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About the Institute

The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

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.

Braun, E. Lucy
Salix for Woody plants of Ohio. 17 mss. pages, Dec. 3, 1957

(Unopened manuscript found after Ball's death on Feb. 2, 1958)

SALIX L. Willow

A large genus of about 300 species, mostly in cooler latitudes of the northern hemisphere, but represented on all continents except Australia. Dioecious trees or shrubs, mostly in wet ground; those of arctic and alpine situations very small, sometimes but a few centimeters in height. Winter-buds covered by a single scale; leaves alternate (subopposite in the introduced S. purpurea), relatively narrow in most of our species; aments ~~expanding~~ expanding before the leaves (as in the familiar pussy willow), with the leaves (as in the common black willow), or, in a few species, after the leaves (as in the sandbar willow). Over half of our species belong to the second group; only two (nos. 3 and 10) to the third; the remainder (nos. 12, 14, 17, 21, 22, 23, 24, 25) flower in early spring, before the leaves develop. Winter-buds of early-flowering species are of two sizes, the ament buds the larger. The goat willow, S. caprea (the pussy willow of florists), has the largest buds of any of our species. Fruit a small one-celled pointed capsule, sessile or pedicelled, dividing at maturity into two valves; seeds retain their viability for only a few days.

In addition to our native species, a number of introduced ones occur more or less frequently; of these, S. alba and S. fragilis are widely naturalized. The flexible slender branches of several species are used in basket-making.

Species vary as to leaf shape, pubescence, and glaucescence, characters on which varieties are sometimes distinguished. Shape and persistence of stipules, especially those of vigorous shoots, may aid in identification. Willows are largely insect-pollinated;

Hybrids, both between Old World species and between native species, and occasionally between species from the two hemispheres, occur and add to the difficulty of identification. Botanists sometimes disagree as to the interpretation of certain species. All county records shown on our maps are based on specimens identified by Dr. Carleton R. Ball. Our interpretation of species follows Ball (see Gleason, 1952) with synonymy or notes correlating these with Fernald's treatment (1950). Our key is based principally on mature vegetative characters; species with glabrous mature leaves often have pubescent young leaves. A supplementary key to the species which flower before the leaves develop is also included. Because willows are dioecious, and specimens rarely are complete, certain identification is often difficult. The student will need to refer to more complete descriptions in Gleason (1952) and Fernald (1950).

- a. Leaves and buds distinctly alternate.
- b. Branchlets glabrous or but thinly pubescent, often lustrous;
leaves glabrous at maturity.
- c. Leaves relatively broad, sometimes lanceolate, broadest
below or near middle, glandular toothed; petioles with
coarse glands near blade.
- d. Leaves green beneath, or gray or glaucescent; aments
developing with the leaves.
- e. Leaves lanceolate to ovate-lanceolate, long-acuminate
to attenuate; stipules (on sprouts) oblong to
semi-circular 1. S. lucida
- ee. Leaves ovate, short-acuminate, gummy when expanding;
stipules small, early deciduous; introduced
shrub 2. S. pentandra
- dd. Leaves pale or glaucescent beneath.
- e. Aments expanding after the leaves, capsules maturing
in late summer; leaves short-acuminate, finely
glandular-serrate; stipules absent; native
shrub 3. S. serissima
- ee. Aments expanding with the leaves; leaves acuminate;
introduced trees.
- f. Leaves coarsely glandular-serrate (5-6 teeth per
cm.); stipules small, semi-cordate or wanting
. . . 4. S. fragilis
- ff. Leaves with 9-10 glandular serrations per cm.,
often more or less silvery-silky; stipules minute,
deciduous, or wanting . . 5. S. alba

cc. Leaves relatively narrow, or if broad, without petiolar glands.

d. Vein-eyelets minute, 4-5 to a mm.

e. Leaves green on both sides, narrowly lanceolate, sometimes falcate; stipules (on sprouts) acute, serrate 6. S. nigra

ee. Leaves glaucous beneath.

f. Branchlets not pendulous.

g. Leaves linear-lanceolate to lanceolate; stipules on sprouts conspicuous, obtuse; branchlets yellowish to dark brown, brittle-based; southern 7. S. caroliniana

gg. Leaves lanceolate to ovate-lanceolate; stipules wanting or minute; petioles 6-20 mm. long, slender, often twisted; branchlets not brittle-based; northern--8. S. amygdaloides

ff. Branchlets elongate, pendulous or "weeping"

