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Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

Ball, C.R.

in Deam, C.C. Shrubs of Indiana p. 35-66.

Dept. Conservation Publ. 44, Dec. 1924

INDIANA WILLOWS.

1. *S. lucida* Muhl.
 - a. *lucida intensa* Fern.
 - S. pentandra* L.
2. *S. serissima* (Bailey) Fern.
 - S. alba* L.
 - S. fragilis* L.
 - S. babylonica* L.
3. *S. amygdaloides* Anderss.
4. *S. longipes* Shuttleworth
5. *S. nigra* Marsh.
6. *S. interior* Rowlee
 - a. *interior linearifolia* Rydb.
 - b. " *wheeleri* Rowlee
7. *S. cordata* Muhl.
 - " " *deamii* Ball
8. *S. glaucophylla* Bebb
9. *S. syrticola* Fern.
10. *S. pedicellaris hypoglauca* Fern.
11. *S. candida* Fluegge
12. *S. petiolaris* J. E. Smith
 - a. " *gracilis* Anderss.
13. *S. sericea* Marsh.
14. *S. discolor* Muhl.
- 15a *S. erioccephala* Michx.
- 15b *S. humilis* Marsh.
16. *S. tristis* Aiton
17. *S. bebbiana* Sarg.

prim?

1. SALIX. THE WILLOWS.

(The classical name of the willows)

Trees or shrubs (occasionally herbaceous); stems usually clustered; branchlets round; leaf-blades linear, lanceolate, elliptic-lanceolate, oblanceolate, ovate-lanceolate, ovate or obovate, and obtuse to long-acuminate, in all Indiana shrubby species, finely toothed to entire and revolute; catkins appearing before (precocious), with (coetaneous), or after the leaves (serotinous); each pistillate flower with a little gland at the base of the pedicel on the inside.

A large genus of several hundred species varying from tiny shrubby or subherbaceous plants scarcely more than a centimeter in height, on alpine mountain summits or polar shores, to giant trees 15-³⁶ meters (50- feet) in height and 0.6 - 1.5 meters (2-5 feet) in diameter, in alluvial lowlands; occurring under Indiana conditions from cold bogs, swamps, and riverbanks, to dry uplands and sand dunes. Willows are used for many purposes, among them ornament, shade, hedges, posts, poles, mattresses or revetments to protect levees, baskets, fish weirs, whistles, etc., while the wood is used for charcoal, which is especially prized for gunpowder making, and the bark furnishes salicin, used for tanning and in medicine as a substitute for quinine and as a tonic and febrifuge.

Shrubby Willows of Indiana

Draft of keys prepared Feb. 28, 1921, Mar. 23, 1923
(See Ball letter with mss. for
Trees of Indiana) waa

INDIANA WILLOWS.Key based on Floral and Foliage Characters.

1

Scales yellow, deciduous; capsules glabrous, stigmas nearly sessile.

Stamens 5 or more; staminate aments pedunculate; aments promptly coetaneous, or occasionally precocious, solitary.

Aments broadly oblong, 2-4 cm. long, 1.2-2 cm. wide, peduncles 1-3 cm. long, leafy; capsules 5-9 mm. long; petioles glandular.

Fruit in May and June; aments 1.2-1.5 cm. wide; capsules 5-6.5 mm. long.

Leaves ovate-oval, acute, pale beneath; pedicels 0.5-1 mm. long (introduced tree)..... pentandra ✓

Leaves ovate-lanceolate, acuminate, green beneath

Glabrous beneath..... 1. lucida.

Thinly pubescent beneath..... 1a. lucida
intensa ✓

Fruit in July and August; aments 1.8-2 cm. wide; ✓

(Capsules 7-9 mm. long, thick-walled, leaves elliptic-lanceolate, acute, glaucous beneath)..... 2. serissima

Aments linear to oblong, 3-7 or 10 cm. long; staminate peduncles 1-2 and pistillate 1-6 cm. long; capsules 3.5-5 mm. long; petioles not glandular.

Leaves linear-lanceolate, green on both sides; petioles short (tree)..... nigra ✓

Leaves linear-ovate, white beneath, dark green above, on short petioles..... 3. longipes ✓

Leaves lanceolate, acuminate, yellow-green above, pale to sub-glaucous beneath, on long slender petioles (tree)..... amygdaloides

Stamens 2; staminate aments subsessile or sessile, 3-6 cm. long.

Leaves finely to coarsely serrulate; aments solitary, promptly coetaneous; capsules 1.5-5 mm. long (introduced trees).

- 1 Since the tree forms flower and fruit before reaching tree size, they are included in the key so that the tree ~~var~~forms may be which may be found also, also separated from the shrubs. A few introduced species, are ~~also~~ included in the key

Capsules 3-5 mm. long; leaves lanceolate.

Capsules ovoid-conic, 3-5 mm. long, subsessile (tree)

alba.

Capsules long-conic, 4-5 mm. long; pedicels 0.5-1 mm. long

(tree) fragilis.

Capsules 1.5-2 mm. long; leaves linear-lanceolate.

Pistillate aments 1-2 cm. long, subsessile; capsule sessile
(no staminate plants in U. S.). (shrub).....

babylonica.

Leaves remotely denticulate; aments 1-4 together, coetaneous
on peduncles 1-3 cm. long, or serotinous on peduncles 5-10 cm.
long (native shrub).

Capsules 7-10 mm. long, pedicels 0.5-1 mm. long; aments 3-8
cm. long, of different ages; leaves narrowly to broadly
linear.....

4. longifolia.

Scales brown (at least at apex, except No. 15) to black, persistent.

X Capsules glabrous; scales not sericeous.

Aments oval or subglobose, few-flowered, coetaneous or subsero-
tinous; scales nearly glabrous; styles 0-0.2 mm. long.

Leaves entire, finely reticulate on both sides; peduncles
leafy, 2-5 cm. long.....

5. pedicellaria.

Aments linear-oblong, many-flowered, precocious to coetaneous;
scales tomentose with twisted gray hairs; style 0.5-1.5 mm.
long.

Leaves glaucous or subglaucous beneath; peduncles bracted, 0-6
mm. long in flower, to occasionally 1 cm. long in fruit.

Leaves subglaucous beneath; pedicels 1-1.5 mm. long; styles
0.5 mm. long.....

6. cordata.

Leaves glaucous beneath; pedicels 2-4 mm. long; styles 1
mm. long.....

7. glaucophylla.

Leaves green beneath; peduncles leafy, 1-2 cm. long in
flower;.....

8. adenophylla.

styles 0.7-1.5 mm. long.

Capsules pubescent or tomentose; aments precocious / or subcoetaneous, sessile or peduncles 0.5-2 cm. long, bracted.

Scales dark brown or black, spatulate-oblong; pedicels mostly 1-2 mm. long (longer in 9).

