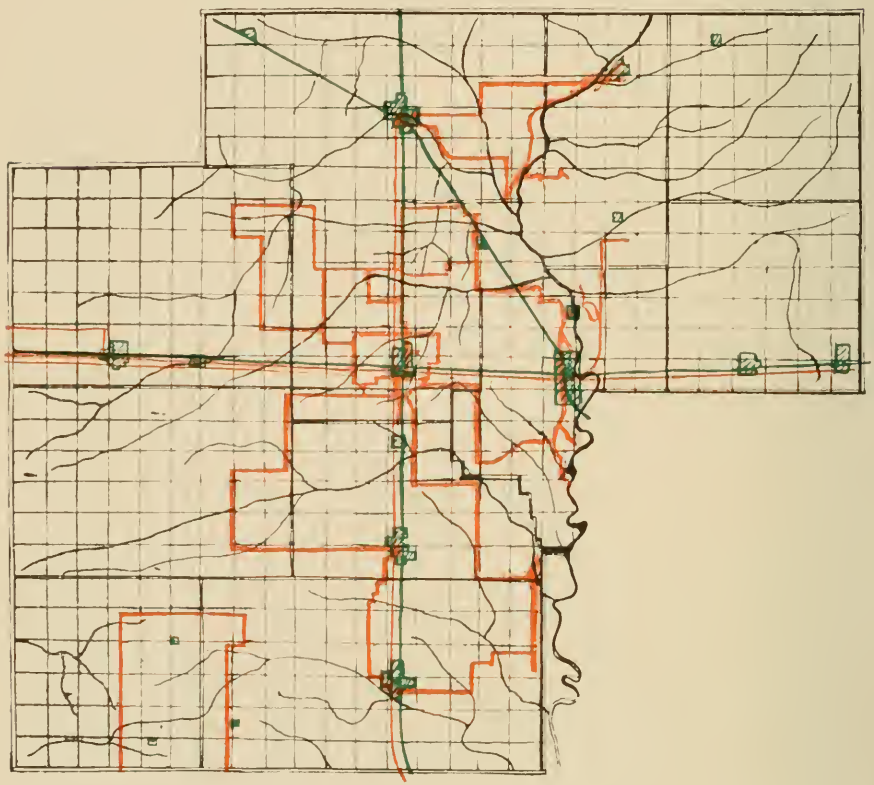
As I recall it, many days were totally unfit for the collector owing to the continuous heavy rains. As a result of this many thickets were miry or filled with water. As a further consequence, the mosquito hordes too often interfered with the pleasure of the work if nothing else. Such experiences, more or less trivial, must be evident to most collectors and serve only to hint at other difficulties besides those of determination.

In attempting to say something about the distribution of each species in the county, references are made to the general distribution and

PLATE II.

WHITE COUNTY.

Red Lines Show Actual Roads Traveled in Collecting Specimens.



the reported distribution in the State. Some maps covering these features reveal several matters of interest. First, it becomes evident that the definition of the general limits of any species is a big task, always changing, and a graphical representation of a number of species for Indiana shows quite clearly, among other things, that some counties have been quite thoroughly worked, whereas others have had little or no attention at all. Elkhart, Benton, Clinton, Jasper, Newton, Ohio, Perry, Pike, Pulaski, Rush, Switzerland, Tipton, Vanderburgh, Warrick, Whitley and White Counties are not mentioned in a single published report. As the maps show, the counties bordering on the Wabash River and extending in a continuous line from Posey to Steuben County, have been the most thoroughly worked, as have Wells County (by Deam), the group of Delaware, Jay, Randolph and Wayne (by Phinney), Jefferson (by Coulter), Clark (Baird and Taylor), area of New Albany, Floyd (Clapp), Hamilton (Wilson), and Franklin (Meyncke). (See Range maps pp. 424-429, 444, 450, 453, 456, 460, 461.)

Nearly two decades ago Dr. Cowles of the University of Chicago made an ecological study of the shores of Lake Michigan. The results of his investigations were published in the Botanical Gazette. Though none of these contain a definite list of plants for the borders of the Indiana Dune area on Lake Michigan, I have been able to pick out a number of trees mentioned in the articles as occurring in that area. And since these references seem to have had no acknowledgments in later records, I include a list of trees below, taken mostly from the Botanical Gazette, Vol. 27, No. 4, April, 1899. Most of the species occur at Dune Park in Porter County.

(List 4.)

Some Trees of the Dune Area of Indiana.

Pinus strobus L.
Banksiana Lamb.
Abies balsamea (L) Mill.
Tsuga canadensis (L) Carr.
Thuja occidentalis L.
Juniperus virginiana L.
communis L.

Salix glaucophylla Bebb.
adenophylla Am. auth., not Hook.
humilis Marsh.
Populus monilifera Ait. (P. deltoides Marsh).
balsamifera L.
Juglans cinerea L.
Ostrya virginiana (Mill) K. Koch.
Betula payrifera Marsh.
Fagus ferruginea Ait. (F. grandifolia).
Quercus coccinea tinctoria A. DC. (Q. velutina Lam.).
alba L.
Ulmus fulva Michx.
Celtis occidentalis pumila Muhl.
Sassafras officinale Nees and Eberm.
Hamamelis virginiana L.
Amelanchier canadensis (L) Med.
Prunus pumila L.
virginiana L.
Ptelea trifoliata L.
Rhus canadensis Marsh.
copallina L.
Acer saccharinum L.
Tilia americana L.
Cornus stolonifera Michx.
florida L.
Fraxinus americana L.
Viburnam acerifolium L.

The Range maps included for the distribution of some selected species indicate the opportunity for someone to make a careful collection, an accurate determination and a report, covering one or more counties, either to the State Board of Forestry or the chairman of the Committee on the Indiana Botanical Survey.

When reports for all counties are complete it will be interesting to note from just what counties certain species are actually absent and to seek the reason for this absence in terms of ecology or otherwise.

Besides the matter of distribution in itself, I have endeavored to

add other details of more or less importance. The following, then, is a brief consideration of each species collected in White County—first the Oaks, next the Hickories, a study of the Tippecanoe flora, followed by the Willows and other species generally distributed over the county.

## 2. The Oaks.

The Oaks constitute the most important trees in White County in point of utility and quality as well as in number of species in any one genus represented, or as regards the number of individuals in the genus.

Seventeen species of oaks have been reported for Indiana. This is the number contained in both, Coulter's Flora and in Deam's 1911 Report. The former, however, lists Quercus texana Buckley (Texan Red Oak—Gibson, Posey, Knox—Dr. Schneck?) and Q. Phellos L. (Willow oak—Gibson, Posey, Knox)—omitting Quercus Schneckii Britton (Schneck's oak), and Q. ellipsoidalis E. J. Hill (Hill's oak).

Quercus Schneckii Britton is a species yet in doubt (Deam). It may be referable to Q. texana, but the new flora of Britton and Brown says it "has been confused with Q. texana." It closely resembles Quercus rubra L. and may supplant the latter to an unaware extent. Thus far it has been reported from Bartholomew (Elrod); Gibson, Knox, Posey and Vermillion (Schneck); Knox (Ridgway); Posey and Wells (Deam). "It is believed that it is more or less frequent along the Wabash and its tributaries," and so may occur in White County along the Tippecanoe or southeastern part of the county.

Quercus phellos L. references for Indiana have been changed to Q. imbricaria Michx. (See Deam, 1911 Report, pp. 91-92.)

Quercus ellipsoidalis E. J. Hill was described (E. J. Hill, Bot. Gaz. 27:204, 1899) after Coulter's Catalogue was published.

Other oaks (Q. ilicifolia Wagn. and Q. nigra L.) have been reported for our area, but for apparently sufficient reason have been referred to other species, being in most cases variant forms. (1911 Report p. 91.)

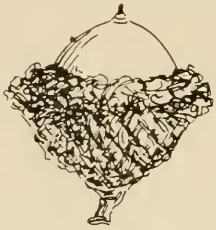
Ten out of the seventeen species reported for Indiana were found in White County. Of the seven remaining species, Q. lyrata Walt., Q. Michauxii Nutt., Q. falcata Michx., are quite restricted to the extreme southwestern counties; Q. stellata Wang., Q. Prinus L., and Q. marylandica Muench., are southern or local; the distribution of Q. Schneckii is discussed above.

PLATE III.

TYPICAL ACORNS

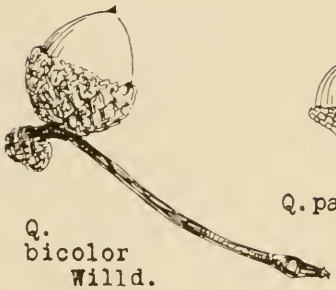
Of Oaks Indigenous to White County.

Q. alba L.



Q. macrocarpa Michx.

Q. Muhlenbergii Englm.



Q. bicolor Willd.

Q. palustris Muench.

Q. rubra L.

Q. coccinea Wang.

Q. velutina Lam.

Q. ellipsoidalis E.J.Hill.

Q. imbricaria Michx.

Q. _____?

(See p.52)

Just exactly how generally some of the ten species collected are distributed over the county I am unable to say. This matter will be discussed with each species separately.

## The White Oaks.

Four species of the White Oak group appear in White County. These in point of number of individuals, rank as follows: (1) Q. alba L. (2) Q. macrocarpa Michx. (3) Q. bicolor Willd. (4) Q. Muhlenbergii Engelm.

*Quercus alba L.* White Oak. (Sp. Pl. 996-1753.)

The White Oak is one of the most numerous and perhaps the most valuable tree of the county. The largest of these trees, as well as many others of less maturity, have long ago disappeared. Some fairly large trees are, however, still to be found. The species is quite generously distributed over the entire county.

The White Oak is readily distinguished from other oaks in spite of the fact that it shows much diversity, in nearly all parts, among individuals of its own small group or species. The bark character varies on many trees. On most younger trees and on many older ones it is comparatively thin and flaky. On not infrequent large trees it is rather deeply fissured with a thickness approaching three inches or more. The outer appearance of the bark on these trees is a peculiar gray as a rule, the inner part being a rich brown.

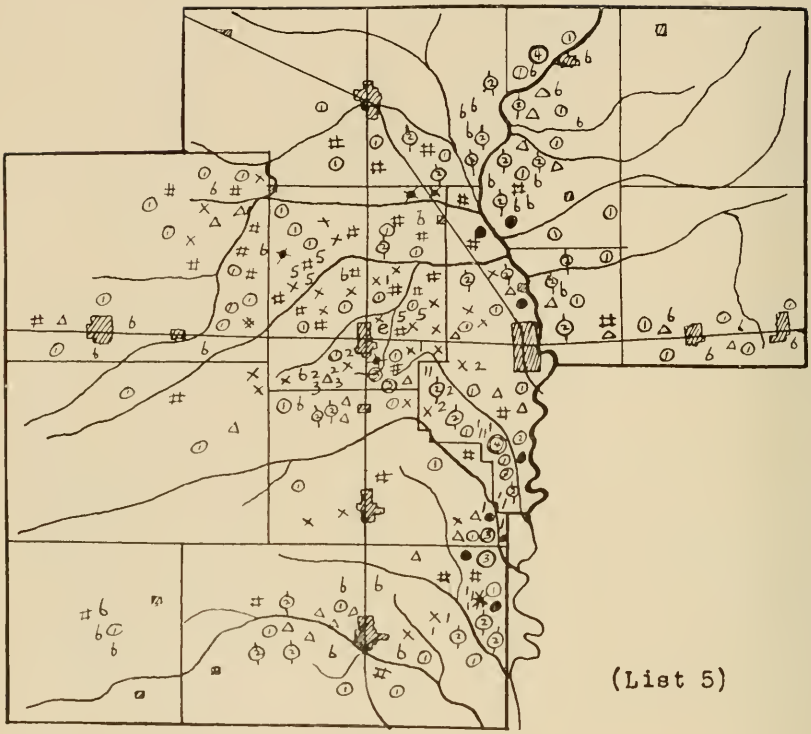
The leaves vary considerably in size and shape. Specimen No. 289 (p. 410), is the typical form. Nos. 443 and 257, also No. 446, show slight variation in size and shape. The leaves in No. 283 show a tendency toward less deep lobing and the one with the lobes more divergent are still further amplified in No. 467, giving a hint toward the leaf character of Q. stellata Wang. No. 292 is simply a large shallow lobed form. The lobes of Nos. 469 (p. 417) and 282 (p. 418) are extremely shallow and, by an amateur, the latter may be almost mistaken for the Swamp White Oak (Q. bicolor Willd.).*

A decided difference is also noted in the thickness of twigs and size of the winter buds in different individuals. In some, Nos. 469 (p. 417) and 282 (p. 418), the twigs are especially thin with correspondingly

* See Q. bicolor p. 411 for distinguishing leaf characters.

PLATE IIIi.

WHITE COUNTY.



(List 5)

General Distribution of the Oaks and Hickories

HICORIA

1 cordiformis(Wang)Brit.
2 ovata (Mill) Brit.
3 ovata var.fraxinifolia Sarg.
4 laciniosa (Michx.f.) Sarg.
5 alba (L) Brit.
6 unidentified.

(These ranges are incomplete).

QUERCUS

① alba L.
② macrocarpa Michx.
③ bicolor Willd.
④ Muhlenbergii Engelm.
● rubra L.
× palustris Muench.
■ coccinea Muench.
e ellipsoidalis E.J.Hill.
☆ velutina Lam.
△ imbricaria Michx.
✱ -------? (See p.52).

small buds, due perhaps mostly to general shading of the trees from which these specimens were taken. In others, of which No. 446 (p. 414) is an example, the twigs are particularly heavy and large. This specimen also shows a decidedly vigorous type of acorn with a long stalk and a broad cup.

Some of the differences are so conspicuous and constant for a number of individuals that there appears to be several races or varieties in this species.

Scarcely more than a third of the counties (33) have reported this well-known tree. It would be interesting for others while reporting this species to note if these racial characteristics, if such, are found.

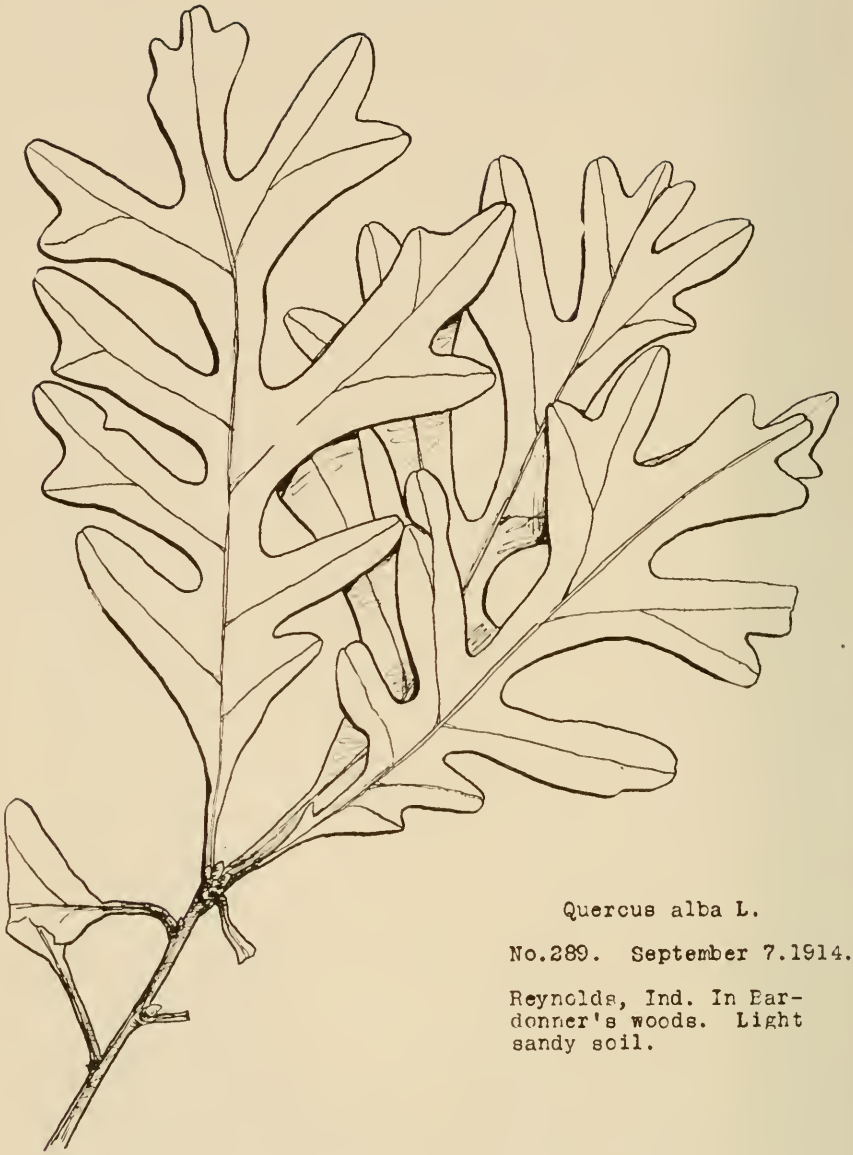
*Quercus macrocarpa Michx.* Mossy-cup, Blue or Bur Oak, Mossy-cup White Oak, Scrub Oak. (Hist. Chen. Am. 2 pl. 23, 1801. Q. olivaeformis Michx. f. 1812.)