. . . 9. S. babylonica

dd. Vein-eyelets larger, often 1 mm. across.

e. Leaves green beneath, sometimes paler but scarcely glaucous.

f. Leaves linear or linear-oblong, the margins more or less parallel except near base or apex; petioles very short.

g. Leaves linear to linear-oblong, spinulose-denticulate, younger leaves silky on one or both sides; aments after the leaves

. . . 10. S. interior

gg. Leaves linear-oblong, glaucescent and purple-tinged, entire or irregularly toothed toward apex, often subopposite; aments before the leaves 25. S. purpurea

ff. Leaves not as above.

g. Leaves broadest above middle.

h. Leaves oblong to oblanceolate, short-acute to obtuse, revolute margined; lateral veins subequal and parallel ~~11. S. pedicel~~

; . . . 11. S. pedicellaris

hh. Leaves oblanceolate to narrowly obovate, acute to short-acuminate; margin somewhat revolute; lateral veins unequal, curving

. 23. S. humilis

gg. Leaves broadest below or near middle, oblong-oblanceolate to ovate, acuminate; margin not revolute.

h. Margin closely glandular-serrate; stipules on vigorous shoots large, 10-15 mm. long, semi-ovate to subreniform--12. S. rigida

hh. Margin coarsely undulate-serrate with 5-6 glandular teeth per cm.; stipules small or absent, early deciduous; branchlets brittle at base; intr. tree 4. S. fragilis

ee. Leaves whitened or glaucous beneath, rarely somewhat silky.

f. Stipules, at least on vigorous sprouts, conspicuous and more or less persistent.

- g. Leaves closely crenate or crenate-serrate
with gland-tipped teeth, rounded to cordate
at base or somewhat tapering, white-glaucous
beneath; northern shrub--13. S. glaucophylloides
- gg. Leaves entire, undulate, or crenate-serrate,
generally tapering toward base; buds large;
widespread shrub . . . 14. S. discolor
- ggg. Leaves closely glandular-serrate, rounded to
subcordate at base, glaucescent beneath;
widespread shrub . . . 12. S. rigida
- ff. Stipules absent, or very small and early
deciduous.
- g. Introduced trees, widely naturalized; branch-
lets brittle at base; leaves narrowly lance-
olate to lanceolate.
- h. Branchlets yellow to greenish; leaf-margin
with 9-10 gland-tipped teeth per cm. 5. S. alba
- hh. Branchlets greenish to dark red, very brittle
at base; leaf-margins with 5-6 gland-tipped
teeth per cm. 4. S. fragilis
- gg. Native shrubs, northern.
- h. Branchlets yellowish to dark brown or red-
dish; leaves narrow-lanceolate or -oblance-
olate, subentire to serrulate; capsules
lanceolate-rostrate, on pedicels 2.5-5 mm.
long 15. S. petiolaris
- hh. Branchlets olive-green to dark brown; leaves
narrowly to broadly elliptic, oblanceolate

to obovate, entire, often revolute; capsules narrowly lanceolate, on slender pedicels

2-4 mm. long. . . . 11. S. pedicellaris

var. hypoglauca

bb. Branchlets silky, puberulent, or pubescent; leaves more or less pubescent, often densely so beneath.

c. Introduced tree; leaves silky beneath, narrowly lanceolate to lanceolate; branchlets yellow to greenish 5. S. alba

cc. Shrubs, sometimes tree-like.

d. Leaves pubescent on both sides, often more densely so beneath.

e. Leaves relatively narrow, less than 1/3 as wide as long.

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f. Leaves glaucous and densely silky to glabrate beneath, pubescent above, at least on midrib, linear-lanceolate to oblanceolate; stipules absent or minute 16. S. subsericea

ff. Leaves densely white-tomentose beneath, thinly tomentose above with deeply impressed midrib, linear-oblong to linear-lanceolate; stipules lanceolate, glandular . . . 18. S. candida

fff. Leaves green on both sides, usually more or less silky pubescent, linear to linear-oblanceolate; stipules absent 10. S. interior

ee. Leaves broader, 1/3-1/2 or more as wide as long.

f. Leaves densely lustrous pubescent on both sides, oblong-ovate, glandular-serrate with divergent teeth; stipules large, cordate-ovate, toothed, longer than the short ^{thick} petiole. - 19. S. syrticola