Staminate aments linear-oblong; capsules 4-8 mm. long.

Capsules and scales silvery pubescent; leaves glabrous or silvery-pubescent beneath; styles almost obsolete.

Capsules lanceolate-conic, 6-8 mm. long, fruiting aments lax, 1.5-2 cm. wide; peduncles 1-2 cm. long, leafy-bracteate..... 9. petiolaris.

Capsules ovoid-oblong, 3-5 mm. long; aments sessile or subsessile; fruiting aments 1-1.5 cm. wide, dense.... 10. sericea ✓

Capsules and scales densely white woolly.

Styles 1-1.5 mm. long; leaves white-tomentose beneath. 11. candida.

Staminate aments (except No. 14) broadly oblong ("pussies"), not bracted; capsules 6-12 mm. long, long-conic; styles almost obsolete.

Capsules 8-10 or 12 mm. long; aments not crowded, 2-4 cm. long, the pistillate becoming 4-8 cm. long at maturity; branchlets mostly black; wet or marshy ground.

Branchlets glabrous; leaves obovate-oval, glabrous.... 12. discolor.

Branchlets tomentose; leaves elliptic-oblong, often pubescent beneath..... 12a. variety eriocephala.

Capsules 6-9 mm. long; aments crowded, 1-3 cm. long, not exceeding 4 cm. at maturity; branchlets light brown to dark brown, puberulent; dry sandy or clayey ground.

Aments 1.5-3 cm. long; capsules 7-9 mm. long, leaves 5-10 cm. long..... 13. humilis.

Aments 1-1.5 cm. long, subglobose; capsules 6-7 mm. long; leaves 3-5 cm. long..... 14. tristis.

Scales yellowish, linear-oblong; pedicels 3-5 mm. long..... 15. rostrata.

Key Based on Foliage Characters.

Leaves green on both sides.

Margins remotely spinulose-denticulate.

Blades linear, acute at both ends..... 4. longifolia,Blades oblong..... 4a. longifolia,
wheeleri

Margins closely serrate.

Blades linear-lanceolate (native tree)..... nigra,Blades lanceolate or oblong-oblancoate (usually pale to
subglaucous beneath)..... 6. cordata,

Blades broadly lanceolate to ovate.

Shining above, apex acuminate, petioles glandular

Glabrous on both sides

Ovate, short-acuminate (introduced tree)..... pentandra,Ovate-lanceolate, long-acuminate..... 1. lucidaThinly pilose beneath..... 1a. lucida,
intensa

Dull above, apex acute, petioles not glandular

More or less pilose-tomentose on both sides..... 8. adenophylla

Leaves glaucous beneath

Margins finely and distinctly serrate

Petioles glandular

Blades lanceolate, acuminate (introduced trees).

Blades linear-lanceolate; branchlets slender, pendulous,
tough..... babylonica

Blades lanceolate; branchlets stouter, spreading, fragile.

Blades somewhat sericeous, 7-9 serrations per cm. of
margin..... albaBlades glabrous, 4-6 serrations per cm..... fragilisBlades elliptical, acute (native shrub)..... 2. serissima

3
7
77
Petioles not glandular

Blades narrowly conic-lanceolate, acuminate, 7-15 cm. long. 3. longipes

Blades broadly lanceolate, ovate-lanceolate or narrowly obovate, 5-10 cm. long.

2
Blades ovate-lanceolate, acuminate; petioles long, slender (native trees)..... amygdaloides

Blades ovate, broadly oblong or obovate, short-acute; petioles short..... 7. glaucophylla

Blades lanceolate, or oblong-lanceolate, acute.

Blades usually glabrous or glabrate.

Pale green or subglaucous beneath, coarsely reticulate above..... 6. cordata

Glaucous and finely reticulate (and sometimes thinly silky) on both sides..... 9. petiolaris

Blades silvery pubescent beneath..... 10. sericea

Margins entire or remotely dentate or ^{per}dentate, mostly revolute.

Blades glabrous or glabrate

Blades oblong, 2.5-5 cm. long, closely reticulate on both surfaces..... 5. pedicellaris

Blades obovate or oval, 5-10 cm. long, coarsely subreticulate beneath.

Blades obovate, thin, entire..... 12. discolor

Blades elliptic-oval, thick, coarsely repand-dentate.... 12a. variety ericocephala

Blades tomentose and more or less rugose, at least beneath.

Blades linear-oblancoolate, white-woolly beneath..... 11. candida

Blades oblancoolate, gray-tomentose beneath

Blades 5-10 cm. long..... 13. humilis

Blades 3-5 cm. long..... 14. tristis

Blades elliptic-oval or rhomboidal..... 15. rostrata

1. *Salix lucida* Muhl. Shining Willow.

Fig. - - -

Salix lucida Muhl., Neue Schrift. Ges. Nat. Fr. Berlin, 4:239, pl. 6, f. 7. 1803.

A shrub or small tree to 20' High, with smoothish brown bark and glabrous, chestnut-brown shining twigs and bud scales. Leaves large, lanceolate to ovate-lanceolate, mostly long-acuminate, 2'-6' long, 1'-2' wide, up to 8' x 3', narrowed to rounded or cordate at base, sharply glandular-serrulate, glabrous, shining green above, paler green beneath; petioles stoutish, 3'-6'' long; ~~stipules~~ glandular above at outer end; stipules reniform to semi-lunate, 1'-3'' long. Aments coetaneous, oblong or oval, stout, 1'-2' or more long, on short, lateral, leafy peduncles $\frac{1}{2}$ '-3/4' long; scales oblong or oval, obtuse, entire or crenate at apex, yellow, thinly pilose, deciduous; stamens 3-5 or more, filaments free, pubescent below; capsules lanceolate, 3'-4'' long, glabrous, brownish; pedicel $\frac{1}{2}$ '-1'' long; styles $\frac{1}{2}$ ' long, entire, stigmas short, thick.

In swamps and along streams and lakes, Newfoundland to east-central Sask., south to Delaware, north-central Ia., and no.-cent. Mo. Dak., with outlying stations at Weeping Water, Nebr. and south in the Appalachians to Roanoke Co., Va.

1a. *S. lucida* var. *angustifolia* Andersson has shorter, narrowly lanceolate leaves. It occurs sparingly in the northern part of the range of the species.

1b. *S. lucida* *intensa* Fernald, has the lower surface of the leaves, and sometimes the twigs also, sparsely hairy. With the species but more abundant northward.

1a SALIX LUCIDA variety INTONSA Fernald.

Branchlets of the first year and the under surface of the leaves permanently thinly pubescent with reddish hairs.

Distribution. With the species as far west as the Great Lakes, but less common.

In Acum, Shrubs of Ind p. 40.