The Bur Oak is more widely spread than perhaps any other oak in the United States. It has been reported from 30 counties in Indiana. In White County it occurs chiefly along the Tippecanoe and the lower stretches of the creeks emptying into that river. Not many trees were noted west of the Monon Railroad. A single tree of fair size, about three miles directly north of Reynolds, enjoys an isolation by a radius of several miles. A number of this species are to be found about two miles south of Reynolds. I very much doubt its occurrence in Princeton Township and likewise for Westpoint. It does, however, occur west of these places, for I have seen it in abundance along Carpenter Creek in Jasper County, near Remington. It is usually found in moist, rich soil, near or some small distance from streams. Specimens were taken from trees near the Ward School, three and three-fourths miles southeast of Reynolds. The Bur Oak leaves an impression of a rather coarse appearing tree throughout, easily distinguished from all other oaks.

*Quercus bicolor Willd.* Swamp White Oak. (Neue Schrift Geo. Nat. Fr. Berlin 3:396. 1801), (Quercus Prinus platanoides Lam. 1873. Q. platanoides Sudw. 1893).

The range of the Swamp White Oak in the United States is much more restricted than that of the two other white oaks here reported. In Indiana it is reported from 25 counties (scattering). It is very much less frequent in White County than other oaks. Several trees of

PLATE IV.



Quercus alba L.

No.289. September 7.1914.

Reynolds, Ind. In Bardonner's woods. Light sandy soil.

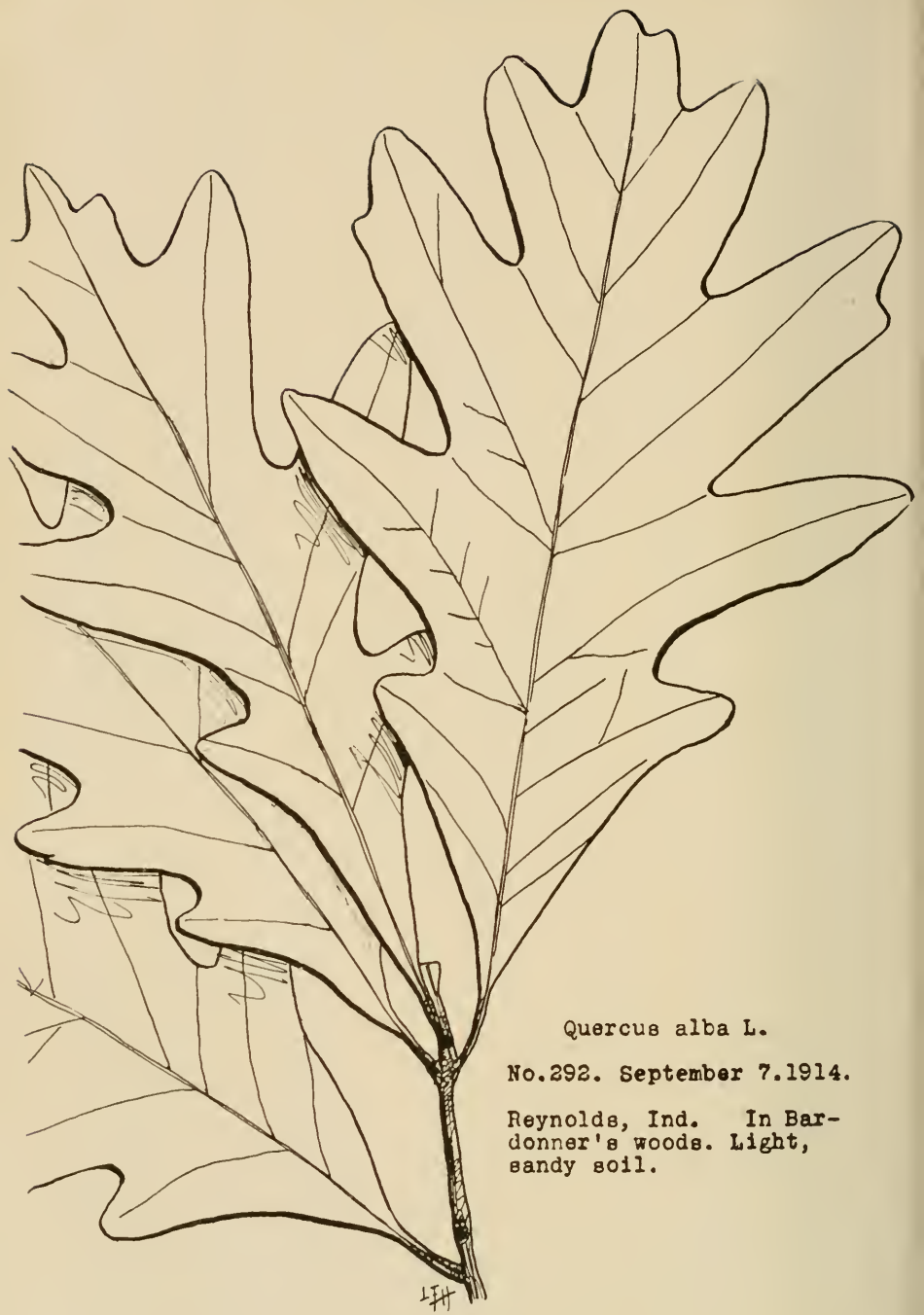
small size are to be found in Ward's thicket about one mile south of Reynolds. Other trees of this species were noted south of the Dyer school, five and three-fourths miles northeast of Brookston, near the Carroll County line. It is found exclusively in swampy or low, moist, rich soil.

The leaves of the Swamp White Oak are broadly obovate or oblong-ovate, rather coarsely round-toothed or pinnatifid. Unlike the White Oak the veins nearly always end in a glandular sharp tip. In the case of the White Oak there is more often a noticeable depression at the vein ending in the lobe. The bark on the younger branches peels back and curls over in a stiff and persistent papery layer, exposing the new lighter brown bark. This is quite characteristic, as is also the long-peduncled acorns.

*Quercus Muhlenbergii Engelm.* Chestnut or Yellow Oak, Chinquapin or Chinkapin, Oak, Tanbark Oak, etc. (Trans. St. Louis Acad. 3:391. 1887), (Q. Prinus acuminata Michx. 1801. Q. acuminata Sarg. 1895.)

This oak is reported from 35 counties in all parts of the State. It is sometimes confused with Q. Prinus L., resembling it closely, as the historical account above indicates. In White County it was noted only along the Tippecanoe River. The acorns readily distinguish it from other oaks indigenous to White County.

PLATE V.

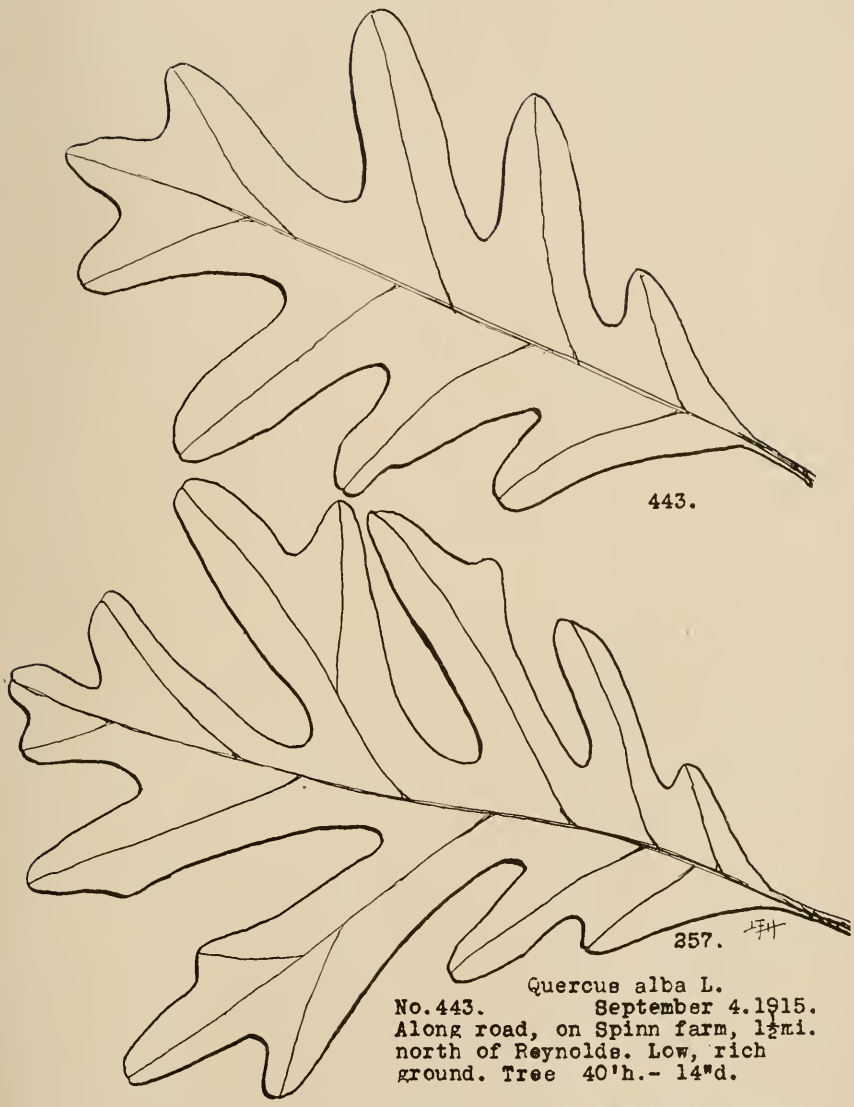


Quercus alba L.

No.292. September 7.1914.

Reynolds, Ind. In Bardonner's woods. Light, sandy soil.

PLATE VI.

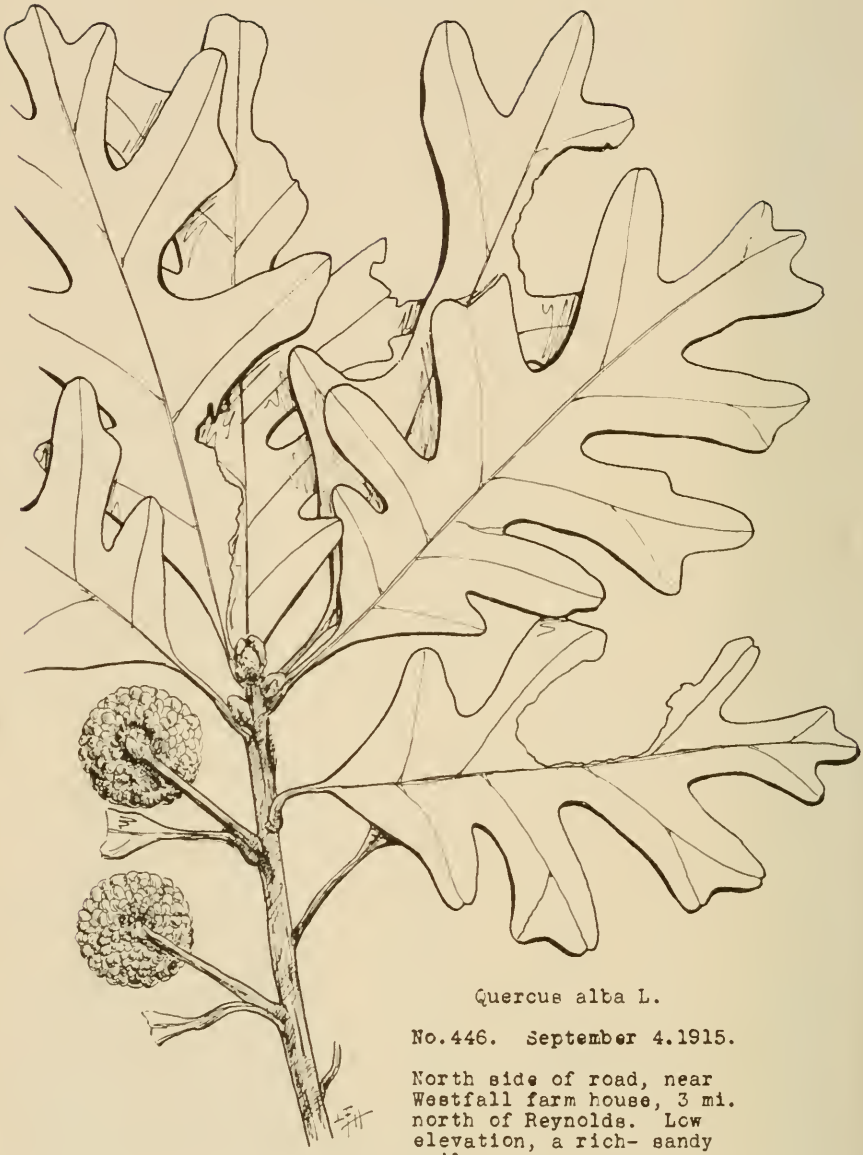



Quercus alba L.

No.443. September 4.1915. Along road, on Spinn farm, 1½mi. north of Reynolds. Low, rich ground. Tree 40'h.- 14"d.

No.257. September 7.1914. Scearcy farm, 1 mi. north-east of Reynolds. Low,rich,black soil. Tree 40'h.- 12"d.

PLATE VII.