- ff. Leaves more or less gray-pubescent on both sides.
- g. Leaves rugose-veiny beneath and glaucous,
elliptic to broadly rhombic-oblongate or
obovate-oval, toothed or subentire; stipules
small; native shrub . 20. S. bebbiana
- gg. Leaves densely pubescent beneath, obovate to
elliptic-lanceolate, crenate or remotely
serrate; intr. shrub . . 21. S. cinerea
- dd. Leaves glabrous or nearly so above, except on midrib.
- e. Leaf margin finely and regularly serrulate, pubes-
cence of lower leaf surface silvery-silky, leaves
lanceolate; branchlets brittle at base; foliage
blackening in drying . . 17. S. sericea
- ee. Leaf margin entire, undulate, remotely or irregularly
dentate or serrate, often slightly revolute; veins
prominent beneath; leaves not silvery-silky.
- f. Leaves relatively broad, 1/3 of more as wide as
long, margins usually toothed, teeth large;
stipules large, half-ovate; large shrubs.
- g. Native shrub; leaves elliptic to elliptic-
discolor
oblongate . . 14. S. ~~latifolia~~ var. latifolia
- gg. Intr. shrub, often tree-like; leaves broadly
ovate to elliptic, suborbicular or obovate,
soft-pubescent beneath . . 22. S. caprea

- ff. Leaves relatively narrow, less than $1/3$ as wide as long; margins subentire, teeth, if present, small and far apart; stipules lanceolate, or wanting; low shrubs.
- g. Shrub, 1-3 m.; leaves oblanceolate to narrowly obovate, often glabrate and pale beneath; aments 1.5-3 cm. long . . 23. S. humilis
- gg. Shrub, 0.5-1 m.; leaves narrowly oblanceolate; aments 1-1.5 (-2) cm. long . . 24. S. tristis
- aa. Leaves and buds subopposite; leaves linear-oblanceolate, linear-oblong, or spatulate, irregularly serrate above middle 25. S. purpurea

1. Salix lucida Muhl. Shining Willow

Large shrub or small tree, 1-6 m. tall. The large leaf-blades (up to 15-20 cm. long and 5-8 cm. wide), green and shining on both sides but slightly paler beneath, the long-acuminate or attenuate apex, gland of outer end of petiole, and shining chestnut-brown twigs and buds characterize this species. A northern species of low ground. Three varieties are distinguished; our specimens (with one exception) belong to the typical variety. One specimen from Catawba Island, Ottawa County, is referred to var. intonsa Fern., which has young branchlets and lower leaf-surface more or less hairy. A hybrid between S. alba and S. lucida is recorded from Logan County.

2. Salix pentandra L. Bay-leaf Willow

Small Eurasian tree, introduced into the United States and Canada for basket making, or as an ornamental; an occasional escape. Resembles S. lucida. Our records, for Athens, Auglaize, Belmont, Franklin, Greene, Hamilton, and Lake counties, doubtless include planted specimens.

3. Salix serissima (Bailey) Fern. Autumn Willow

A northern shrub of swamps and bogs. Similar to S. lucida, from which it differs in its smaller size and its short-acuminate very firm, more elliptic leaves whitened beneath.

4. Salix fragilis L. Crack Willow; Brittle Willow

Large tree, early introduced from Europe; similar to S. alba, but the branchlets not as yellow, and very brittle at base, the leaves glabrous (glaucous) beneath, and the serrations coarser. Aments in both species developing with the leaves. Recorded from over one-third of Ohio's counties.

5. Salix alba L. White Willow

Large tree, early introduced from the Old World. The yellowish branchlets, somewhat brittle at base, and bright green leaves silky and glaucous beneath, identify this common tree in the field. Trees with more yellow branchlets and less pubescent leaves are common; these are referred to var. vitellina (L.) Stokes by Fernald (1950) and by Deam (1953), but are considered by Ball (Gleason, 1952) to be hybrids of S. alba and S. fragilis, both European species. Hybrids with native species also occur; S. alba x S. lucida is recorded from Logan County. White willow, together with its forms and ~~xxxxxxx~~ hybrids, is widely distributed in Ohio.

6. Salix nigra Marsh. Black Willow

Tree to 20 m. tall, sometimes shrub-like. Our commonest species, growing in ravines and along almost every stream, if there is sufficient light. The yellow-brown to dark brown branchlets, brittle at base, and narrowly lanceolate leaves green on both sides, with tiny vein-eyelets, characterize black willow. Ranges almost throughout the Deciduous Forest and its outliers. Hybrids between S. nigra and S. amygdaloides are recorded from Ashtabula, Erie, Franklin, and Lorain counties.