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dupl in Acum

2 SALIX SERISSIMA (Bailey) Fernald.
AUTUMN WILLOW.

Shrub 1-4 m. high, with olive-brown shining branches and yellowish-brown glabrous shining branchlets; bud-scales and petioles; stipules none; petioles slender, usually glandular at outer end; leaf-blades lanceolate, elliptic-lanceolate or oblong-lanceolate, and rounded at base, or the lower oblanceolate and acute at base, acute or short-acuminate at apex, 5-8 or 10 cm. long, 1-3.5 cm. wide, closely and finely glandular-serrulate, glabrous, dark green and shining above, pale or subglaucous beneath; aments appearing after the leaves, short and stout, oblong to oblong-oval, 1.5-2.5 cm. long, the pistillate 2 cm. wide and lax at maturity, terminating leafy branches 1-3.5 cm. long; scales obovate, pale yellow, white-pilose; capsule narrowly conical, 7-10 or 12 mm. long, thick-walled, glabrous, brown; pedicels stout, 1-2 mm. long; style about 0.5 mm. long; stigmas very short, 2-lobed; stamens 3-5 or more; filaments free, thinly pilose.

This species is named for its habit of late flowering. The flowers are found from late June to mid-July and the fruit throughout August and into September.

Distribution: In swamps and bogs from northern New Jersey and western Connecticut and Massachusetts north to Newfoundland and James Bay, and west to Alberta, Flathead Co., Montana, and Pike's Peak, Colorado (Hunnell). It occurs in the bogs of extreme northern Ohio and Indiana and thence northward to North Dakota.

In Indiana it has been collected in Lagrange Co., by Deam, in a willow bog on the south side of Pigeon River $1\frac{1}{2}$ miles southeast of Monge (No. 31123) and in a tamarack bog 5 miles east of Lagrange (No. 39069). Schneider reports it from Steuben County, also.

in Deam, Shrubs of Ind. p. 410. 45
dupl. in dupl.

2 SALIX LONGIPES Shuttlew. WARD'S WILLOW. [Salix wardii Bebb;
Salix longipes wardii (Bebb.) Schneider].

Shrub 1-3 m. high, or a small tree, with gray bark; branchlets yellowish to dark brown, the seasonal thinly to densely pubescent, as also the bud-scales and short petioles; stipules large, broadly kidney-shaped, obtuse, densely glaucous beneath; leafblades narrowly lanceolate to lanceolate, 7-15 cm. long, 1-3 cm. wide, tapering slowly to a long acuminate point, closely shallowly serrate, dark green above, densely white glaucous beneath, often somewhat pubescent, especially on the midrib; aments appearing with the leaves, slender, lax, 3-11 cm. long, subsessile at first but finally on long leafy peduncles 2-7 cm. long; scale oblanceolate or obovate, villous, yellowish; capsules narrowly ovate, acuminate, 3.5-5 mm. long; pedicels 1.5-3 mm. long; styles almost obsolete; stigmas very short, entire; stamens 5-8, pubescent at the base.

Flowers in the last half of May and fruit during late May and early June.

in Draw Shrubs of Indiana p 42-44
1924.

dupl. in Sect. - Sp.

Distribution. - *S. longipes* is a southern species, ranging from the Potomac River south across the United States to Cuba and west in one form or another to southern Illinois, southeastern Kansas and south-central Texas. North of the Ohio River it was reported from southern Illinois, opposite St. Louis by Schneider and ^{been} ~~was~~ collected in southern Indiana by Deam.

To Charles C. Deam, State Forester, belongs the credit of adding this species to the flora of the State. He first collected it "on the bank of the Ohio River about 6m. east of Cannelton, Perry Co. (Deam 26749) on Sept. 24, 1918. Again on Oct. 1, 1920, he visited the same spot and collected No. 33220, stating therewith, "A sprouting shrub growing in crevices of rocks on the low bank of the Ohio River about 6 miles east ^{of} Cannelton. The tips of the branches were about three feet tall. The shrub must be submerged during the winter season at least."

Still later, on Oct. 5, 1923, he visited the locality and collected No. 39992. Under date of Oct. 23, 1923, Mr. Deam wrote to the writer as follows:

"Last fall I found *Salix longipes* as a common willow for several hundred feet along the Ohio River in Perry County where I found it before. The river was very low at the time of my visit. I find this species keeps a zone lower than *Salix nigra*. The species must be under water about half the year. The plants are uniformly very short and usually only the summer's growth above the rocks.

The plant at this place grows in among more or less much detached rocks from the cliffs along the bank. It finds root in the mud between these large rocks and also finds protection. The plants that have any trunk to them at all are those that are protected by the rocks, but the majority of specimens I found had only this year's growth and an examination showed that they were broken off or worn off by the water during the high water.

I found a rocky bank along the Ohio River above Madison, Indiana, and I strongly expected to find this species there, but I searched in vain for it. I was not lucky enough to get along the bank of the Ohio across from Louisville where it was first reported."

Two closely related species, E. amygdaloides and E. nigra, were included among the tree species and are not included with the shrubs, although young plants would be regarded as shrubs. They are included in the keys to the species, however, for the greater convenience of students.

4. SALIX LONGIFOLIA Muhlenberg. SANGRE DE TORO WILLOW. (Salix interior Howies). Fl.

Midtall shrub with clustered stems, 1.5-4 or rarely 5.5 m. (5-18 feet) high and 2-6 or rarely 10 cm. (1/2-1 1/2 or 2 in.) in diameter, with grayish bark and reddish-brown, ^{erect or ascending} usually glabrous branchlets and bud scales; stipules none; leafblades ^(see var. pedunculata) linear-lanceolate or linear-oblong to very narrowly elliptical, acute, the base narrowed to the short petiole, 5-12 (usually 6-8) cm. long, 5-12 mm. wide, the margins with ^{remotely and irregularly dent} widely spaced slender sharp teeth, often thinly villous when young, glabrous in age, green on both sides; ^(see var. angustissima) aments appearing after the leaves, on slender leafy twigs 3 to 10 cm. long, the pistillate 1 or 2 together, 3-6 or 8 cm. long, rather loosely flowered; the staminate 1-3 together, 2-4.5 cm. long, the lower lateral ones later; scales lanceolate, thinly pubescent, yellow, deciduous; capsules narrowly conic, 7-9 mm. long, ^{terminal} thinly villous when young, glabrous in age, on pedicels about 0.7 to 1.5 mm. long; style almost obsolete; stigmas very short, divided; gland 1, shorter than the pedicel; stamens 2, filaments free, pubescent.

Flowering begins about the middle of April in Southern Indiana and from 10 days to 2 weeks later in the northern part of the State. In this species, as in all species of section Longifoliae, from 1 to 3 catkins are borne together, the lateral ones, especially the staminate, being lower and later in developing. Late or second flowering also occurs rather commonly in this species. For these reasons the period of flowering and fruiting is greatly prolonged, flowering extending until late June and fruiting until mid-July, or later in the northern counties.