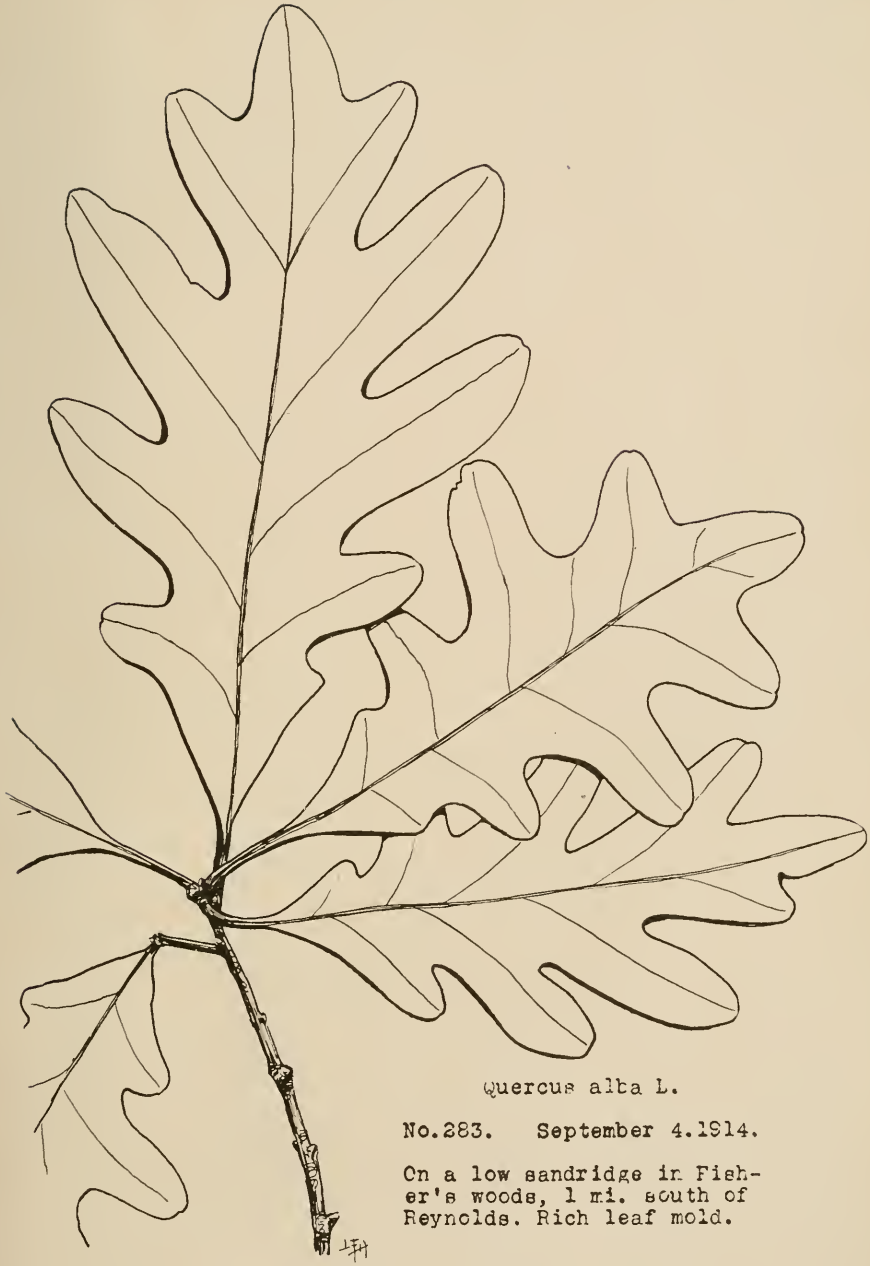


Quercus alba L.

No. 446. September 4. 1915.

North side of road, near Westfall farm house, 3 mi. north of Reynolds. Low elevation, a rich- sandy soil.

PLATE VIII.

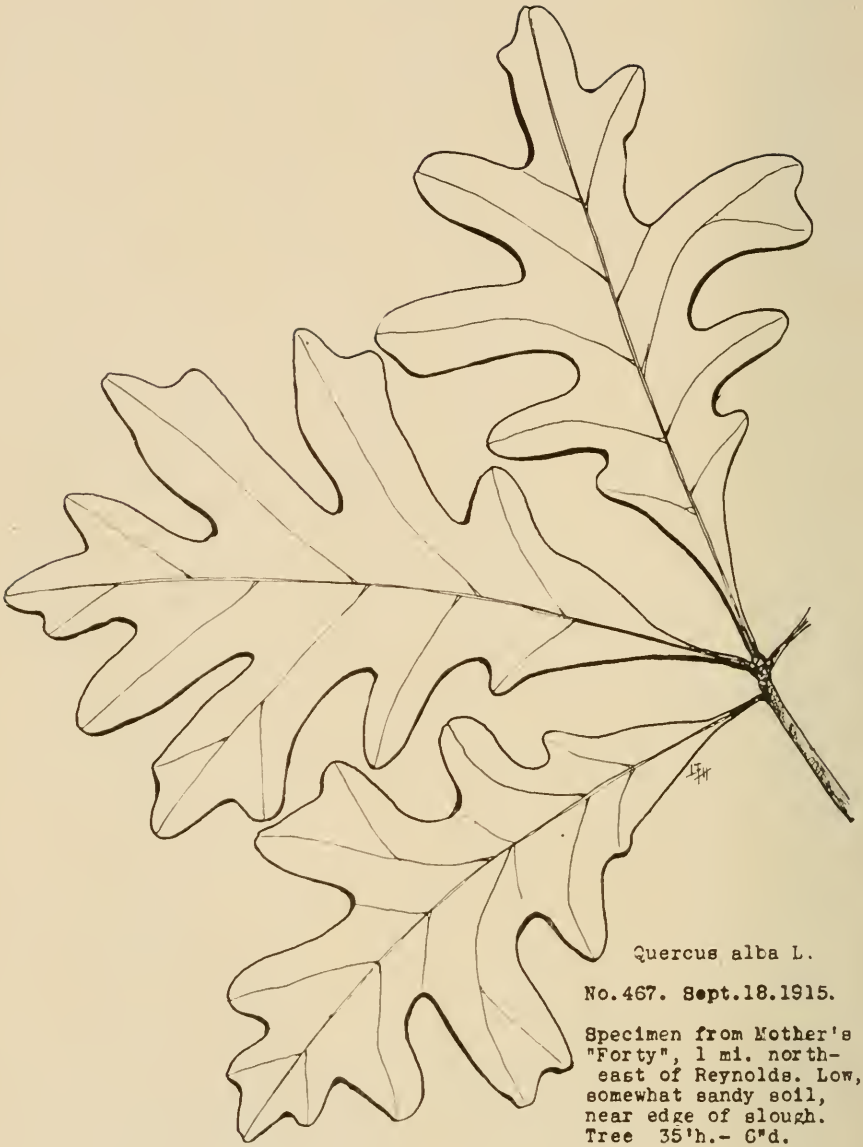


Quercus alba L.

No.283. September 4.1914.

On a low sandridge in Fisher's woods, 1 mi. south of Reynolds. Rich leaf mold.

PLATE IX.

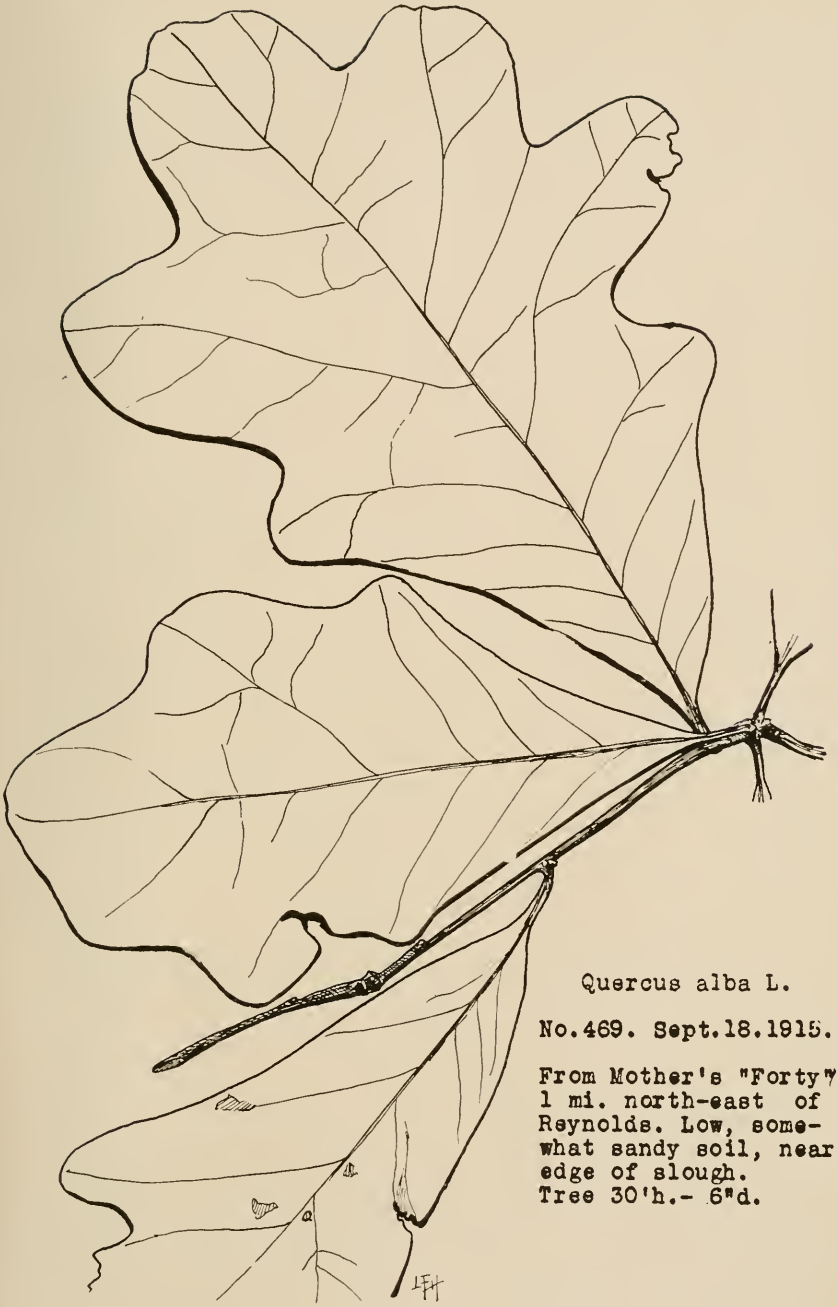


Quercus alba L.

No.467. Sept.18.1915.

Specimen from Mother's "Forty", 1 mi. northeast of Reynolds. Low, somewhat sandy soil, near edge of slough. Tree 35'h.- 6"d.

PLATE X.



Quercus alba L.

No.469. Sept.18.1915.

From Mother's "Forty" 1 mi. north-east of Reynolds. Low, somewhat sandy soil, near edge of slough. Tree 30'h.- 6"d.

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PLATE XI.

Quercus alba L

No.282. September 4.1914.

Near edge of a low sand-ridge, in Fisher's woods, 1 mi. south of Reynolds. Tree 40'h.- 10"d.

PLATE XII.

Quercus bicolor Willd.

No.456. Sept.7.1915.

Along road, 5½ mi. north-
east of Brookston, Ind.
South of Dyer school.
Low, rich, black soil.
Tree 30'h.- 6"d.
Bwamp White Oak.

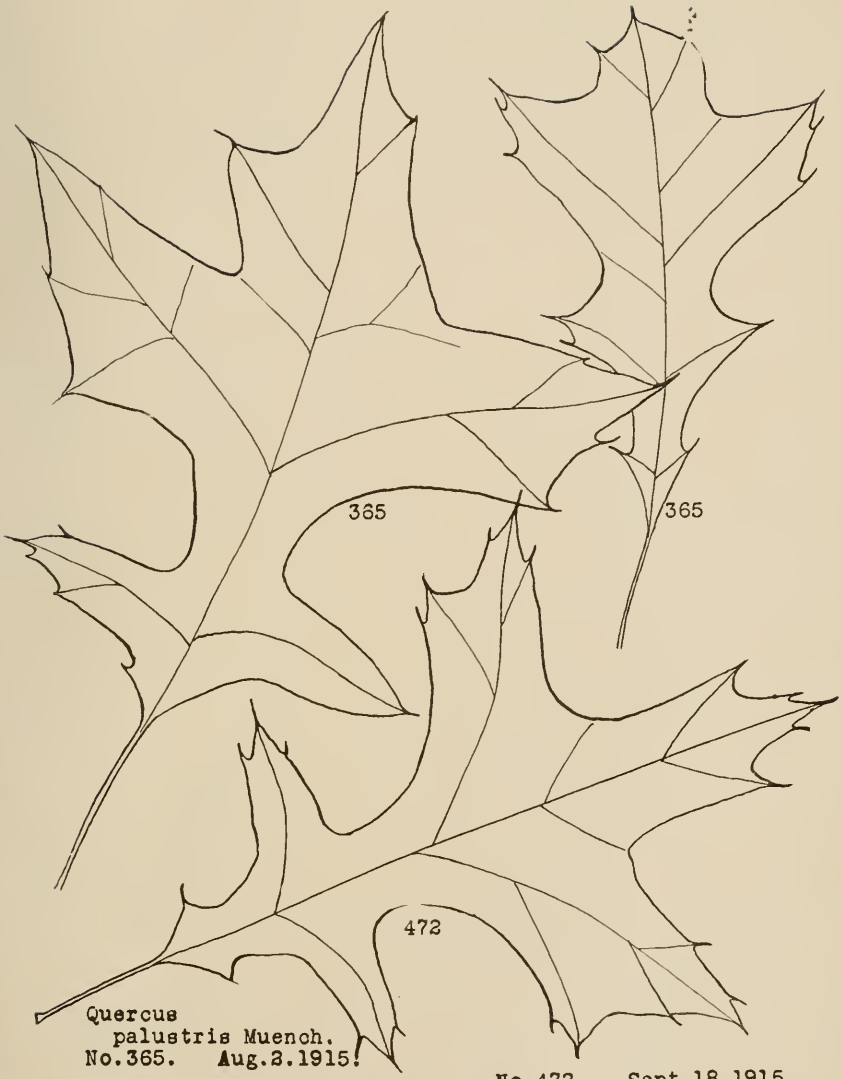
PLATE XIII.

Quercus bicolor Willd.

No. 448. Sept. 6. 1915.

In Ward's thicket, 1mi. south of Reynolds, Ind. Low, rich soil- swampy. Tree 25'h.- 4"d. Swamp White Oak.

PLATE XIV.



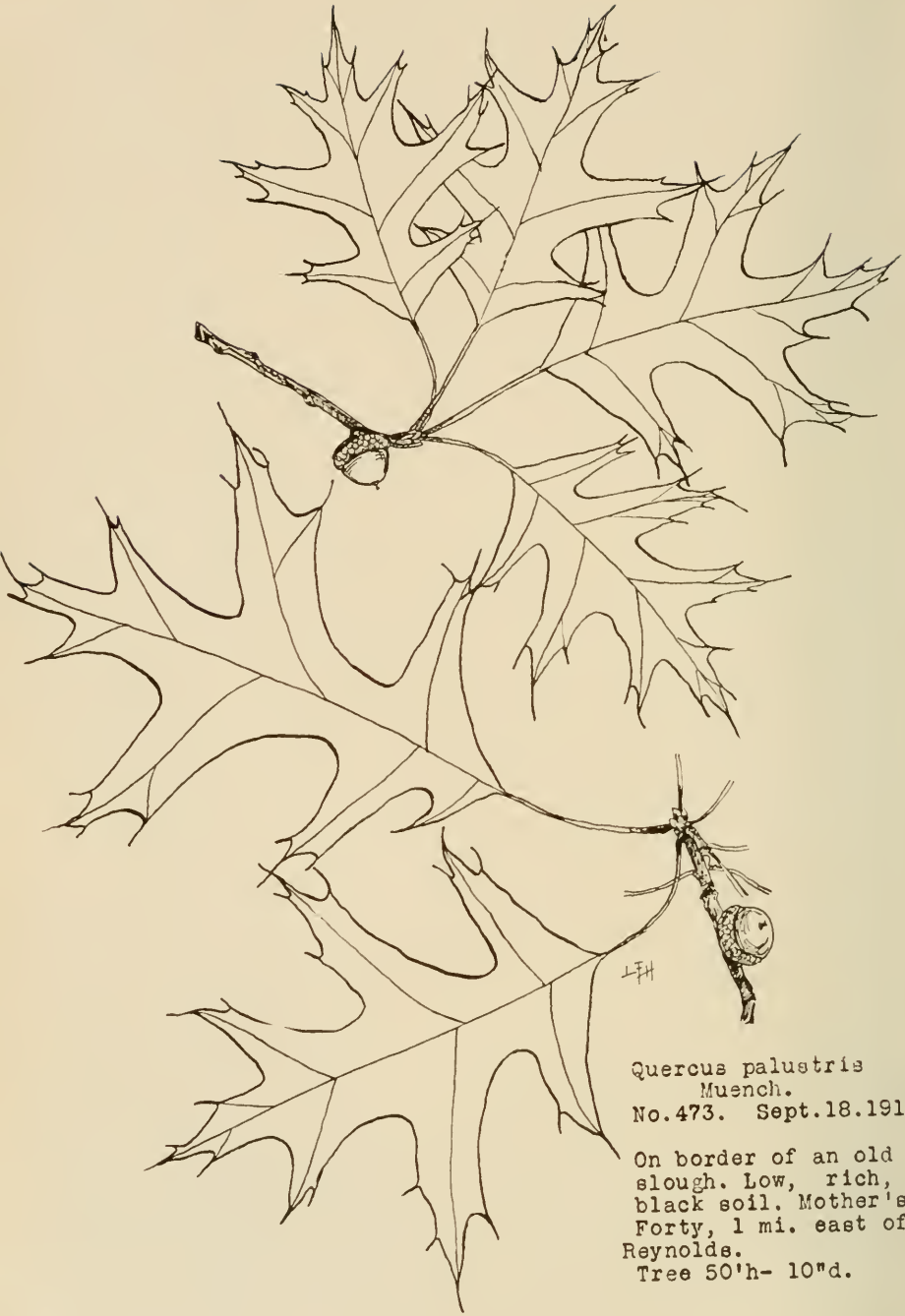

Quercus
palustris Muench.
No.365. Aug.3.1915.