7. Salix caroliniana Michx. Carolina Willow; Ward's Willow

S. longipes Shuttlew.

S. longipes var. wardii (Bebb) Schneider

S. wardii Bebb

A southern shrub or small tree, 1-3 m. tall, barely entering our range; usually in rocky soil along streams.

Resembles shrubby plants of S. nigra, from which it is distinguished by the glaucous under surface of leaves.

8. Salix amygdaloides Anderss. Peach-leaf Willow

Small tree or shrub, to 15 m. tall; "branchlets longer and less brittle than those of S. nigra, yellowish to reddish brown, usually somewhat drooping, giving a 'weeping' appearance, which, with its color, makes the species easy to recognize at a distance" (Deam, 1953). Along streams and in swamps in the northern part of Ohio; wide-ranging, extending almost across the continent (sw. Quebec and Vermont west into Washington and Oregon). Hybrids between this species and S. nigra are recorded from Ashrabula, Erie, Franklin, and Lorain counties.

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9. Salix babylonica L. Weeping Willow

A well known and frequently planted tree, ^{easily} ~~xxxix~~ recognized by the slender pendulous branchlets; rarely occurring as an escape propagating from broken branchlets. The specific name is inappropriate, for this species is a native of northern China, where it is scarcely weeping. It was early introduced into Europe, and later given its specific name by Linnaeus, apparently under the impression that it was the "willow" mentioned in Psalm 137. Hybrids between S. babylonica and S. fragilis are recorded from Ashtabula and Erie counties.

10. Salix interior Rowles Sandbar Willow

S. longifolia Muhl.

A very common willow, 1.5-4 or 5 m. tall, forming large colonies along streams and shores of ponds and lakes; often a

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pioneer on depositing shores. The slender leaves with small outwardly-pointing teeth, usually silky pubescent when young and later glabrous, the late and prolonged period of flowering, and habit of growth readily distinguish this species. Commonly infested with pine-cone willow-galls, caused by the larvae of a gall-gnat. A widespread species, extending from New Brunswick to Alaska and south to Virginia, Louisiana, and southern Texas; common throughout Ohio. A variable species in which several varieties and forms have been distinguished. Most of our specimens are referable to the typical variety. S. interior var. wheeleri Rowlee (forma wheeleri(Rowlee) Rouleau), differing in its relatively shorter and broader leaves, more densely and permanently clothed with long appressed hairs, is recorded from Erie, Ottawa, and Warren counties; var. pedicellata (Anderss.) Ball, a western variation with leaves only 3-6 mm. wide, is recorded from Ottawa County.

11. Salix pedicellaris Pursh Bog Willow

Slender creeping and stoloniferous bog shrub 3-10 dm. tall, glabrous throughout. As now understood, the typical variety is less common and more circumscribed in range than var. hypoglauca Fern., to which all our records are referred. This has the thick leaves whitened and distinctly glaucous beneath; this character, together with the slightly revolute margin and usually obtuse apex distinguish the species from our other willows. Northern in range; in our area, local in bogs.

12. Salix rigida Muhl. Heart-leaf Willow

S. cordata Muhl., not Michx.

Shrub, 2-6 m. tall, of streambanks, ~~dislands~~, and swamps over a wide range, from the maritime provinces of Canada westward to Saskatchewan and Montana, and southward, in outlying stations, to the Gulf States. Represented in our area by two intergrading varieties, extremes of which are quite distinct.

Leaves broad, 3-3.5 cm. wide var. rigida

Leaves narrower, 1-2 cm. wide var. angustata ^{(Pursh) Fern.} ~~Anderss.~~

The large stipules of vigorous shoots are conspicuous on both varieties, which are similarly distributed over Ohio. S. rigida hybridizes with a number of other species; Ohio records include a hybrid of the typical variety and S. sericea, and a hybrid of var. angustata and S. petiolaris. Pine-cone willow-galls are common on this species.