DISTRIBUTION. The sandbar willow ranges from Quebec, New Brunswick and New Hampshire south to Delaware, the District of Columbia and the Ohio Valley, thence south to southern Louisiana and west, in one or another of its varieties, over most of the Great Plains area, and north to Alaska, Yukon, Mackenzie, and Ontario. It is very abundant in the Mississippi Valley.

In Indiana it is found throughout the State, from the beach sands of Lake Michigan to the rich alluvium of the Ohio River. It occurs along ditches and lake margins and on the flood plains of streams, being confined chiefly to lands which are subject to overflow at some time in the year.

A form with very narrow leaves, only 3 to 6 mm. wide, and frequently with longer marginal teeth, also occurs throughout the State with the species, with which it intergrades. It has nearly the range of the species in the eastern United States and is especially abundant in the Mississippi Valley, in the broad sense. In leafshape it is very similar to the western variety angustissima Anderss.

REMARKS. This willow takes its name from the fact that it occurs commonly on sandbars and mudbars in streams and is one of the first plants to occupy new-made bars. It has no economic importance except as a binder of stream margins and bars and a shrubby livener of treeless landscapes in the Great Plains area.

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4a. *SALIX LONGIFOLIA WHEELERI* (Rowlee) Schneider. WHEELER'S WILLOW.
(Salix interior wheeleri Rowlee; S. wheeleri (Rowlee) Rydberg.

Differs from the species chiefly in relatively shorter and broader leaves, 5-8 or 10 cm. long and 1 - 1.8 cm. wide, more densely and somewhat permanently clothed with longer hairs.

Distribution. Schneider records specimens from Connecticut to New Brunswick and James Bay, west to Eastern North Dakota, and south to Iowa and Pennsylvania. It is especially common in the Great Lakes area.

In Indiana, specimens have been collected in Floyd, Lawrence and Posey counties, all in the southern third of the State.

4a. SALIX LONGIPOLIA WHEELERI (Rowlee) Schneider. WHEELER'S WILLOW.
(Salix interior wheeleri Rowlee; S. wheeleri (Rowlee) Rydberg.

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5. SALIX PEDICELLARIS Pursh. BOG WILLOW.
(Salix myrtilloides of American authors, not Linne; Salix
pedicellaris hyroglaucia Fernald). Plate

Low bog shrub 0.5 - 2 m. high, glabrous throughout, with brown bark and light olive brown to dark brown branchlets; stipules none; petioles and bud-scales short; leaf-blades narrowly to broadly elliptical, oblanceolate or obovate, 2-4 or 6 cm. long, 1 - 2 cm. wide, mostly obtuse at apex, narrowed at base, entire and often revolute, thickish, finely but prominently reticulated on both sides, pale green above, pale to glaucous beneath; aments appearing with the leaves, cylindric-oval, 1-3.5 cm. long, on leafy peduncles 2-5 cm. long, the pistillate lax and 2 cm. wide in fruit; scales obovate-oval, obtuse or acutish, glabrous or glabrate, greenish-yellow; capsule lanceolate or narrowly conic, 5 - 7 mm. long; pedicel slender, 2-4 mm. long; styles 0.1-0.2 mm. long; stigmas short, thick, entire or bifid; stamens 2, filaments free.

In Indiana, the bog willow flowers during the first half of May and fruits thereafter to about June 10.

Distribution. In bogs and wet meadows from Eastern Quebec to British Columbia and south to New Jersey, Pennsylvania and northern Iowa in the eastern United States, and to Idaho and Washington in the Far West. Not yet reported from the Dakotas or Montana.

In Indiana this willow is found in the northwest corner, in Lake and Laporte Counties, and in the northeastern portion of the State as far south as Wells and Wayne Counties.

Ind.

Salix cordata Muhl.
non Mx.

6 Salix cordata Muhlenberg. HEART-LEAVED WILLOW. CORDATE WILLOW. Plate.

Usually several-stemmed shrub, 2-6 m. (10-20 ft.) high; twigs, petioles and bud scales yellowish to dark brown, the younger puberulent to pubescent; stipules semicordate to nearly circular; blades narrowly to broadly lanceolate or somewhat oblanceolate, rounded to subcordate at base, acuminate at apex, 7-12 or 15 cm. long by 1.5-3 or 4 cm. wide, closely serrate on the margins, dark green above, subglaucous to glaucous beneath, mostly glabrous, or the younger somewhat puberulent, becoming rigid and strongly nerved with age; aments appearing with the leaves, rather slender, subsessile or on short peduncles, 3-6 or 7 cm. long; scales oblong-lanceolate or oblanceolate, acute or obtuse, 1-1.5 mm. long, brown, thinly to densely pilose; capsule lanceolate from an ovate base, 4.5-6 mm. long, glabrous, greenish, its pedicel 1-1.5 mm. long; style 0.5 mm. long, entire; stigmas entire or divided, half as long as the style; stamens 2, filaments glabrous, free or occasionally united at the base.

Flowers from late April through early May, and fruit from about May 5 to 25, in Indiana.

Distribution. From New Brunswick to Maryland and west to Manitoba and eastern Kansas, along streams and in ditches, around springs and other wet places. In Indiana it is found throughout the northern two thirds of the State, as far south as Dearborn, and Sullivan Counties.

Pipley

2

Very narrow-leaved forms are referred to variety angustata Andersson, but the Indiana material seems to belong to the species.

Hybrids with S. sericea are found rather commonly and may be looked for wherever cordata occurs in Indiana. Hybrids with S. nigra are much less common but have been collected in one or two counties.

Salix missouriensis Bebb., differing in more densely pubescent tomentose branchlets, bud-scales, petioles and midribs, and in larger blades, white-glaucous beneath and often more or less pubescent on the veins, has not been reported for Indiana. It occurs (along the Ohio River) in Illinois near its junction with the Mississippi and further search may reveal it along the Ohio River in Indiana.