In Ward's thicket, 1 mi. south of Reynolds. Low, moist, black soil. Swampy
Tree 40'h.- 7"d.
Determined by Sargent.

No.472. Sept.18.1915.

Bordering north and east edge of an old slough, low, rich, black soil. Mother's Forty, 1 mi.e.of Reynolds.
Tree 40'h. 8"d.
Determined by Sargent.

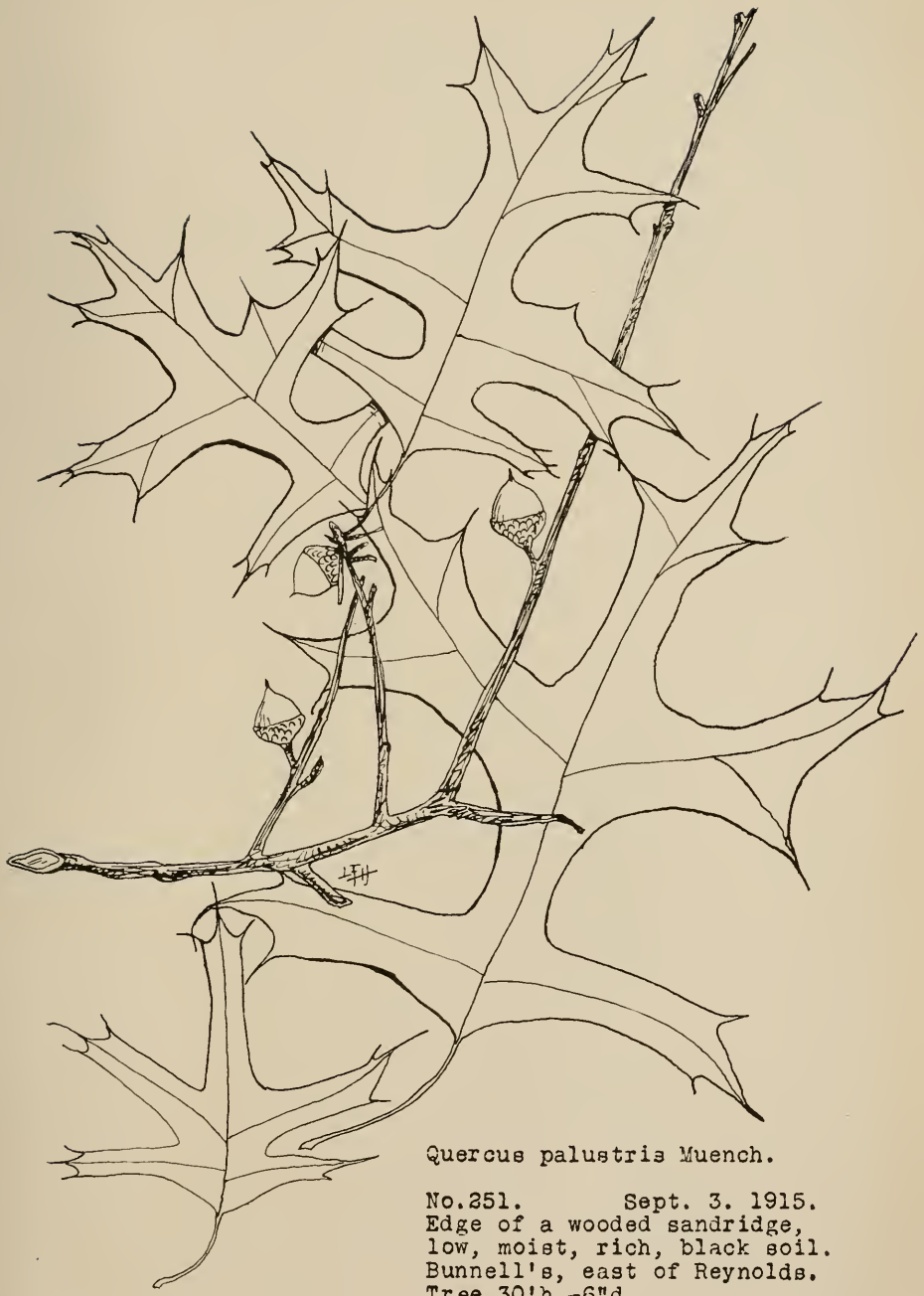
PLATE XIVi.



Quercus palustris
Muench.
No.473. Sept.18.1915.

On border of an old slough. Low, rich, black soil. Mother's Forty, 1 mi. east of Reynolds.
Tree 50'h- 10"d.

PLATE XV.



Quercus palustris Muench.

No.251. Sept. 3. 1915.
Edge of a wooded sandridge,
low, moist, rich, black soil.
Bunnell's, east of Reynolds.
Tree 30'h.-6"d.

PLATE XVI.

RANGE OF
Quercus alba L.
IN THE UNITED STATES AND INDIANA.

PLATE XVII.

RANGE OF
Quercus macrocarpa Michx.
IN THE UNITED STATES AND INDIANA.

PLATE XVIII.

RANGE OF
Quercus bicolor Willd.
IN THE UNITED STATES AND INDIANA.

PLATE XIX.

RANGE OF
Quercus imbricaria Michx.
IN THE UNITED STATES AND INDIANA.

PLATE XX.

RANGE OF
Quercus palustris Du Roi.
IN THE UNITED STATES AND INDIANA.

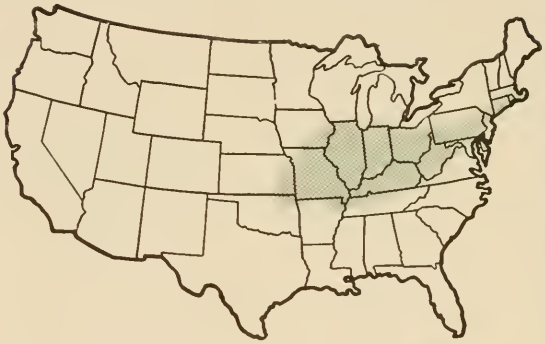


PLATE XXI.

RANGE OF
Quercus coccinea Muench.
IN THE UNITED STATES AND INDIANA.

## The Black Oaks.

The Black Oaks form a difficult group in the identification of species. Numerically, the individuals in members of this group are many and well distributed over White County.

*Quercus imbricaria Michx.* Shingle Oak, Lea, Jack or Laurel Oak. (Hist. Chen. Am. 9 pl. 15, 16. 1801.)

This oak has been reported from 25 counties in Indiana and no doubt occurs in many others. It is the only entire-leaved oak in White County, and in our area it is a medium-sized tree. Specimens were found east of Monon, northwest of Reynolds, up in Princeton township, also southwest and east of Reynolds, at Norway, east of Chalmers near Big Creek, and east of Brookston. In a small grove just northwest of Brookston it forms an almost pure stand of fair-sized trees. It occurs in rich, moist soils or near the edges of low sand ridges.

*Quercus palustris Muench.* (and DuRoi?) Pin Oak, Swamp Oak, Swamp Spanish Oak. (Harbk 2:268 pl. 5-14. 1772.)

Q. palustris has been reported from 26 counties. It is said to be less frequent in the northern tier of counties. In White County it is frequent in low places, associated with other black oaks, but occupying the borders of former swamps rather than higher soil of the other nearby oaks. It is readily distinguished by its small acorns, small, thin, shallow cups, smoother bark than other indigenous oaks, wide divergent leaf lobes, and tardy pruning deflexed dead branches. (See pp. 421-423, 428.)

*Quercus coccinea Wang.* Scarlet Oak. (Amer. 44 pl. 4 f. 9. 1787.)

Though common throughout Indiana, the published records of this oak include but 16 counties. It is more or less common in White County. The fairly large top-shaped cup (2.5 cm. or more broad), with its glabrous, glossy, closely appressed brown scales or bracts about half enclosing the oblong-ovoid nut with its white kernel, makes this species readily recognizable.

*Quercus valutina Lam.* Black Oak, Quercitron, Yellow-bark Oak. (Encycl. 1:721. 1783. Q. tinctoria Bartram. Name only, 1791. Q. coccinea var. tinctoria A. Gray, 1867.)

Velutina is a very common species of oak in White County. It is

also rather common in the State, being reported from 25 counties. It is said to consist of several races, differing in leaf-lobing, amount of pubescence, and size of acorns. The large, somewhat loose bracts of the acorns with the upper ones rather squarrose or tips horizontally wrinkled are characteristic. Leaves which I have taken from sucker growth measure over a foot in length and over 9 inches in breadth. They are very variable—some are deeply lobed, others almost entire. The leaves on vigorous trees are also often comparatively large. The inner bark is a deep orange. Chewed bits of the twigs are said to give the saliva a yellowish discoloration in contradistinction to the Red Oak and the Scarlet Oak, if not as well for other black oaks. (See pp. 406, 408, 429.)

*Quercus ellipsoidalis E. J. Hill.* Hill's Oak. (Pin Oak, Yellow or Black Oak. Bot. Gaz. 27:204. 1899.)

There is no certainty how plentiful this oak is in White County. Sargent has verified a specimen taken about a mile northeast of Reynolds on a low sand ridge. The tree was about 30 feet high and 6 inches in diameter. "In Indiana it has been reported from Lake County only." Very likely it will be found to occur at points between White County and Lake Michigan.

*Quercus rubra L.* Red Oak. (Sp. pl. 996. 1753.)

This is the "largest and most valuable of the biennial oaks." It is distributed throughout the State. In White County it is rather restricted to the Tippecanoe area. The leaves are usually much less deeply lobed than those of the other black oaks. The acorn when mature is usually larger than the acorns of any other White County oak, except macrocarpa. (See p. 406.)

*Quercus . . . ?*

A rather peculiar specimen of oak was taken about four and one-fourth miles northeast of Brookston, in an oak forest on low, rich, black soil. Two such trees were growing just beside each other. The bark is close, almost black, and shallow fissured. These trees were about 45 feet high and 10 inches in diameter. Leaf specimens with twigs, buds and acorns were collected on September 7, 1915.

From the specimens and data at hand, at least three authorities have disagreed as to the status of this oak. All say it is a variable

PLATE XXII.

Quercus -------?

No. 455. Sept. 7. 1915.

Near road, in forest on low, rich, black soil, 4½ mi. N.E. of Brookston. Trees (2) 45'h.- 10"d. ----See discussion pp. 52 and 53.

form and admit the difficulty of determination. It has been said to be a variable form of Q. texana Sarg., not Buckley ?, possibly synonymous with Q. Schneckii Brit. Q. borealis Michx., or Q. falcata Michx., or a hybrid of these two have been mentioned, as has also Q. velutina Lam.

My own idea coincides exactly with none of these. Q. borealis Michx. does not occur in the State, so far as known. Not a single reference to it is made in either Coulter's Catalogue or Deam's 1911 Report. Q. falcata Michx. has been reported from but three counties in the State, viz., Gibson, Posey and Fountain, which last is somewhat exceptional. Evidently the specimen under consideration is neither of these or could possibly be a hybrid of them. Since more or less doubt shrouds the texana-Schneckii determination from more than one standpoint, and since these are the same or different species according to different authors, I hesitate in applying either name, whether of the same or different species.

Q. velutina Lam. does not seem to be very conclusive.

The supposed typical leaves, fruit, etc., used in various keys for the same species many times, vary considerably. So in this case. The leaves in this instance compare very favorably with those shown for Q. rubra L., in Hough's Handbook of the Trees of the Northern States and Canada.

I have associated it most closely with Q. rubra L., being a rather variable form of that species or a hybrid of it with velutina or coccinea. I add this note from Hough's handbook: "Gray's Oak, Q. borealis Michx. f., (also Q. ambigua Michx. f.), a large tree, occasionally found from Ontario to Quebec to the mountains of North Carolina, bearing leaves like Q. rubra L., and fruit like Q. coccinea. It is considered by some a distinct species and by others, and probably more correctly, only an aberrant form of Q. rubra L."

### 3. The Hickories.

*With a Revised List for the State.*

The Hickories are very difficult of determination and authors are by no means agreed. If I may venture upon a suggestion, it seems to me that a more careful, thorough and extensive study *in the field* is

necessary before the genus can be satisfactorily divided into its species and varieties.

In the first place, the group has been favored with three genus names, viz., Juglans (L. 1753.); Hicoria (Raf.—1808.—Scoria Raf. 1808, Hicorius Raf. 1817, Hicoria Raf. 1836.); and Carya (Nutt. 1818.).

The walnuts and butternuts and our present hickories were all included under the term Juglans. The group was split up on the strength of whether the husk was dehiscent or not, and of course the so-called hickories emerged as a separate genus. Without going further into the historical side of the matter, both Hicoria and Carya as a genus name are commonly applied. I favor the term Hicoria, derived from the aboriginal or American Indian name with its apparent priority in print. Be this, however, as it may, the names and descriptions given to species are infinitely more troublesome.

The last 7th Edition, of Gray's Manual, describes eight species with all of these, possibly excepting Hicoria aquatica, within the borders of Indiana. Britton and Brown, new (2nd Ed.) Flora, contains 12 species, including but the same species as given in Gray for Indiana. Doubt shrouds several of these species as admitted in the texts.

Deam's 1911 Report lists seven species as occurring in Indiana. Except in name, this checks exactly for those given in Coulter's Catalogue. Very brief notes on the Indiana species are noted below, old and new records are given in a list following these notes.

1. *Hicoria Pecan (Marsh) Brit.* Pecan, Illinois Nut, Soft-shell Hickory. (See p. 436.)

This tree does not occur in White County. Its range as given in the 1911 Report is the lower Wabash and lower stretches of its tributaries. (See p. —.) Without doubt this species occurs in some as yet unreported counties. In a letter from Mr. Deam, Jan. 31, 1916, he says that H. Pecan extends up the Ohio Valley at least as far as Clark County. This species and the next are not difficult of determination.

2. *Hicoria cordiformis (Wang) Brit.* Bitter-nut, Swamp Hickory, Pignut, etc. (See p. 436.)

This species is said to occur throughout Indiana, being, however, nowhere abundant (Deam 1911 Report). In White County it is perhaps the most abundant in the central townships.

3. *Hicoria ovata (Mill) Brit.* Shagbark, Shellbark Hickory, etc. (See p. —.)

Common in all parts of Indiana. Common in White County in rich, moist soils or the edges of sand ridges. Sargent has split the species by designating two varieties. (See p. 437.)

(a) *Hicoria ovata fraxinifolia Sargent.*

As noted in the appended list, this variety occurs in three other counties besides White. Without attempting any description here, I simply add that Sargent verified a specimen for me, taken one and one-half miles southwest of Reynolds.