7 *SALIX GLAUCOPHYLLA* Bebb. GLAUCCOUS-LEAVED WILLOW, DUNE WILLOW. 220

A low spreading shrub (in our limits), 1-2.5 m. high with clustered stems; branchlets stoutish, yellowish to chestnut to dark brown, puberulent to tomentose when young, becoming glabrate; bud scales large, colored and clothed as the branchlets; stipules subcordate to broadly reniform, acute, 3-10 mm. long, crenate serrate, glaucous beneath; petioles stoutish, 6-12 mm. long, as the branchlets; leaf-blades elliptical lanceolate to ovate-lanceolate to ovate, or somewhat oblanceolate to obovate on fruiting twigs, 2-4 cm. wide, 5-10 cm. long, acute to short-acuminate at apex, acute to rounded or subcordate at base, serrate or crenate-serrate with glandular inflexed teeth, leathery, green above, densely glaucous beneath, rather prominently nerved in age, glabrous or lower midrib somewhat tomentose beneath; anthers precocious or nearly so, subsessile or on peduncles 8-15 mm. long (and bearing 2-4 small leaves), 4-7 cm. long, the pistillate 6-8 or 10 cm. long in fruit, 1.5 - 2 cm. wide, the rachis and peduncle pilose-tomentose; scales oblanceolate or obovate, 1.5 - 2 mm. long, brown, drying black, pilose-tomentose; capsule conic-subulate, 7-10 mm. long, glabrous, greenish or reddish; pedicel slender, 2-4 mm. long; style entire, 1 mm. long; stigmas half as long, thick, entire or divided; stamens 2, filaments 6-8 mm. long, glabrous.

Flowering in northern Indiana during the first half of May and fruiting during the latter half.

8 *SALIX ADREOPHYLLA* Hooker. GLAND-LEAVED WILLOW.
(*S. verticilla* Fernald)

A low spreading shrub 1-3 m. high, with short, stoutish branchlets and petioles grayish tomentose to only puberulent; stipules 6-15 mm. long, semicordate to subovate, glandular serrate; leafblades broadly ovate to ovate or ovate-lanceolate, acute or abruptly acuminate at apex, cordate or broadly rounded at base, 1.5-3 or 4 cm. wide, 4-7 or 8 cm. long, closely glandular serrate (the teeth sometimes long and slender), silky lanate when young or permanently so above, glabrate beneath in maturity, thick and leathery, deep green on both sides, with nerves whitish above and elevated beneath; aments appearing with the leaves, on pubescent peduncles 1-2.5 cm. long and bearing 3-5 small leaves which may become 2-3 cm. in length; pistillate aments 2-4 cm. long in flower, becoming 6 to 8 cm. long in fruit, the rachis pubescent; capsule conic-restrate, glabrous, reddish, 5 to 8 mm. long; pedicel glabrous, 0.5 to 1 mm. long, nearly twice as long as the gland; style, 0.7 - 1.5 mm. long; stigmas entire or slightly bifid; scales of both sexes oblong, pale brown, densely villous with long hairs; staminate aments 2-4 cm. long; stamens 2, filaments glabrous.

Flowers in Indiana during the first half of May and fruits in due succession thereafter.

DISTRIBUTION. Mostly in sandy situation⁵, from Labrador, the type locality, to James Bay, and southwestward to the shores of the Great Lakes, including Michigan, Indiana and Wisconsin. Frequently the plants bear numerous large cone-line insect galls at the ends of the twigs. In Indiana, it is found only in the Dune district along Lake Michigan in Lake, Porter, and Laporte Counties.

Salix adenophylla was described from the Labrador specimen as having glabrous scales. The plant of the Great Lakes area has pilose scales and Fernald therefore has given it a new name, syrticola. The type specimen of adenophylla is old and fragmentary, however, and the gap in the range has been nearly closed by recent collections, so it is doubtful if two species are represented.

Ind

9. SALIX PETIOLARIS J. E. Smith.

Shrub or small tree, with few stems, 1-2 or 3 m. high, with gray bark; branchlets slender, dark brown, glabrous to puberulent; bud scales small, inconspicuous; stipules none; petioles slender, 5-12 or 20 mm. long; leaf blades linear-lanceolate to lanceolate, ^{or} to oblanceolate, short-acuminate to acuminate at apex, acute at base, 5-8 or 9 cm. long, 8-13 or 15 mm. wide, closely glandular-serrulate, usually thinly silvery pubescent when young, usually becoming glabrate or glabrous and finely reticulate on both surfaces in age, green and somewhat shining above, subglaucous to densely glaucous beneath, often drying somewhat black, like sericea; aments appearing with the leaves, the staminate obovoid, 1-2 cm. long, subsessile, bracteate; stamens 2, filaments slender, free, glabrous or finely pubescent at base; the scales in both sexes linear-lanceolate to oblong-spatulate, light brown to darker, acute, thinly pilose; pistillate aments 1-2 cm. long in flower, on leafy peduncles 1 cm. long, the aments becoming broad and lax and 2-3.5 cm. long and the peduncles 1-2 cm. long in fruit; capsules 6-8 mm. long, lanceolate-ovoid, thinly silvery pubescent; the pedicels becoming 2.5-4 or 5 ^{mm} cm. long in fruit; styles obsolete to 0.2-0.4 mm. long; stigmas short, entire or divided.

Flowers in Indiana from about April 20 to May 5, and fruits from about May 10 to the end of the month.

Distribution. Moist alluvium from New Brunswick south to New Jersey and west to Pennsylvania, Iowa, South Dakota, North Dakota, and Saskatchewan.

In Indiana, it is found sparingly in the northern third of the State.

Inval

10. SALIX SERICEA Marshall. (Salix grisea Willdenow, S. pennsylvanica Forbes). SILKY WILLOW.

Shrub with clustered stems, 1-3 m. high; branchlets, small bud-scales, and slender, 5-10-mm. petioles light brown to mostly dark brown, glabrous or at first puberulent to pubescent; stipules 3-7 mm. long, linear-lanceolate to semicordate, toothed, mostly deciduous, glaucous beneath; leaf-blades narrowly lanceolate to lanceolate, 5-8 or 10 cm. long, 1.5-2 cm. wide, or up to 14 x 3 cm. on vigorous shoots, acuminate, acute to somewhat rounded at base, finely serrate, dark green and puberulent to glabrous above, glaucous and densely to thinly silvery pubescent beneath, in age finely reticulate on both surfaces; aments appearing before the leaves, numerous, sessile to subsessile, naked or with 2 or 3 small bracts on the 0.5-3-mm. peduncle; staminate obovoid or narrower, 1-2 mm. long; stamens 2, filaments free, glabrous; pistillate 1.5-2.5 cm., or 3 cm. in fruit, cylindrical, narrow; scales in both sexes ovate, or oval and obtuse, dark brown, long-pilose; capsule ovoid-oblong, 3-5 mm. long, blunt, silvery pubescent; pedicel 1-1.5 or occasionally 2 mm. long, pubescent; style obsolete or 0.1-0.3 mm. long, often divided; stigmas very short, notched.

In southern Indiana flowers may appear in late March but further north not until April 1 to 20, while fruit is found from April 20 to May 15. Hybridizes with cordata commonly, and with other species.

Distribution. In moist situations, New Brunswick west to Michigan and ~~Eastern Iowa~~ and south to South Carolina, Kentucky and southeastern Missouri. In Indiana, it is found abundantly throughout the southern half and the eastern part of the northern half but seems to be lacking from the western half of the northern half.