(b) *Hicoria ovata var. Nuttallii Sargent.*

This variety occurs in Indiana according to two determinations by Sargent. Specimens were taken in Dekalb County, south of Auburn. Leaflets 5. (Deam's Nos. 19, 291, 19, 293.)

4. *Hicoria laciniosa (Michx. f.) Sarg.* Big Shagbark, Kingnut, etc. (See p. 437.)

This species bears a close resemblance to the preceding species. At this time I am unable to define its distribution in White County other than to say that it occurs in Honey Creek Township. Rich soil, edges of sand ridges.

5. *Hicoria microcarpa (Nutt) Brit.* Small-fruited Hickory, Little Pignut or Shag-bark.

The habitat and range of this species has not been well studied (Deam 1911 Report). Sargent now calls the old microcarpa, ovalis—Carya ovalis Sarg.—or Hicoria ovalis, and has singled out no less than four varieties under the species. Since hickories are more or less abundant in White County this species with one or more of its varieties may be found there. I say this in view of my limited number of specimens and its reported occurrence in Tippecanoe County. (See list p. 437.)

6. *Hicoria alba (L) Brit.* White Hickory, Bull-Nut, Mocker Nut, etc.

Said to be rather rare in the northern part of the State. Locally more or less abundant in Honey Creek Township (White County), which with its low sand ridges is more suited to its drier situations.

7. *Hicoria glabra (Mill) Brit.* Black Hickory, Pignut, etc.

Sargent now styles this species porcina. I have taken no specimens

of it in White County, but owing to its wide distribution it seems reasonable to expect it there.

(a) *Hicoria glabra var. megacarpa Sargent.*

Another of Sargent's new varieties. "Franklin County, on high ground, west of Metamora. Bark tight, leaflets 5."

Without further comment I am permitted to add the following revised list for this very puzzling genus Hicoria. The determinations represent Sargent's latest efforts.

(List 6.)

Revised List of Hickories for Indiana.

The determination of all the new records were made by Sargent. Specimens of these new records were collected by C. C. Deam, Prof. G. N. Hoffer and by myself, and are deposited in the Deam Herbarium, Bluffton, Ind.; Purdue Herbarium, Purdue University; Arnold Arboretum, Harvard University, and in my own herbarium. The chief change noted in the revised list is Sargent's recognition of seven new varieties.

1. Hicoria Pecan (Marsh) Brit. Pecan, Illinois Nut, Soft-shell Hickory. Juglans Pecan Marsh. 1785; Carya olivaeformis Nutt. 1818; Carya illinoiensis (Wang) K. Koch. ?; H. Pecan Brit. 1888.

Old Records: Franklin (Meyncke—from a cultivated tree?); Gibson (Schneck); Jefferson (Young); Knox (Thomas); Posey (Schneck), (Deam) and (Wright); Vigo (Blatchley).

No new records.

2. Hicoria cordiformis (Wang) Brit. Bitter-nut, Swamp Hickory, etc. J. alba minima Marsh. 1785; J. cordiformis Wang. 1787; C. amara Nutt. 1818; H. minima Brit. 1888; H. cordiformis Brit. 1908.

Old Records: Carroll (Thompson); Delaware, Jay, Randolph and Wayne (Phinney); Fountain (Brown); Franklin (Meyncke); Gibson and Posey (Schneck); Hamilton and Marion (Wilson); Knox (Ridgway); Noble (VanGorder); Parke (Hobbs); Steuben (Bradner); Vigo and Monroe (Blatchley); Wayne (Petry and Markle); Montgomery (Thompson); Posey (MacDougal and Wright); Putnam (Grimes); Tippecanoe (Coulter); Adams, Delaware, Hamilton, Jennings, Knox, Montgomery, Owen, Vermillion, Warren and Wells (Deam).

New Records: Allen, Bartholomew, Fountain, Franklin, Johnson, Knox, Switzerland (Deam and Hoffer); White (Heimlich).

3. Hicoria ovata (Mill) Brit. Shag-bark, Shell-bark Hickory, etc. J. ovata Mill. 1768; C. alba Nutt. 1818, not J. alba L.; H. ovata Brit. 1888.

Old Records: Cass and Tippecanoe (Coulter); Clark (Baird and Taylor); Delaware, Jay, Randolph and Wayne (Phinney); Franklin (Meyncke); Gibson (Schneck); Hamilton and Marion (Wilson); Knox (Ridgway) and (Thomas); Kosciusko (Clark) and (Scott); Posey (Schneck) and (MacDougal and Wright); Vigo (Blatchley); Wayne (Petry and Markle); Jefferson (Young); Monroe (Blatchley); Montgomery (Evans); Putnam (Grimes) and (MacDougal); Clark, Delaware, Hamilton, Jennings, Owen, Posey, Steuben and Wells (Deam).

New Records: Allen, Clark, Crawford, Franklin, Gibson, Jay, Knox, Owen, Pike, Steuben and Wells (Deam and Hoffer); White (Heimiich).

3. Hicoria ovata (Mill) Brit.

(a) var. fraxinifolia Sarg. 1916. Ash-leaved Shag-bark or Shell-bark Hickory.

No old records.

New Records: Daviess, Martin, Wells (Deam and Hoffer); White (Heimlich).

(b) var. Nuttallii Sarg. 1916.

No old records.

New Records: Dekalb (Deam).

4. Hicoria laciniosa (Michx. f.) Sarg. Big Shag-bark, King Nut, etc. C. sulcata Nutt. not J. sulcata Willd.; J. laciniosa Michx. f. 1810; H. sulcata Brit. 1888; H. laciniosa Sarg. 1894.

Old Records: Carroll (Thompson); Clark (Smith); Dearborn (Collins); Delaware, Jay, Randolph and Wayne (Phinney); Franklin (Meyncke); Gibson and Posey (Schneck); Jefferson (Coulter) and (Young); Knox (Ridgway); Kosciusko (Clark); Miami (Gorby); Noble (VanGorder); Parke (Hobbs); Putnam (Grimes); Steuben (Bradner); Tippecanoe (Coulter); Vigo (Blatchley); Harrison, Marion, Posey, Vermillion and Wells (Deam).

New Records: Allen, Bartholomew, Floyd, Gibson, Jay, Jefferson, Martin, Washington, Wells (Deam and Hoffer); White (Heimlich).

5. Hicoria ovalis. (C. ovalis Sarg. 1916.) H. microcarpa (Nutt) Brit. J. alba odorata Marsh. 1785; C. microcarpa Nutt. 1818; H. microcarpa Brit. 1888; H. glabra var. odorata Sarg. 1895. Small-fruited Hickory, Little Pignut or Shag-bark.

Old Records: Clark (Baird and Taylor); Delaware, Jay, Randolph and Wayne (Phinney); Franklin (Meyncke); Gibson (Ridgway) and (Schneck); Hamilton and Marion (Wilson); Jefferson (Coulter) and (Young); Knox (Ridgway); Kosciusko (Scott); Miami (Gorby); Posey (Schneck) and (MacDougal and Wright); Tippecanoe (Coulter); Laporte, Vermillion, Warren and Wells (Deam).

New Records: Allen, Bartholomew, Daviess, Floyd, Franklin, Gibson, Jay, Lagrange, Lawrence, Steuben, Sullivan, Washington, Wells (Deam and Hoffer).

5. Hicoria ovalis. (Carya ovalis Sarg.)

(a) var. odorata Sarg. 1916.

No old records.

New Records: Allen, Jefferson, Lagrange, Steuben and Wells (Deam and Hoffer).

(b) var. obovalis Sarg. 1916.

No old records.

New Records: Grant, Jackson, Lagrange, Steuben, Washington and Wells (Deam and Hoffer).

(c) var. obcordata Sarg. 1916.

No old records.

New Records: Grant, Lagrange, Porter and Wells (Deam and Hoffer).

H. ovalis. (C. ovalis Sarg.)

(d) var. ..... ??

No old records.

New Records: "These specimens seem to be a new variety," Sargent 1916. No name has been given. Specimens are from Knox and Gibson (Deam and Hoffer).

6. Hicoria alba (L) Brit. White-heart Hickory, Mocker-nut, Bullnut, etc. J. alba L. 1753; J. tomentosa Lam. 1797; C. tomentosa Nutt. 1818; H. alba Brit. 1888.

Old Records: Cass (Benedict and Elrod); Clark (Baird and Taylor) and (Smith); Dearborn (Collins); Fountain (Meyncke); Gibson

and Posey (Schneck) and (Deam); Hamilton and Marion (Wilson); Jefferson (Coulter) and (Young); Knox (Ridgway); Kosciusko (Clark) and (Scott); Miami (Gorby); Vigo (Blatchley); Wabash (Benedict and Elrod); Tippecanoe (Coulter).

New Records: Daviess, Franklin, Harrison, Jackson, Jay, Jefferson, Knox, Lawrence, Sullivan, Washington (Deam and Hoffer); White (Heimlich).

7. Hicoria porcina. (C. porcina Sarg. 1916.) Pignut Hickory, Black Hickory. *Hicoria glabra* (Mill) Brit. J. glabra Mill. 1768; C. porcina Nutt. 1818; H. glabra Brit. 1888; H. glabra hirsuta Ashe. 1896.

Old Records: Cass and Wabash (Benedict and Elrod); Carroll (Thompson); Clark (Baird and Taylor) and (Smith); Dearborn (Collins); Delaware, Jay, Randolph and Wayne (Phinney); Franklin (Haymond) and (Meyncke); Gibson and Posey (Schneck); Hamilton and Marion (Wilson); Jay (McCaslin); Jefferson (Coulter) and (Young); Knox (Ridgway) and (Thomas); Noble (VanGorder); Parke (Hobbs); Putnam (Grimes) and (MacDougal); Steuben (Bradner); Tippecanoe (Coulter); Vigo (Blatchley); Delaware, Owen, Posey and Warren (Deam).

New Records: Crawford, Floyd, Franklin, Harrison, Lawrence, Martin, Sullivan (Deam and Hoffer).

7. Hicoria porcina. (Carya porcina Sarg.)

(a) var. megacarpa Sarg. 1916.

No old records.

New Records: Franklin (Deam).

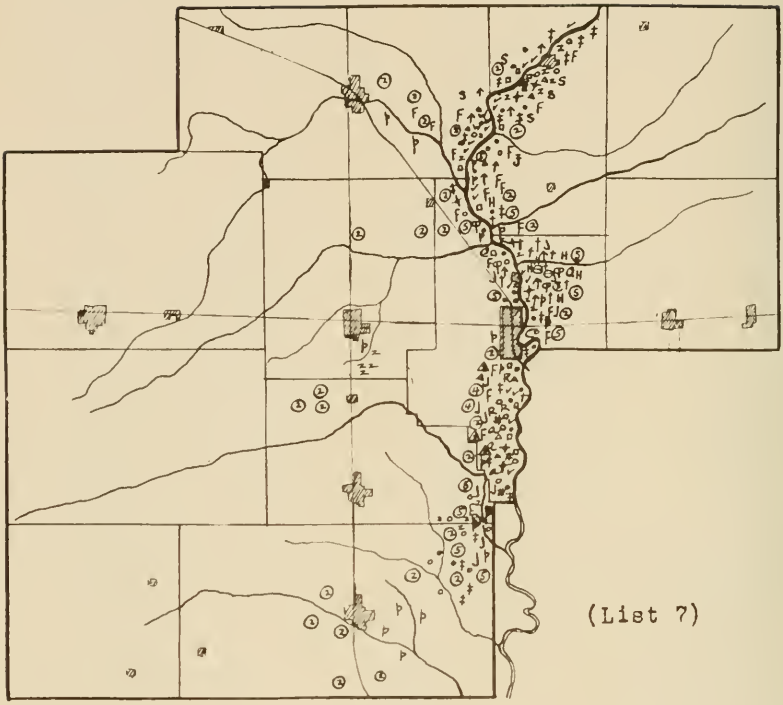
### 4. Trees Restricted to the Tippecanoe River Banks.

As indicated by the list and map on page 440, about half (23 out of 62) the species found in White County are totally or in some cases nearly exclusively confined to the Tippecanoe River banks. Some few of these are found at a distance from the river or the lower stretches of creeks. These include the Bur Oak, the Prickly Ash and others.

Though not restricted to the above area, the Red Cedar, the Black Walnut, Sassafras, and a few others, receive their best development in the vicinity of the Tippecanoe. The largest sassafras trees were noted near Buffalo, east bank of the river; the most abundant and largest

PLATE XXIII.

WHITE COUNTY.



(List 7)

...Trees Restricted to the Tippecanoe River Banks...

② Quercus macrocarpa Michx.
④ " Muhlenbergii Engelm.
⑤ " rubra L.
Ⓟ Populus heterophylla L.
z Zanthoxylum americanum Mill.
△ Acer nigrum Michx.
J Juglans cinerea L.
Þ Platanus occidentalis L.
• Liriodendron Tulipifera L.
✕ Celtis occidentalis L.
° Ostrya virginiana (Mill)Willd.
▲ Cercis canadensis L.
▫ Tilia americana L.
✓ Gleditsia triacanthos L.
# Gymnocladus diocia(L)Koch.
R Robinia Pseudo-acasia L.
a Aesculus glabra Willd.
F Fagus grandifolia Ehrh.
↑ Ptelea trifoliata L.
Ŧ Staphyllea trifoliata L.
Ⓒ Cornus florida L.
Ⓐ " alternifolia L.f.
† Asimina triloba (L)Dunal.
‡ Carpinus caroliniana L.
H Hamamelis virginiana L.
w Betula lutea Michx.
* Crataegus albicans Ashe ?

Cedars were seen south of Monticello, especially along the lower course of Big Creek. (See map, p. 451.)

*Quercus macrocarpa Michx.* See p. 409.

*Quercus Muhlenbergii Engelm.* See p. 411.

*Quercus rubra L.* See p. 431.

*Populus heterophylla L.* Swamp or Downy Poplar, River- or Swamp Cotton-wood., Balm-of-Gilead. In Indiana this tree is "rare and local, except in the lower Wabash bottoms." The published records of the distribution are as follows: Delaware, Jay, Randolph and Wayne (Phinney); Franklin (Meyncke); Gibson and Posey (Schneck); Hamilton (Doane); Jay (McCaslin); Knox (Ridgway); Miami (Gorby); Vigo (Blatchley); Blackford, Laporte, Posey, Wells (Deam).

I found specimens near the Carroll County line, five and three-fourths miles northeast of Brookston, in low, rich soil; trees 25 or more feet high and up to 6 inches in diameter. (See p. 454 for other species of Populus.)

*Acer nigrum Michx.* Black Sugar Maple, Black or Hard Maple. I cannot speak with certainty of the exact distribution of maples in the county. Species of this genus are very frequently used as shade trees and all have some escapes. Members of this genus were found in abundance near Buffalo and south along the Tippecanoe. Some trees are also to be found in oak forests of Honey Creek Township. A. nigrum was found about three miles south of Monticello. The group consisted of a number of large trees (70 feet high by 17 inches diameter) on a sandy, gravelly slope. (See other Maples p. 458.)

*Juglans cinerea L.* Butternut, White or Lemon Walnut, Oilnut. Reported from many counties, but said to occur in very sparing numbers in some. It is rather rare in White County and adheres to the banks of the Tippecanoe. Specimens were taken from fair-sized trees on high, rich, gravelly soil, east of Lowe's bridge, about four miles southwest of Buffalo. (See p. 454 for nigra.)

*Platanus occidentalis L.* Sycamore, Button-wood, Button-ball, Plane Tree. This is Indiana's distinctive tree. Found in all parts of the State, more or less frequent along streams or the borders of lakes. It has the distinction of being the largest deciduous tree in North America. (Tree at Worthington, Indiana, over 44 feet in circumference and 150 feet high.)

I have seen some comparatively large individuals along the Wabash up to the mouth of the Tippecanoe. It is found along the entire extent of the latter river through White County. It was also found in Honey Creek Township (Ward's thicket), near Spring Creek (J. P. Erickson farm) about three and one-half miles northeast of Brookston, and along Big Creek, four miles east of Chalmers.