11. *SALIX CANDIDA* Fluegge. SAGE-LEAVED WILLOW, HOARY WILLOW (*Salix candidula* Nieuwland).

^{bud-}Low much-branched shrub, 2-10 dm. high, the branches divaricate, full of leaf-scars, glabrous, yellowish ⁺ light brown, branchlets densely white-tomentose; stipules lanceolate, acute, glandular, tomentose; petioles 2-7 mm. long, leafblades linear-oblong to narrowly oblanceolate, ^{broadly} or occasionally 4 to 8 or 10 cm. long, 0.7-2 cm. wide, mostly acute at both ends, margins revolute, entire or occasionally ^{of-and-into} crenulate, with conspicuous glands, dark green, dull and thinly tomentose above, with sunken veins, resembling sage leaves, densely white-tomentose beneath; aments appearing with the leaves, subsessile or in fruit on short leafy-bracted peduncles 1 ²/₁ cm. long, pistillate 1-3 cm. long, becoming 2-5 cm. long in fruit, 1-1.3 cm. wide; scales obovate, brown, thinly white-pilose; capsule lanceolate, short-pedicelled, 6-8 mm. long, white-tomentose; styles 1-1.5 mm. long, entire or divided, reddish; stigmas short, divaricate, notched; stamens 2.

In northern Indiana, the hoary willow is in flower during the last half of May and in fruit during the first half of June.

Distribution. Cold bogs in glaciated areas from Newfoundland west to British Columbia, and south to New England, New Jersey, the northern parts of Ohio, Indiana, Illinois and Iowa, northeastern South Dakota, central North Dakota, and the Rocky Mountains in Colorado, Wyoming and Montana.

In Indiana, this species is found in the northern 2 or 3 tiers of counties.

11a. SALIX CANDIDA variety DENUDATA Andersson.

This variety differs from the species in having narrower leaves, glabrate or glabrescent on both sides, especially above, and sometimes glaucescent beneath.

Distribution. Sparingly with the species from Newfoundland to Wisconsin and to New Jersey and perhaps Indiana.

[^]
The Indiana plant was collected "in a willow bog on the south side of Pigeon River, 1½ miles east of Mongo, Lagrange Co.," Chas. C. Deam 30458, May 27, 1920. Mr. Deam, the State forester, notes concerning this plant "Closely associated with S. bebbiana, S. candida, S. petiolaris, and other species of Salix. Only two specimens found. In habit and size resembles S. candida and grew with it." The developing leaves are linear, strongly ~~3~~4 revolute, and glabrous, even to part of those just unfolding. In the numerous aments, the capsules also are entirely glabrous and almost all have remained unfertilized. This indicates, though it does not prove, a hybrid origin. The styles are unusually long and slender, and deeply divided.

12
(14.)

6. SALIX DISCOLOR Muehlenberg. PUSSY WILLOW, SWAMP WILLOW, GLAUCOUS WILLOW. Plate . Shrub or small tree, 2-4 or occasionally 7.5 m. (7-15 or 25 feet) high; bark thin, usually ~~smooth~~ ^{branchlets} smooth, reddish brown; ~~twigs~~ ^{branchlets} stoutish, reddish-purple to dark brown, often pubescent (see the variety); buds large, 5-10 mm. (1/5-2/5 inch) long, colored as the ~~twigs~~ ^{branchlets}; stipules large, mostly roundish, entire or toothed; leaves short-lanceolate to elliptic or elliptic-oblong, acute or short-acuminate at the apex, rounded or acute at the base, 5-10 cm. (2-4 inches) long, 2-3.5 cm. (4/5-1 1/2 inches) wide, nearly entire to coarsely wavy-toothed on the margins, dark shining green above, densely glaucous and occasionally somewhat pubescent beneath, especially on midrib and primaries; ~~flowers~~ ^{aments} appearing in late March or in April before the leaves; ~~catkins~~ ^{aments} sessile on old wood, stout, dense, the staminate very beautiful (pussies), without leaf-bracts at base, 2-5 cm. (1-2 inches) long, the pistillate becoming 3-8 cm. (1 1/8-3 inches) long in fruit; scales elliptic-oblong, ^{dark brown} densely clothed with long shining hairs; capsules conic-rostrate, 7-10 or 12 mm. (1/4-1/2 inch) long, densely gray-woolly; pedicels 1 1/2-3 mm. (1/16-1/8 inch) long; styles about 0.5 mm. long; ~~stigmas~~ ^{aments} about equalling the styles, mostly entire; stamens 2, filaments free, pubescent.

In Indiana, the pussy willow flowers from late March in the southern part of the State, to mid-April and fruit with unfolding leaves may be found to the middle of May.

12
14. SALIX DISCOLOR Muehlenberg. *Ind.* *Ind.* PUSSY WILLOW, SWAMP WILLOW, GLAUCOUS

WILLOW. ^{Fr} Plate . Shrub or small tree, 2-4 or occasionally 7.5 m. (7-15 or 25 feet) high; bark thin, usually smooth, reddish brown; branchlets stoutish, reddish-purple to dark brown, often pubescent (see the variety); buds large, 5-10 mm. (1/5-2/5 inch.) long, colored as the branchlets; stipules large, mostly roundish, entire or toothed; leaves short-lanceolate to elliptic or elliptic-oblanccolate, acute or short-acuminate at the apex, rounded or acute at the base, 5-10 cm. (2-4 inches) long, 2-3.5 cm. (4/5-1 1/8 inches) wide, nearly entire to coarsely wavy-toothed on the margins, dark shining green above, densely glaucous and occasionally somewhat pubescent beneath, especially on midrib and primaries; flowers appearing before the leaves; aments sessile on old wood, stout, dense, the staminate very beautiful (pussies), without leaf-bracts at base, 2-5 cm. (1-2 inches) long, the pistillate becoming 3-8 cm. (1 1/4-3 inches) long in fruit; scales elliptic-oblanccolate, dark brown, densely clothed with long shining hairs; capsules conic-rostrate, 7-10 or 12 mm. (1/4-1/2 inch) long, densely gray-woolly; pedicels 1 1/2-3 mm. (1/16-1/8 inches) long; styles about 0.5 mm. long; stigmas about equalling the styles, mostly entire; stamens 2, filaments free, pubescent.

In Indiana, the pussy willow flowers from late March; in the southern part of the State, to mid-April and fruit with unfolding leaves may be found to the middle of May.

DISTRIBUTION. In swamps and wet places, Newfoundland and Nova Scotia south to Delaware, Kentucky and northeastern Missouri, ^{and} west to the eastern edge of the Great Plains area in North Dakota and Saskatchewan. Fairly well distributed over the entire State of Indiana.