*Liriodendron tulipifera L.* Tulip-tree, Yellow Poplar, Canoe-wood, Lime-tree, White-wood. The published lists for Indiana cover 41 counties. Rather rare in some localities. One of Indiana's largest and most useful trees. Not plentiful, but found along the entire length of the Tippecanoe through White County. "It is practically free from insect and fungous diseases" and is an excellent tree for re-enforcing the woodlot—a good shade tree.

The following trees are more or less common along the Tippecanoe and usually are not found far from the watercourse. Some of them have made their way along the creeks for several miles, notably Spring Creek, east of Brookston, Big Creek, Big Monon, and Pike Creek.

*Celtis occidentalis L.* Hackberry, etc.

*Ostrya virginiana (Mill) Willd.* Hop-hornbeam.

Carpinus caroliniana Walt. Am. Hornbeam, etc.

Cercis canadensis L. Red-bud, Judas-tree.

Tilia americana L. Linden, Basswood.

Gymnocladus diocia (L) K. Koch. Coffeenut-tree.

Aesculus glabra Willd. Ohio Buckeye.

Fagus grandifolia Ehrh. Beech.

Cornus florida L. Flowering Dogwood.

alternifolia L. f. Green Osier, etc.

Asimina triloba (L) Dunal. Pawpaw.

Ptelea trifoliata L. Hop-tree, Shrubby Trefoil.

Hamamelis virginiana L. Witch-hazel.

Staphylea trifoliata L. American Bladder-nut.

The last three of the above list are not included in Deam's 1911 Report. These are large shrubs or small trees. There are Ptelea at Norway, 15 feet high and 3 inches in diameter. The foliage when bruised has an unpleasant odor. The fruit is bitter and has been used as a substitute for hops. According to Coulter it is found in Jefferson,

Tippecanoe, Monroe, Vigo, Putnam, Gibson, Posey, Jay, Delaware, Randolph, Wayne, Clark, Franklin, Hamilton, Cass and Fayette Counties.

The Witch-hazel is interesting because of its flowering so late in the season (October to December). The bony seeds ripen in early spring and may be "shot" several yards from their capsules. Some shrubby specimens near Norway were eight feet or more high. Distribution given in Coulter's Catalogue: Kosciusko, Laporte, Jefferson, Tippecanoe, Clark, Noble, Delaware, Jay, Randolph, Wayne, Franklin, Monroe, Vigo, Cedar Lake, Hamilton, Putnam and Steuben.

The Bladder-nut, which may be a small tree in the south, is more nearly a large shrub in our area. Specimens seen at Norway were rather tall (perhaps 15 feet high). Distribution given in Coulter's Catalogue: Jefferson, Tippecanoe, Monroe, Vigo, Putnam, Gibson, Posey, Kosciusko, Hendricks, Decatur, Knox, St. Joseph, Hamilton, Marion, Steuben and Fayette.

*Gleditsia triacanthos L.* Honey Locust. This is a rather characteristic and imposing tree along the Tippecanoe. It is sometimes found along the lower portions of creeks.

*Robinia pseudo-acasia L.* Common Black Locust. This locust was noted several miles south of Monticello and also near Lowe's bridge. It is cultivated in all parts of the county and escapes are occasionally found.

*Betula lutea Michx.* Yellow Birch. This species has been confused with Betula lenta, which, according to Deam, does not occur in our area. In Indiana it is rare and local. It has not been reported south of Miami County except in Crawford County, associated with the laurel (Kalmia latifolia), which is the only station of the latter in the State, except possibly another record for Floyd County.

Specimens were taken from two trees about two miles south of Buffalo near the water's edge of the river. These were thought to be different species at first, but they are likely both lutea. It is certain that one is lutea and the other will likely be found to be so when fresh material is available. A mere guess at the height of these trees would place them about 40 feet high. They were associated with maples, ashes, sycamores and honey-locusts.

*Zanthoxylum americanum Mill.* Prickly Ash, Toothache Tree, An-

PLATE XXIV.

RANGE OF

Betula lutea Michx.

IN THE UNITED STATES AND INDIANA.

gelica Tree, etc. This species is conspicuous along some parts of the Tippecanoe (Norway and Buffalo). Several trees were found in Ward's thicket, about a mile south of Reynolds, and also along Big Creek, four miles east of Chalmers. It is variously called a small tree or a large shrub and is not included in the 1911 Report. Some of the specimens found were about 10 feet high and 3 inches in diameter.

In Coulter's Catalogue it is reported from Posey, Vigo, Cass, Kosciusko, Steuben, Jefferson, Randolph, Franklin, Shelby and a dozen other counties.

*The Thorns* constitute one of the most puzzling genera in the plant kingdom. More field work is necessary before statements of ranges and abundance of each species in White County is possible. It is likely that more species occur in the county than is given here. (See p. 457.)

*Crataegus pruinosa (Wendl) K. Koch.* Waxy-fruited Thorn. (C. populifolia Ell. 1821; not Walt.; Mespilus pruinosa Wendl. 1823; C. pruinosa K. Koch. 1853; C. Porteri Brit. 1900. Specimens of this thorn were obtained east of Norway across the river in the vicinity of the mouth of Pike Creek. A number of thorn trees are present in this locality, this species being perhaps locally abundant. On gravelly soil, low river bank. Trees 12 feet high, 4 inches in diameter. Determined by Sargent.

Deam says this thorn is well distributed in Indiana. Specimens have been seen from the following counties: Decatur, Delaware, Gibson, Hamilton, Madison, Steuben, Warren, Wells (Deam); Putnam (Grimes).

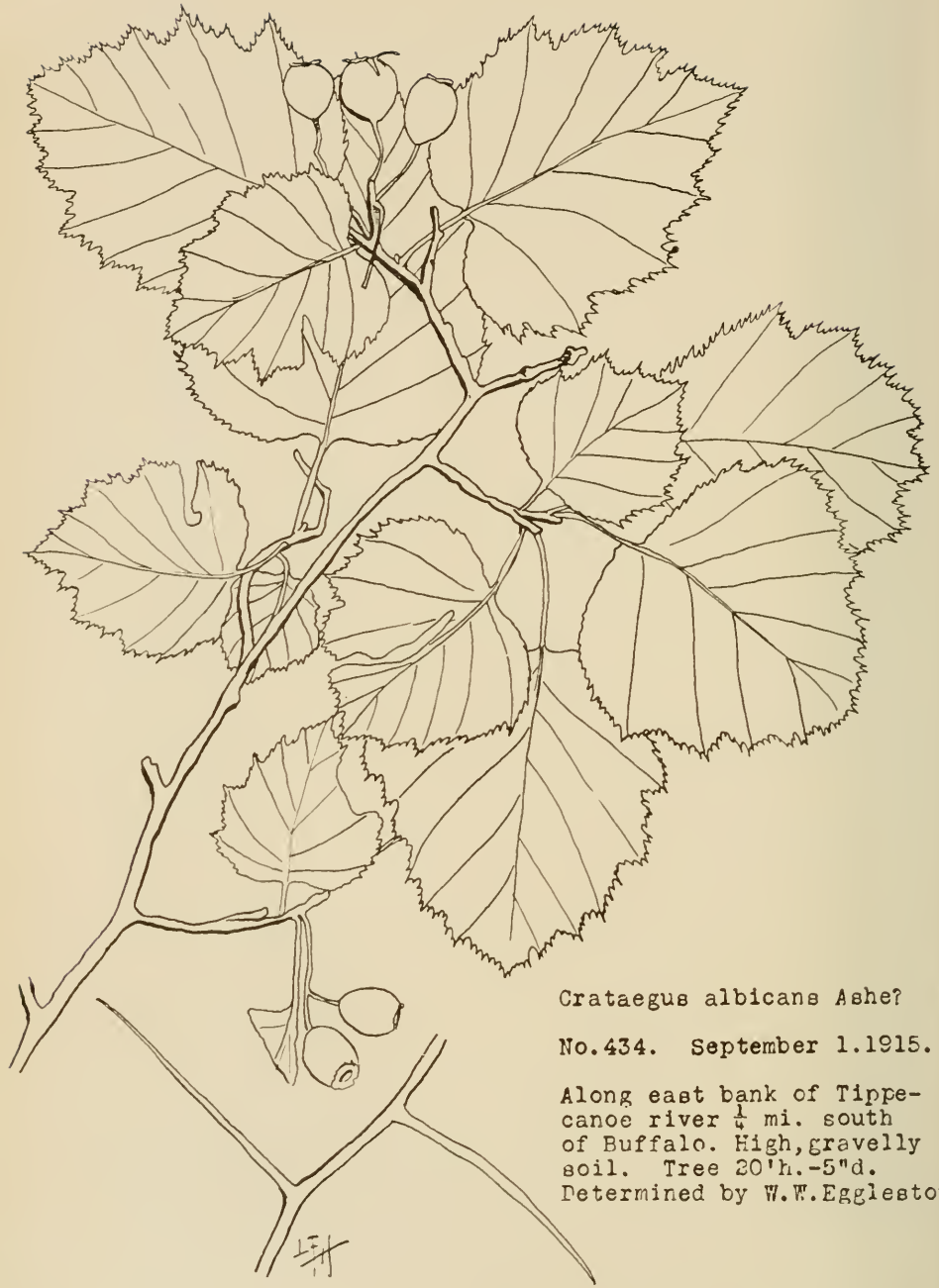
*Crataegus albicans Ashe?* Tatnall's Thorn. C. albicans Ashe 1901; C. Tatnalliana Sarg. Feb. 1903; C. polita Sarg. Apr. 1903. I quote the following from a letter from W. W. Eggleston: "Your specimen of Crataegus sent me . . . . is received. It belongs in the Coccineae and seems to be C. albicans Ashe? More complete material showing the leaves on the vegetative shoots is desirable to be sure of the identification, for with this material I could not be quite sure that it is not C. coccinea L." Britton and Brown, 2nd Ed., makes the following distinction between the two species:

Leaves on vegetative shoots cuneate, C. coccinea.

Leaves on vegetative shoots cordate, C. albicans.

It will be noted that C. albicans has not been reported as occurring in the State. Its general range is given as "Western New England to

PLATE XXV.



Crataegus albicans Ashe?

No.434. September 1.1915.

Along east bank of Tippecanoe river $\frac{1}{4}$ mi. south of Buffalo. High, gravelly soil. Tree 20'h.-5"d. Determined by W.W.Eggleston.

southern Michigan, south to Delaware and in the mountains to northeastern Tennessee."

C. coccinea has the following record for the State: Floyd (Deam); Noble (VanGorder); Steuben (Deam).

The specimen taken was from a lone tree, one-fourth mile south of Buffalo on a high, gravelly river-bank. Tree 20 feet high, 5 inches in diameter. No. 343. September 1, 1915. Additional material is not to be had before the completion of this thesis and so the exact determination must be deferred till some later date. (See p. 457 for other Haws, also p. 449.)

Thus the Tippecanoe River has some 28 species clinging closely to its banks, besides claiming specimens of all other species in White County, except possibly one or two species of willows, Quercus ellipsoidalis and Malus ioensis.

5. Report of a New Species and a New Variety for the State.

*Salix missouriensis Bebb.* Missouri or Diamond Willow, Heart-leaved Willow. 1895.

S. cordata Muhl. 1803; S. angustata Pursh. 1814; S. cordata angustata (Pursh) Anders. 1867; S. acutidens Rydb. 1901.

The above are the synonyms given in Britton and Brown, 2nd Ed., with S. cordata Muhl. preferred.

Sargent, who determined my specimen, called it S. missouriensis.

In Gray's Manual, 7th Ed., cordata and missouriensis are treated as separate species, the last, however, with this note: "A poorly understood tree, said to flower earlier than S. cordata; perhaps a variety (var. vestita Anders.) of that species."

In Hough's Handbook of the Trees of the Northern States and Canada, the Missouri Willow is given as Salix missouriensis *Muehl.*, with the synonym of S. cordata var. vestita Sarg.

In the face of all the above, hybridization is mentioned by each of the contending authors. (See ranges given on map, p. 450.)

This willow has hitherto been unreported for the State except that S. cordata Muhl. and S. cordata angustata (Pursh) Anders. are reported in Coulter's Catalogue, the former with the record: "In a few counties in rather sparing numbers, growing in low, moist soils. More abundant southward. Flowers in April and May. Putnam (MacDougal); Vigo

PLATE XXVI.

Salix missouriensis Bebb.

No. 374. August 4. 1915.

Along road ditch, near Pennsylvania railroad, 1¼ mi. east of Reynolds. Low, wet, rich soil. Bushes about 10 ft. high. Determined by Sargent.

(Blatchley); Tippecanoe (Coulter)." The last mentioned has this record: "In wet soil in the northern part of the State. Flowers from April to May. Steuben (Bradner)."

I have seen no specimens of the above for comparison. The report of missouriensis may or may not be new to the State. Owing to the hybridizing character of the willows and the difficulty of separation, much additional work is necessary before the status of this genus is settled satisfactorily.

The specimens I found in White County consisted of a small group of shrubby growth not more than 10 feet high, one and three-fourths miles east of Reynolds, near the Pennsylvania Railroad, growing along a road ditch in low, wet, rich, black soil. Specimens with fruiting parts were taken on August 4, 1915. Stems with catkins were also collected on April 16, 1916.

*Salix longifolia* var. *argophylla Sarg.* 1916. By the courtesy of Mr. Deam, I am allowed to report this new variety of willow for the State. A specimen was taken by Mr. Deam "on the bank of the big dredge ditch (Little Monon Creek), meeting the railway from the south, about a mile east of Seafield, White County. Determined by Sargent."

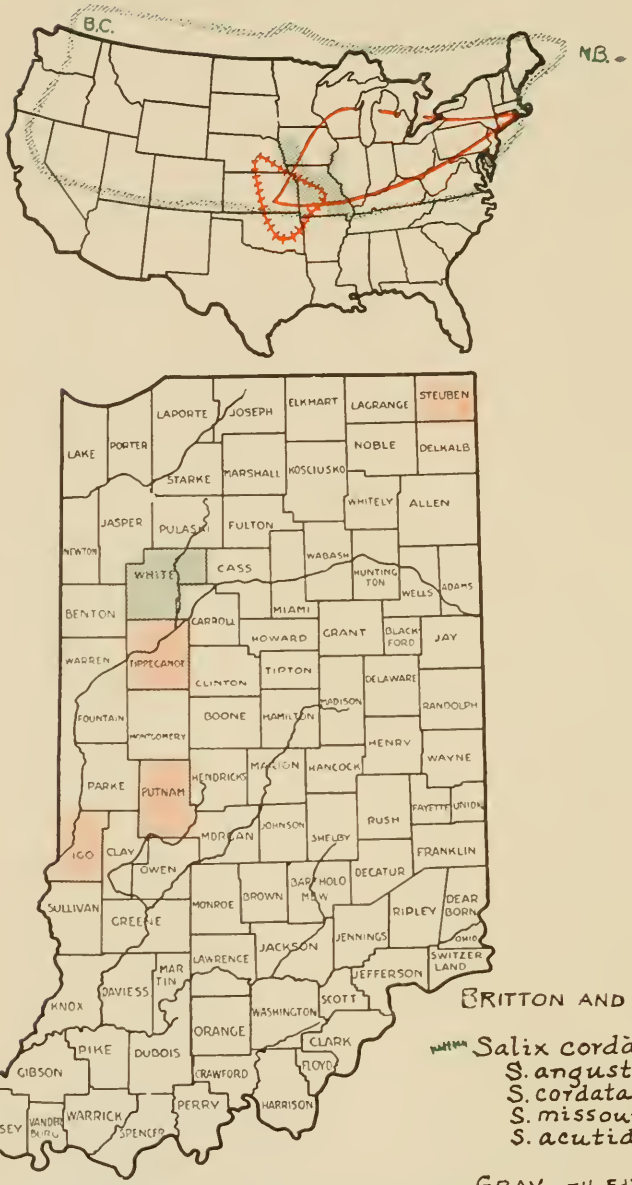
I took specimens of S. longifolia Muhl., determined by Sargent as S. fluviatilis, about three and one-half miles north of the above place, along the same creek, and also about three miles northeast of this place on the banks of the Hoagland ditch.