12a.
14a. SALIX DISCOLOR variety ERIOCEPHALA (Michaux) Andersson. (Salix
ericephala Michaux). Differs from the species chiefly in rather densely
pubescent branchlets and bud scales; thicker and more lanceolate leaves, usually
more or less pubescent beneath, and the sometimes more densely pubescent aments.
DISTRIBUTION. Range of the species but less common.

13 SALIX HUMILIS Marshall. (Salix conifera ⁷¹Wagenheim, S. conifera Muhlenberg, S. Muhlenbergiana Nutt., S. occidentalis Walter.

Shrub with clustered stems, 1-2 m., or occasionally (especially in the Northeast) 3 m. high; branchlets, bud-scales and petioles yellowish to brown, glabrate to puberulent to pubescent; stipules linear-lanceolate to broadly lanceolate, acute, toothed, often deciduous; leaf-blades linear oblanceolate to oblanceolate to occasionally obovate, 5-10 or even 15 cm. long, 1-2 cm. ^{or the obovate 2.5-3 cm.} wide, acute or abruptly short-acuminate at apex, narrowed to the base, entire or sometimes undulate or undulate-serrate, revolute, rich green with whitish midvein and secondaries ^{and} often somewhat puberulent above, densely to thinly pubescent-tomentose and strongly reticulate-nerved beneath, and glaucous when glabrate; aments appearing before the leaves, numerous, sessile, naked, obovoid-cylindrical, 1.5-3 cm. long in flower, becoming 2-4 cm. long in fruit; often recurved; scales oblanceolate, obtuse, blackish, long-pilose; stamens 2, filaments free, glabrous; capsules slender, long-beaked, 7-9 mm. long, gray-pubescent; pedicels 1-2 mm. long, styles 0.2-0.4 mm. long, entire; stigmas short, divided.

In Indiana, flowers are found from late April to the middle of May and fruit from about May 10 to early June.

Distribution. Dry uplands and prairies from Newfoundland west to North Dakota and south to Florida and Texas. In Indiana the upland willow is generally distributed except in the central and eastcentral portions.

Remarks. This species is marked by a great diversity of leaf forms. In New England the prevailing and practically the only form has broadly lanceolate to ovate leaves densely pubescent beneath. This form occurs commonly westward to Minnesota. In Maryland, Virginia and the District of Columbia a form occurs with leaves of this shape but commonly glabrate to glabrous beneath. Forms with narrower leaves occur also. From Ohio westward and southward the prevailing form has narrowly oblanceolate leaves, becoming glabrate and strongly veined beneath in age. Robinson and Fernald (Gray New Manual Botany) refer this form to variety rigid-insculum Andersson. Several specific names, including others than those cited, may have been applied to one or another of the forms of this species or species-complex and it seems just as well to leave it under the name humilis until full study has been made. Practically all Indiana material represents the narrow-leaved, glabrate form.

14. SALIX TRISTIS Aiton. (Salix alpina? Walter). DWARF UPLAND WILLOW.

A low shrub, closely resembling Salix humilis but smaller in every way; stems numerous, 0.4-1 m. high; leaves crowded, mostly narrowly oblanceolate, occasionally broader, 2-5 cm. long, 7-10 or 12 mm. wide, tapering to a very short petiole, otherwise as in humilis; stipules wanting or small, and early deciduous; aments appearing before the leaves, numerous, crowded, 1-1.5 cm. long, sessile, naked, spreading, the pistillate up to 2 cm. in fruit; scales only 1-2 mm. long; capsules 6-7 mm. long on pedicels 1-2 mm. long.

In flower in Indiana from about April 10 to 20 and in fruit from about the first of May to May 20.

Distribution. More or less dry and sandy uplands, roadsides, borders of thickets, etc., from Massachusetts west to McHenry Co., North Dakota, and south to Florida, Tennessee, Missouri, eastern Nebraska and eastern South Dakota.

In Indiana, the dwarf upland willow is found sparingly throughout the western part of the State and across the northern border.

latifolia And²

14a. SALIX DISCOLOR variety ERIOCEPHALA (Michaux) Andersson. (Salix eriocephala Michaux). Differs from the species chiefly in rather densely pubescent branchlets and bud scales; thicker and more lanceolate leaves, usually more or less pubescent beneath, and the sometimes more densely pubescent aments.

DISTRIBUTION. Range of the species but less common.

111

15. SALIX ROSTRATA Richardson. (Salix bebbiana Sargent.) BEAKED
WILLOW, BEBB WILLOW.

Shrub or occasionally a small tree, with one to few stems; branchlets numerous, slender, divaricate, usually full of bud-scars, yellowish to brown, glabrous to pubescent; stipules obsolete or semicordate, acute, toothed; petioles slender, 4-10 mm. long; leafblades obovate to broadly or narrowly elliptic-oblongate, or occasionally ovate, acute or abruptly short-acuminate at apex, mostly acute at base, 4-7 or 10 ^{cm} mm. long, 1.2-2, or 3 cm. wide, entire to undulate-crenate, somewhat revolute, veins somewhat depressed above, prominently reticulated to rugose beneath, dull green and usually finely pubescent above, pale to glaucous and more densely pubescent beneath, ^{and usually rugose} aments numerous, appearing before or with the leaves; the staminate 1-2 cm. long, sessile, naked and narrowed at base, yellow; stamens 2, filaments slender, free; pistillate aments 2-3 cm. long and subsessile in flowering, becoming 3-6 or 7 cm. long, and lax in fruit, the bracted or leafy, densely pilose peduncles; becoming 1-2 cm. long; capsules 6-9 or 10 mm. long, lanceolate, tapering to a long beak; pedicels slender, 3-5 mm. long; styles almost obsolete; stigma-lobes entire to deeply cleft; scales in both sexes lanceolate-oblong, pale, reddish at tip, densely to thinly pilose.

The flowering period in Indiana covers the first half of May and the fruiting period the last half of May and the early part of June.

Distribution. Usually in moist but not swampy places from New Jersey north to Newfoundland, northwestward to James Bay, Yukon, and Alaska, and south to Pennsylvania, northern Indiana, Iowa and eastern South Dakota, and in the western mountains to New Mexico and central California. Much of the far western and southwestern material is variety perrostrata Rydberg.

In Indiana the beaked willow is found abundantly in the first 3 tiers of counties comprising the northern fifth of the State, but only sparingly in the fourth tier of counties. It occurs also in Wayne Co., in the east-central portion.

Excluded species

See Dean letter march 4, 1924
Ball " April 4, 1924

Excluded species. Drafts not found but see remarks
on map sheets and Deam letter March 4, 1924, and Ball April 4, 1929.

Lacking: *S. babylonica*, *S. exigua*, *S. longifolia* v. *argophylla*, *S. pentandra*,
S. purpurea, *S. viminalis*.



Clark County:Paired & Taylor.

Franklin:Meynoke

Jefferson:Barnes

Jefferson:Counter(J.M.).Commonly planted for ornament.