The latest floras do not include the above variety. (See S. interior Rowlee, p. 452.) (S. sessifolia Nutt., S. argophylla Nutt., S. fluviatilis argophylla Sarg.)

*Crataegus albicans Ashe?* Tatnall's Thorn. If the above determination can be verified, it will increase the already long list of thorns for the State. As has been indicated on p. 445, Eggleston favors this determination with the material at hand. If Salix missouriensis does not prove to be new to the State this species may be. (See p. 446.)

PLATE XXVII.

# RANGE OF
## Salix Missouriensis Bebb.
## IN THE UNITED STATES AND INDIANA.




BRITTON AND BROWN – 2nd Edi.

Salix cordata Muhl.
S. angustata Pursh.
S. cordata angustata Anders.
S. missouriensis Bebb.
S. acutidens Rydb.

HOUGH.

vs. Salix Missouriensis Muehl.
S. cordata var. vestita Anders.

GRAY – 7th Edi.

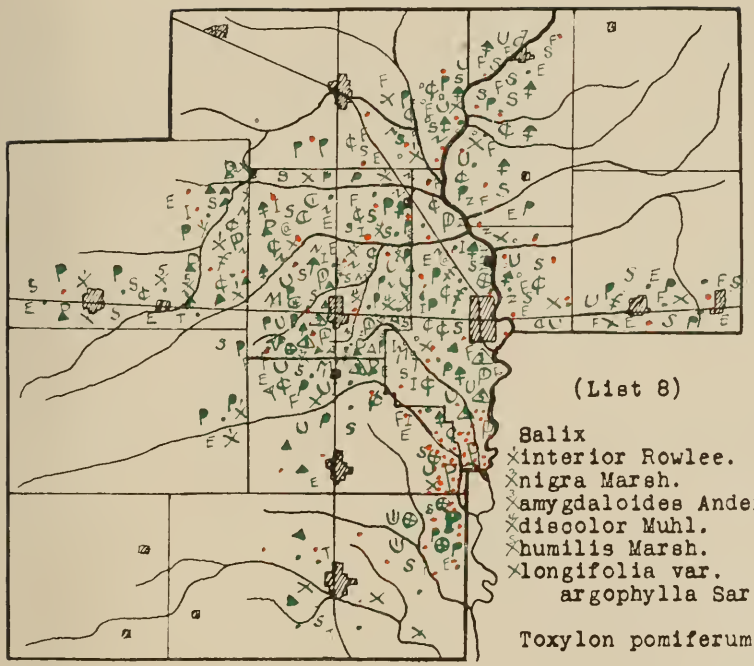
Id. Salix missouriensis Bebb.
S. cordata – var. vestita Anders.?
Salix cordata Muhl.
var. myricoides (Muhl) Carey.

COULTER.

Salix cordata Muhl.
Salix cordata angustata (Pursh) Anders.

PLATE XXVIII.

WHITE COUNTY.



(List 8)

Salix
×interior Rowlee.
×nigra Marsh.
×amygdaloides Anders.
×discolor Muhl.
×humilis Marsh.
×longifolia var.
argophylla Sarg.

Toxylon pomiferum Raf.

General Distribution of Trees over the County -- Omitting the OAKS and HICKORIES, and also those Species more Typically Restricted to the Tippecanoe.

Amelanchier canadensis(L)Med.
Populus alba L.
grandidentata Michx.
tremuloides Michx.
deltoides Marsh.
Sassafras sassafras (L)Karst.
Malus malus (L) Britton.
ioensis(Wood)Britton.
Nyssa sylvatica Marsh.
Crataegus Crus-galli L.
Calpodendron(Ehrh)Medic.
Ilex verticillata(L)A.Gray.
Acer saccharinum L.
saccharum Marsh.
negundo L.
Fraxinus americana L.
pennsylvanicaMarsh.

Corylus americana Walt.
Morus rubra L.
Ulmus americana L.
fulva Michx.
Prunus americana Marsh.
serotina Ehrh.
Cephalanthus occidentalis L.
Cornus femina Mill.
stolonifera Michx.
Zanthoxylum americanum Marsh.
Sambucus canadensis L.
Rhus copallina L.
hirta Sudw.
glabra L.
Juniperus virginiana L.
Viburnam prunifolium L.
Lentago L.

6. Species Generally Distributed Over the County.

*Salix interior Rowlee.* Sandbar Willow. The willow referred to as the Sandbar willow of various authors suffers various scientific names without much apparent agreement. The record in Britton and Brown is as follows: S. longifolia Muhl. 1803; not Lam. 1778; S. interior Rowlee 1900; S. linearifolia Rydb. 1901. Has been confused with S. fluviatilis Nutt. (S. Wheeleri (Rowlee) Rydb. . . . . from N. B. to Ill., differs in having the leaves permanently silky.). Gray's 7th Ed. says that S. longifolia Muhl. is the Sandbar willow. Synonym, S. interior Rowlee; S. fluviatilis auth., not Nutt. Hough gives S. fluviatilis Nutt. as the Sandbar willow with the synonym of S. longifolia Muhl.

Thus the trials and patience of the amateur, and I should also include the expert, are once more exemplified, if not sorely pressed. One wonders in so many cases if no agreement ever will result. At any rate, the species which answers the description of S. interior Rowlee is abundant along the streams of White County.

This species is not given in the 1911 Report. In Coulter's Catalogue the record is as follows: Salix fluviatilis Nutt., Syn. S. longifolia Muhl. Tippecanoe (Cunningham); Putnam (MacDougal); Vigo (Blatchley); Jefferson (J. M. Coulter); Clark (Baird and Taylor).

Due perhaps chiefly to their tendency to hybridize, the willows are admittedly difficult of determination. The remaining forms considered as occurring in White County seem to be less confusing.

*Salix nigra Marsh.* Black Willow. This willow is more or less abundant in White County. Specimens were taken from Honey Creek Township. Its range is more than the total eastern half of the United States.

*Salix amygdaloides Anders.* Peach-leaved Willow. Although having a large range in North America, from Quebec through Saskatchewan to British Columbia, and through northern Kentucky to the Rio Grande in New Mexico, along the mountains to Oregon and Washington, this species is not mentioned in Coulter's Catalogue, and in the 1911 Report the published record is but from one county, Kosciusko (Scott), with the then new record of a specimen each taken in Lake County by Umbach and Deam. Distribution in White County uncertain, specimen taken from Honey Creek Township.

PLATE XXIX.

RANGE OF

Salix amygdaloides Anders.

IN THE UNITED STATES AND INDIANA.

*Salix discolor Muhl.* Glaucous Willow. This form has been omitted from the 1911 Report. In Coulter's Catalogue it is reported from Tippecanoe (Cunnington); Jefferson (Barnes); Vigo (Blatchley); Kosciusko (Coulter); Clark (Baird and Taylor); Gibson and Posey (Schneck); Knox (Spillman); Hamilton (Wilson); Steuben (Bradner). It is more or less abundant in White County. Specimens were taken in Monon and Honey Creek Townships.

*Salix humilis Marsh.* Prairie Willow. This willow is not included in the 1911 Report, nor is it mentioned in Hough's Handbook of the Trees of the Northern States and Canada. The range for Indiana as given in Coulter's Catalogue is as follows: Laporte (Barnes); Putnam (MacDougal); Vigo (Blatchley); Tippecanoe (Coulter); Hamilton (Wilson); Steuben (Bradner).

In this, as in many other instances, the attention is drawn to the number of well-worked counties. It occurs in Honey Creek Township and is very likely in other townships.

*Populus tremuloides Michx.* American Aspen, Quaking Asp or Aspen, 1803. The Quaking Aspen is a very familiar tree in White County. Very abundant in low, wet places. Sometimes found growing with the Cottonwood.

*Populus deltoides Marsh.* Cottonwood, Necklace Poplar. (P. carolinensis Moench. 1785; P. monilifera Ait. 1789; P. angulata Ait. 1789.) This is a much larger tree than the Quaking Aspen. Common throughout the county. Said to consist of several races.

*Populus grandidentata Michx.* Large-toothed Aspen. Scattered throughout the county in low, rich soils, or near the edges of sand ridges.

*Populus alba L.* White or Silver-leaf Poplar. Introduced from Europe. Escapes in all parts of the State, although the published records are meagre. Escapes in several places in White County. Specimens were taken from trees along Big Creek about four and one-fourth miles east of Chalmers.

For Populus heterophylla see p. 441. The above species of this genus are arranged in the order of their frequency in White County.

*Juglans nigra L.* Black Walnut. Common throughout the State. Found along the Tippecanoe River and also some distance from its banks in locally abundant numbers. Cultivated throughout the county. (See p. 464.) (J. cinerea, see p. 441.)

*Corylus americana Walt.* Hazelnut, Filbert. The hazel sometimes becomes a rather large shrub. It is very abundant in White County, as well as throughout the State.

*Ulmus americana L.* American or White Elm. Reported from 29 counties in the State. Of general distribution in White County along with—

*Ulmus fulva Michx.* Slippery, Red, or Moose Elm. Said to be in more sparing numbers in the State than the preceding, but nevertheless reported from an extra county. Not abundant, merely local in White County.

*Morus rubra L.* Red Mulberry. Isolated trees or very small groups in various parts of the county. Along the lower stretches of Spring Creek it is associated with elms, hop-hornbeams, etc.

*Toxylon pomiferum Raf.* Hedge, Osage Orange. The natural range of this species covers only the adjacent borders of Texas, Oklahoma, Indian Territory, Arkansas and Louisiana, or from Missouri and Kansas south to Texas. It has been cultivated over a considerable part of the country and escapes are more or less frequent. Escapes in Indiana are given for Decatur (Ballard); Franklin (Meyncke); Hamilton (Wilson); Jefferson (J. M. Coulter); Tippecanoe (Thompson); Vigo (Blatchley); Montgomery (Evans); Putnam (Grimes); Knox (Deam).

In various parts of White County it has a tendency to spread away from the fence rows. Reports of isolated trees occurring along the Tippecanoe are likely, but at this time must be given as uncertain.

*Sassafras variifolium (L) Karst.* Sassafras. Although but one species of Sassafras is recognized, two forms are known and attention to the difference is here noted. "One is known as White Sassafras, which is nearly all sap wood, and the bark of the roots is white. In contact with the soil the wood soon rots. The other is known as the Red Sassafras. The bark of the roots and the greater part of the wood is red, and is durable in contact with the soil."* Both forms are common in White County. The larger trees are found along the Tippecanoe near Buffalo.

*Malus malus (L) Brit.* Apple. The apple tree has escaped in various parts of White County and large trees are sometimes found.

* Deam 1911 Report, page 238.

PLATE XXX.

RANGE OF

Malus ioensis (Wood) Britton.

IN THE UNITED STATES AND INDIANA.

It is not included in the 1911 Report nor in Coulter's Catalogue. Why should it not receive the same treatment as other escapes? (Toxylon, Populus alba, Ailanthus, etc.)

*Malus ioensis (Wood) Brit.* Western Crab Apple. This is a western form, as the range map shows (p. 456). A broad-leaf and a narrow-leaf form are described in the 1911 Report. Both forms occur in White County. Specimens were taken from trees on a low sand ridge about one mile northeast of Reynolds. (See Deam 1911 Report, pp. 248 and 250.)

*Amelanchier canadensis (L) Medic.* Service-berry, June-berry, May or Sand-cherry. The June-berry remains a small tree in White County and is met with in very sparing numbers in different parts of the county. The specimens taken were somewhat variable, but it is thought all belong to the same species.

*Crataegus crus-galli L.* Cockspur Thorn, Newcastle Thorn. A small tree, said to be well distributed in Indiana, but with reports only from the following counties: Decatur (Mrs. C. C. Deam); Knox and Gibson (Schneck); Owen (Grimes); Vigo (Blatchley); Crawford, Jackson, Lawrence, Posey and Wells (Deam). More or less abundant along the Tippecanoe and in sparing numbers over the county.

*Crataegus calpodendron (Ehrh) Med.* Pear Thorn, Pear or Red Haw. (C. Crus-galli Mill. not L.; C. tomentosa DuRoi, not L.; C. Chapmani Ashe; etc.). Specimens of this thorn were found in Honey Creek, Monon and Union Townships. It is likely to be found in others. Specimens have been examined from the following counties: Putnam (Grimes); Marion, Posey and Wells (Deam).

The national as well as the State distribution of the thorns must be as yet rather uncertain. For notes on other White County thorns see pp. 445, 446.

*Prunus americana Marsh.* Wild Red Plum. Found throughout Indiana and reported from thirty-four counties. Single trees and small clumps in various parts of White County.

*Prunus serotina Ehr.* Wild (Black) Cherry. Common in all parts of the State. Very common in White County. The wood, bark and fruit are each of some economic importance.

*Zanthoxylum americanum Mill.* Prickly Ash. Toothache Tree. According to Coulter's Catalogue, "A small tree, sometimes reduced to

a shrub, which is generally distributed over the State." In White County it is most commonly found along the Tippecanoe. It was also noted in Ward's thicket in Honey Creek Township and along the lower part of Big Creek.

*Rhus hirta (L) Sudw.* Staghorn Sumac. (Rhus typhina L.) Said to be frequent but not especially abundant in any of its stations in various parts of the State. Rather abundant in some places of White County. Perhaps the most common sumac in the county.

*Rhus glabra L.* Smooth Upland or Scarlet Sumac. This sumac is similar to the preceding, but is glabrous throughout. Reported as being more common in the State than the above species. Well distributed but not so abundant in White County.

*Rhus copallina L.* Dwarf Black or Mountain Sumac. Upland Sumac. This form becomes a distinct small tree in White County. Noted mostly in Honey Creek Township.

The above three species are rich in tanin and are extensively used for tanning. None of them are poisonous, but the last two should be handled with care by persons with thin, sensitive skins. Another species of rhus, *R. Toxicodendron L.* (or R. radicans L.), the Poison Ivy, which grows both as a climbing vine or as a low shrub, is very poisonous. The berries are not poisonous and are largely eaten by birds. The poison ivy is commonly met with in different parts of the county.

*Ilex verticillata (L) A. Gray.* Virginia Winter-berry, Black Alder, Fever-bush. This is a shrub, attaining a height of 6 feet or more. Abundant in White County as well as in the State.

*Acer saccharinum L.* Soft, Silver, or White Maple. Reported from many counties. In White County most abundant near the Tippecanoe. A few large trees (60 to 70 feet high) are to be found in Fisher's Woods one mile south of Reynolds. Extensively used as a shade tree.

*Acer saccharum Marsh.* Sugar, Rock, or Hard Maple. Reported as frequent to common in all parts of Indiana. Of uncertain distribution in White County. Specimen from a small tree about four and one-fourth miles southeast of Chalmers along a small stream near the banks of Big Creek.

*Acer negundo L.* Box Elder, Ash-leaved or Cut-leaved Maple. Rare east of the Appalachians, rare to infrequent in northern Indiana. Used to some extent as a shade tree in White County. Rather inferior tree,

escapes easily. Specimens were found along the Tippecanoe, near Tioga, and also near Buffalo. Its natural migration into White County seems doubtful. Escapes were also noted in Honey Creek Township. (For notes on A. nigrum see p. 441.)

*Nyssa sylvatica Marsh.* Gum, Black or Sour Gum, Pepperidge. Well distributed in Indiana. Frequent to common in White County. A tall tree attaining a greater diameter than most trees in the county. The leaves are variable and are not to be mistaken for those of N. aquatica L., which has been off the list of Indiana trees. (See Deam 1911 Report p. 93, also pp. 321-323.)

*Cornus stolonifera Michx.* Red Osier, Kinnikinnik. Absent from the extreme southern counties, but abundant in the northern counties (Coulter's Catalogue). Found in all parts of White County. Readily distinguished by its bright purple twigs at some distance. Sometimes a rather tall, thick-stemmed shrub.

*Cornus femina Mill.* Panicled Cornel or Dogwood. White-fruited Dogwood. (C. paniculata L'Her. 1788; C. caudissima Marsh. 1785; not Mill. 1768.) Reported in Coulter's Catalogue from various parts of the State. Taller in White County than is noted in the preceding reference (3 to 6 feet high). Britton and Brown give it a height of 6 to 15 feet. Many specimens in White County are between these figures. Often found in great clumps in low, wet places in woods or in the open. The fruit is white and usually abundant. (For other Cornels see p. 442.)

*Fraxinus americana L.* White Ash, Gray Ash. This ash is very common along the Tippecanoe and is distributed over the county generally. Marked differences in the twigs of older and younger trees and other minor differences were noted. Frequent to common in all parts of the State.

*Fraxinus pennsylvanica Marsh.* Curiously enough this ash is variously known as the White, Gray, Black, Green, Red, Blue, Water, Swamp, or River Ash. It also bears at least three other scientific names, (F. pubescens Lam.; F. lanceolata Borck.; F. viridis Michx. f.) Its leaves, and especially its fruit, are very variable. (See Deam 1911 Report, illustrations p. 334.) More or less frequent in all parts of Indiana, but reported from only twenty-two counties. Its distribution for White County is not determined; specimens were taken from Honey Creek Township, southwest of Reynolds.

PLATE XXXI.

RANGE OF

Viburnam Lentago L.

IN THE UNITED STATES AND INDIANA.

PLATE XXXII.

RANGE OF

Viburnam prunifolium L.

IN THE UNITED STATES AND INDIANA.

The above two species were the only ones of this genus found in the county. This was a disappointment, since F. quadrangulata Michx., and F. nigra Marsh., are reported from Cass, Tippecanoe and a number of other counties. Both of these may occur in the county.

*Cephalanthus occidentalis L.* Button-bush, Honey-balls, Pond-Dogwood, etc. An abundant shrub or small tree (20 feet high) in all parts of the State (Coulter). Found in all parts of White County, though not so abundant as a medium-sized shrub. Easily recognized by its flowers.

*Viburnum lentago L.* Sheep-berry, Nanny-berry, Black Haw, etc.

*Viburnum prunifolium L.* Black Haw, Stag-bush, etc. It is somewhat surprising to find that the latter, having a much smaller range in the United States, should be reported from so many more counties in Indiana than the former with its very great range. (See range maps pp. 460 and 461.) In so far as I have been able to discover, the former is far more plentiful in White County, sometimes forming great patches on cut-over areas. The fruit of both is sweet and edible.

*Sambucus canadensis L.* Elder-berry. Abundant throughout the State in various situations (Coulter). Common in White County. The flowers and fruit have strong medicinal properties. (Brit. & Br.)

*Juniperus virginiana L.* Red Cedar, Juniper, etc. This is the only native evergreen of the county. Reported from various counties with different degrees of abundance. Well distributed in White County, reaching its best development along the Tippecanoe. Many trees, some of fair size, were found about two miles up from the mouth of Big Creek.

(For other species distributed more or less generally over the county see The Oaks, pp. 405-433, and the Hickories, pp. 433-436.)

## V. ECONOMIC USES.

The original forest of White County must have been extensive and must have exhibited a high-grade quality of timber quite generally. For several decades after 1830 there were numerous sawmills operating in various parts of the county. Some of the pits, wells or other vestiges of these mills are still to be seen, though perhaps the location of most of them is a matter of speculation.

The results of individual inquiry concerning the specific activities of these early sawmills were very meagre, but through the efforts of Mr. Ed Newton of Monticello, Ind., I am able to cite a few definite historical accounts.

### Historical Sketch of the Sawmills of White County.

In 1830 Joseph Rothrock built a brush dam across the Tippecanoe River at Tioga, south of Monticello, and installed a sawmill, which was probably the first mill built in White County. It never amounted to much and its location is now only a memory.

A Norwegian, Hans Erasmus Hiorth, bought a thousand-acre tract of land in 1832 and laid out the town of Norway, north of Monticello. He built a timber dam across the Tippecanoe, set up two sawmills and operated them by power obtained from the dam. They were run very successfully for many years, but have now been dismantled for over a third of a century.

In 1848 a dam was built across the Tippecanoe at Monticello and in the following year Zebulin Sheetz built the first sawmill in Monticello, operating it with power obtained from the dam. A second mill was built later by Hoagland & Conklin. Both of these mills have been dismantled for some forty years and their very location is forgotten.

In 1882 W. E. Meyers built a steam sawmill at Idaville, capable of cutting from 6,000 to 8,000 feet of lumber per day. This mill was run for several years very successfully, but has gone the way of all the preceding.

Definite history for a mill operated by the Wrights along the Tippecanoe between Monticello and Buffalo was not available.

At present there are a number of portable sawmills distributed over the county. These are operated by thrashing-machine engines and their owners will locate wherever there is 10,000 feet or more of timber to cut.

The only active stationary mills coming to my knowledge are those of Pierce & Son at Burnettsville and that of John H. Knickerbocker at Monticello. The Pierce mill has been running for several years, but the latter, which uses electric power, was started only last summer. But very little of the material cut at either mill is shipped, most of the lumber being used in the immediate vicinity.

The lumber concerns of Monticello report no sales of native timber for a number of years. This is also true for concerns in Idaville and Brookston. The Colborn-Dye Company of Wolcott, however, in looking over their files for the past five years, find the following statistics:

TABLE III.

*White County Oak Bought and Sold by the Colborn-Dye Company of Wolcott.*

| | |
|---|---|
| 1911 | 25,100 feet. |
| 1912 | 8,878 feet. |
| 1913 | 7,858 feet. |
| 1914 | 22,622 feet. |
| 1915 | 11,813 feet. |
| Total | 76,271 feet. |

"We have probably had 3,000 to 4,000 feet from our local people, which is not included in the above. The figures given above are all for oak timber shipped from Burnetts Creek."

Several carloads of walnut were shipped from Monticello in the spring of 1915.

Messrs. Reed, Spencer & Wright of Wolcott have bought and are cutting for shipment a quantity of white oak east of Monticello.

The figures for a mill near Reynolds, covering four active years, are as follows. (Thomas Lemon.)

TABLE IV.

| | 1907. | 1908. | 1912. | 1914. | Total. |
|---|---|---|---|---|---|
| Feet of lumber | 51,704 | 63,490 | 76,819 | 6,345 | 198,358 |
| Cords of wood | 719 | 1,158 | .... | 211 | 2,086 |
| Railroad ties | .... | 3,159 | 4,906 | 583 | 8,648 |
| Fence posts | .... | .... | 3,501 | .... | 3,501 |

A reply from Brookston (M. B. Yount) enumerates various cuts of lumber aggregating 51,000 feet, as follows:

Table V.

7,000 feet 1-inch board finishing lumber @ $30-$50 per 100 feet.
15 000 feet 2½-inch bridge plank @ $30 per 100 feet.
7,000 feet 1-inch boards @ $25 per 100 feet.
22,000 feet of 2 x 4 and 2 x 6, 8, 10, 12, 14, 16 feet long, @ $25.
All oak—some white oak, little black oak, remainder red oak. (1915.)

Table VI.

Jacob Dieter of Reynolds reports:

5,000 railroad cross-ties.
245,000 feet of lumber.
5,000 fence posts.

All black and white oak.

Mr. Wm. F. Prall has done much cutting on the Bunnell estate near Reynolds and reports the following figures for the period of September, 1915, to March, 1916:

Table VII.

10,000 railroad cross-ties.
25,000 feet of lumber.

In nearly this same time he has cut 200,000 feet of lumber in Carroll County just across the White County line.

The reports from the above five sources make a grand total of 574,129 feet of lumber, 43,648 railroad cross-ties, 8,501 fence posts and 2,086 cords of wood. Other mills in the county will show as high and possibly higher figures. Besides the output of these portable mills using up native timber there is, speaking comparatively, a considerable amount of timber cut up as cord wood and fence posts. The supply is becoming less and less each year, and were the county at once deprived of all the timber now left, the lack of this valuable resource still remaining, I am sure, would be keenly felt.

Much timber land has been cleared for agricultural purposes and this work is still in progress. Very often parties have been so anxious

to clear a section that timber was given away for the work of its removal. Practices in clearing have often been very wasteful. I mention this with the very contrasting idea in mind of how governments and foresters are taking every precaution to conserve the rapidly diminishing forests by preventing and controlling fires, insect and fungous pests. Man seems to enter as the most destructive agent of all, not alone by being merely uneconomical but by lacking judgment in making cause for erosion, or perhaps denuding, a place entirely unfit for any other purpose. Forest management and care of trees generally is almost entirely unknown in White County, as it doubtless is in many other counties of the State. Further than that, any admonition to take care of the forests would seem absurd to most citizens. And yet some have seen fit to set out little groves of the much heralded but rather overrated catalpa. White County is an integral part of the hardwood area of the country and as such merits its share of attention.

Below is given a summary covering some interesting features taken from a report of the Department of Labor and Commerce, Bureau of Corporations (The Lumber Industry, Part I, Standing Timber, Jan. 20, 1913). Figures for White County in comparison with the following data are not available. Those acquainted with the area or any other part of the State may draw their own conclusions.

The total amount of standing timber in the continental United States, suitable for the manufacture of lumber under present standards in the industry, is about 2,800 billion board feet, of which 2,200 billion, or 78%, is privately owned. (Unit is the board foot, which is 1 foot square and 1 inch thick.)

The present (1913) commercial value of the privately owned standing timber is about $6,000,000,000, and is becoming more and more valuable. The yearly drain on saw timber is about fifty billion board feet. Only fifty-six years' supply remains.

TABLE VIII. COMPARISONS OF CUT OF LUMBER BY SPECIES.*

SOFTWOODS.

| | United States. | Indiana. | Illinois. | Ohio. | Michigan. |
|---|---|---|---|---|---|
| Active mills reporting | 48,112 | 1,604 | 827 | 1,632 | 1,323 |
| Total lumber cut | 44,509,761 | 556,418 | 170,181 | 542,904 | 1,889,724 |
| Yellow pine | 16,277,185 | | | | |
| Douglas fir | 4,856,378 | | | | |
| White pine | 3,900,034 | 64 | 153 | 203 | 258,080 |
| Hemlock | 3,051,399 | 432 | | 8,415 | 614,622 |
| Spruce | 1,748,547 | | | 78 | 21,797 |
| Western pine | 1,499,485 | | | | |
| Cypress | 955,635 | | 4,186 | | |
| Redwood | 521,630 | | | | |
| Balsam fir | 108,702 | | | | 9,645 |
| Cedar | 346,008 | 595 | 30 | 16 | 17,647 |
| Larch | 204,022 | | | | |
| Tamarack | 157,192 | | 152 | 48 | 44,956 |
| White fir | 89,318 | | | | |
| Total softwood | 33,896,959 | 1,216 | 4,521 | 10,389 | 996,747 |

TABLE IX.

HARDWOODS.

| | United States. | Indiana. | Illinois. | Ohio. | Michigan. |
|---|---|---|---|---|---|
| Oak | 4,414,457 | 228,343 | 101,279 | 259,410 | 40,023 |
| Maple | 1,106,604 | 43,644 | 7,163 | 43,852 | 543,214 |
| Yellow poplar | 858,500 | 29,174 | 3,628 | 42,317 | |
| Red gum | 706,945 | 23,649 | 9,748 | 2,194 | |
| Chestnut | 663,891 | 2,789 | | 16,424 | |
| Beech | 511,244 | 98,729 | 1,472 | 49,421 | 111,340 |
| Birch | 452,370 | 1,216 | 475 | 856 | 64,341 |
| Basswood | 399,151 | 13,917 | 587 | 16,007 | 69,453 |
| Elm | 347,456 | 40,364 | 12,102 | 33,182 | 58,321 |
| Cottonwood | 265,600 | 4,143 | 3,939 | 2,944 | 6,384 |
| Ash | 291,209 | 23,488 | 2,894 | 25,753 | 24,865 |
| Hickory | 333,929 | 23,513 | 11,095 | 21,774 | 1,850 |
| Tupelo | 96,676 | 262 | 764 | | |
| Walnut | 46,108 | 7,669 | 5,051 | 8,580 | 184 |
| Sycamore | 56,511 | 11,003 | 5,073 | 5,243 | 749 |
| Cherry | 24,594 | 1,969 | 163 | 2,105 | 1,587 |
| All others | 37,557 | 1,330 | 227 | 2,453 | 666 |
| Total hardwood | 10,612,802 | 555,202 | 165,660 | 532,515 | 922,977 |

*Table 18, pp. 88, 89, 90, 91, 92. Department of Commerce and Labor, Bureau of Corporations. The Lumber Industry, Part I, January, 1913.

## TABLE X.

Indiana ranks 26th in total lumber cut in the United States.

Indiana ranks 9th in hardwoods cut.

Indiana is a poor last in softwoods cut. (Illinois next.)

The greatest softwood States in the Union in order are: Washington, Louisiana, Mississippi, Texas, Oregon, North Carolina, Alabama, Minnesota, Virginia, Wisconsin, Arkansas, Georgia, California, etc.

The greatest hard wood States in the Union in order are: Tennessee, Michigan, West Virginia, Kentucky, Arkansas, Pennsylvania, Virginia, Wisconsin, Indiana, Ohio, Missouri, Mississippi, North Carolina, etc.

TABLE XI.

Indiana ranks 9 in Oak.
7 in Maple.
7 in Yellow Poplar.
7 in Red Gum.
15 in Chestnut.
2 in Beech. (Mich. first.)
14 in Birch.
7 in Basswood.
3 in Elm. (Wis., Mich.)
12 in Cottonwood.
5 in Ash. (Ark., Wis., O., Mich.)
5 in Hickory. (Tenn., Ark., Ky., Mo.)
14 in Tupelo. (La., Va.)
2 in Walnut. (O., Ind., Ky., Tenn. Supply very short.)
1 in Sycamore. (Ind., Mo. close second. Ark. poor third.)
5 in Cherry. (W. Va., Pa., N. Y., O., Ind.)
9 in all others. (Ky. big first.)

TABLE XII.

*Number of Indiana Sawmills, Grouped According to Output.*

| | | | |
|---|---|---|---|
| Total sawmills ..... | 1,599 | 1,000- 2,500 M..... | 80 |
| Less than 50 M..... | 195 | 2,500- 5,000 M..... | 26 |
| 50- 500 M..... | 1,121 | 5,000-10,000 M..... | 3 |
| 500-1,000 M..... | 173 | 10,000-15,000 M..... | 1 |

The pioneers in White County used much timber for log houses, fuel, and rail fences. Much is still used for house and barn sills, bridge stringers and planks. Fence posts and corner braces, with wire, have

long ago taken the place of rail fences, although one can still find some rail fences in existence. Old settlers tell of much wood being formerly used as fuel by the railroads at their inception. For domestic use wood is still the chief fuel in the county. Formerly most fuel wood was cut in "full cord wood" length, now it is nearly all cut in "block wood" length. Not much pole wood is sold. So far as I know, very little White County timber gets to manufacturing establishments.

## VI. SUMMARY.

With the completion of this thesis it is not meant that the final word on Trees of White County has been said. More observation is necessary to complete ranges within the county, and more material is necessary to determine some species definitely. Very likely a few species have escaped observation.

Sixty-two out of 125 trees reported for the State have been found in White County; 17 small trees or large shrubs are noted, in addition to two new varieties for the State.

The likelihood of a new willow and a new thorn for the State are mentioned. A new variety of willow is also reported.

The peculiar oak found northeast of Brookston needs further investigation, as do all of the above, and other species as well.

Lack of time has precluded further data being included.

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