Lake,Porter,Laporte and St.Joseph:Nieuwland in Mid.Nat.Vol.3:
223:1914.Cult.and often persisting in places when
left to stand.

Note: I do not believe this has escaped at all,or enough to
make mention of. All of the authors except Nieuwland in their
lists reported plants and trees from lawns,cemeteries.parks.etc.

Salix exigua Nuttall.



St. Joseph: Nieuwland in Mid. Nat. Vol. 3: 224: 1914. At Webster's Crossing.

I visited this place and I did not even find *S. interior*



White: Heimlich in Proc. Ind. Acad. Sci. 1917: 449: 1918.

Heimlich reported this, based on my specimen which Sargent so named. This is my specimen No. 15,224. You have seen this sheet and you put a label on the sheet which reads as follows: *Salix* interior Rowlee. This is not *S. argophylla* Nutt. a plant of the Pacific Northwest, but is merely the result of the original foliage having been eaten off by sawfly larvae. The new leaves are always smaller, firmer, silvery-silky and crowded. C. R. Ball.

5. interior Rowlee

Ind

66

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.)

Louis Frederick Reimlich, The Trees of White County, Indiana, with some reference to those of the State. Proc. Ind. Acad. Sci. 1917: 397-471 1918.
(*Salix longifolia argophylla* Sarg. p. 449).

This is a triple error for
S. l. argyrophylla Aspl.
S. flu. " (") Sarg.

Csee Deam letters Apr 14, 26. 1924
Ball Apr 24, 1924



White:Heimlich in Proc.Ind.Acad.sci. 1917:447:1918.
He gives about 2 pages of discussion on synonymy of this species
etc. and gives a full page drawing of it which looks to me like
simple *S.cordata*. He is inclined to believe this is a synonym
of Muhl's *S.cordata*. You know when Heimlich published all he
had to go by was the records published by Coulter, and he cites
only 3 references. You can look up what Heimlich said or I can
loan a separate of this paper in the Proc.Ind.Acad.sci. if it
is any trouble for you to get it.

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.

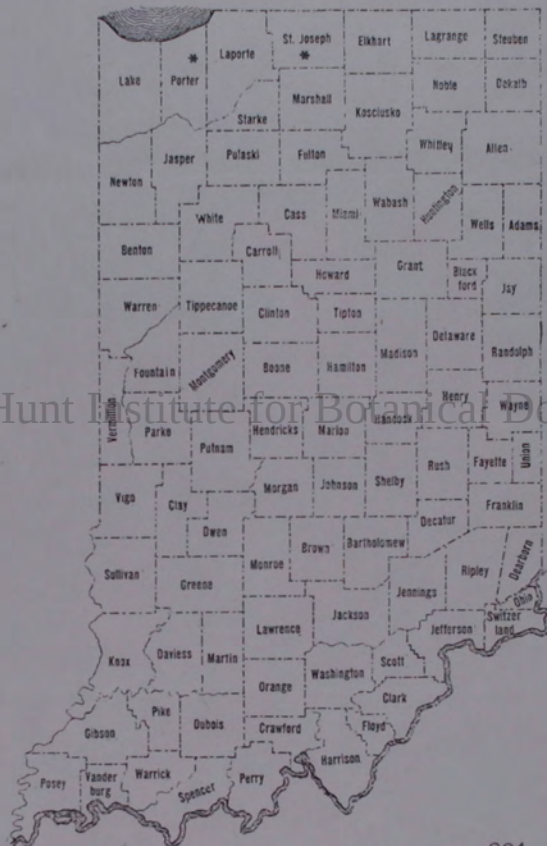
In the face of all the above, hybridization is mentioned by each of the contending authors. (See ranges given on map, p. 450.)

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 (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)."

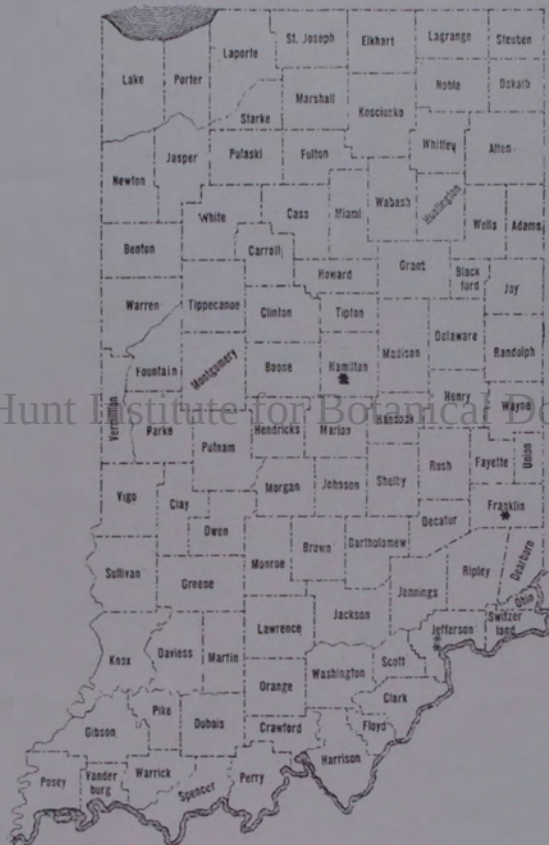
I have seen no specimens of the above for comparison. The report of *missouriensis* may or may not be new to the State. Owing to the hybridizing character of the willows and the difficulty of separation, much additional work is necessary before the status of this genus is settled satisfactorily.

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.

Heimlich, Louis Frederick, The Trees of White County, Indiana, with some reference to those of the State. Proc. Ind. Acad. Sci. 1917: 387-471, 1918.
(*Salix missouriensis* Bebb. pp. 447-8) pl. 26 (plant), pl. 27 (map).



Salix purpurea L.



Franklin: Meyncke. (no remarks)

Hamilton: Wilson. Very scarce. (All of Wilson's stuff is below par)

Jefferson: Barnes (No comments)

Jefferson: Coulter, (J.M.). (no comments).

Note: I have never seen this species in Ind. as an escape,
and in fact I do not recall that I ever saw it, even in cult.

Salix viminalis L.



Clark: Baird & Taylor (No comments)

Dearborn: Collins for part of Dearborn Co and adjoining Ky)
No comments)

Franklin: Meyncke (No comments)

Jefferson: Barnes (no comments)

Jefferson: Coulter (No comments)

Jefferson: Young (April). Barnes, Coulter and Young reported on the same thing. Young pub. first and Coulter and Barnes followed, and each just practically copied Young's list and did not give him credit. If Coulter did not make any comment you can bet he did not know it, and copied it from Young's list.

St. Joseph: Nieuwland in Mid. Nat. Vol. 3: 224: 1914. Escaped from a cult. plot.