13. Salix glaucophylloides Fern. Willow Dune Willow; Blueleaf

S. glaucophylla Bebb, of Ed. 7 and Schaffner (1932)

S. glaucophylloides var. glaucophylla (Ball) Schneid.

Low spreading shrub, 1-2.5 m. tall, of sandy shores, dunes, and sometimes wet soil. Represented with us by two varieties, the typical, and var. albovestita (Ball) Fern., differing by having branchlets densely white-~~tanxxxxx~~ pilose and somewhat larger leaves more or less densely white-pubescent at least when young. The latter recorded only from Erie County (Cedar Point) where it grows with the typical variety. The general ^{range} of the species is northern, from Quebec eastward through the Great Lakes area to Wisconsin, with occasional inland stations.

14. Salix discolor Muhl. Pussy Willow

Large shrub, sometimes tree-like, 2-6 m. tall, flowering very early, before leaf-buds start growth. Winter-buds of two sizes, the larger ament-buds conspicuous in late summer and all through the winter. A common species of swamps and wet ground, transcontinental in the North, and ranging south to Maryland, Kentucky, and Missouri. Represented in Ohio by two varieties:

Twigs, buds and leaves glabrous var. discolor

Twigs, buds, and often lower leaf-surface pubescent . . .

. . . var. latifolia Anderss. (var. ericecephala of Ed. 7)

The latter variety usually has narrower leaves than the typical variety.

15. Salix petiolaris J. E. Smith

S. gracilis Anderss. var. textaris Fern.

Shrub or small tree, 1-3 m. tall, with gray bark. Swamps, wet prairies, and streambanks; northern in range, sporadic southward. The linear-lanceolate, closely glandular-serrate leaves with long slender petioles give this species a distinctive appearance.

16. x Salix subsericea (Anderss.) Schneid.

Diffuse shrub of meadows and moist ground, mostly near streams. Considered to be a hybrid: S. petiolaris x S. sericea. Northern in range, as is S. petiolaris.

17. Salix sericea Marsh. Silky Willow

Shrub with clustered stems, 1-4 m. tall; in moist soil and on the banks of streams through much of the Deciduous Forest.

The appressed silvery or glistening silky pubescence of the lower leaf-surface and capsules is distinctive.

18. Salix candida Fluegge Sage-leaf Willow; Hoary Willow

Low shrub 2-10 dm. tall, the branches widely spreading, the branchlets densely white-tomentose. The dark, dull green leaves with sunken veins (leaves densely white-tomentose beneath) suggest sage leaves, hence the common name. A transcontinental northern species extending southward into northern Ohio, where it occurs sparingly in wet prairies and bogs.

19. Salix syrticola Fern. Sand-dune Willow

S. adenophylla of Amer. auth., not Hook.

S. cordata Michx. (as in Gleason) in part

A large straggling shrub of fore-dunes along the Great Lakes. In Ohio, known only from Cedar Point, and probably extinct. The crowded broadly ovate leaves ($2/3$ as wide as long) with cordate base, short petioles, and large stipules, and the dense lustrous pubescence give this willow a distinct aspect.

20. Salix bebbiana Sarg. Long-beaked Willow

S. rostrata Richards

Shrub, or occasionally a small tree, 2-5 m. tall, with one or a few stems. The common name refers to capsule shape -- lanceolate or flask-shaped, 6-10 mm. long, tapering to a long beak. A northern species of moist soil; several varieties are recognized; ours are referable to the typical variety.

21. Salix cinerea L. Gray Willow

Similar to S. caprea, and used in the same way, but less frequently planted. The hybrid, S. cinerea x S. caprea, is doubtfully recorded from Lake and Lorain counties.

22. Salix caprea L. Goat Willow

The pussy willow of florists; native of Europe, widely planted, and rarely escaped. Tree-like shrub, most conspicuous when flowering in early spring. Recorded for Brown, Franklin, Hamilton, Highland, and Lake counties.

23. Salix humilis Marsh. Upland Willow

Shrub, 1-2 m. tall, with many stems. Aments in early spring, before the leaves, resemble those of S. discolor but are much smaller, hence the common name, small pussy willow, sometimes applied to this species. Usually found in dry situations, but also in swamps and swampy woodlands; ranges throughout the area of the Deciduous Forest. A highly variable species, represented in Ohio by three intergrading varieties (four, if Fernald's interpretation, 1950, is followed) differing in leaf-shape and pubescence:

Leaves 1.5-2 (-3) cm. wide, oblanceolate to narrowly obovate, loosely pubescent to glabrate . . . var. humilis

Leaves 0.7-1.5 (-2) cm. wide, narrowly oblanceolate, glabrate . . . var. hyporhiza Fern. (var. rigidiuscula Anderss.)

Leaves 1.5-5 cm. wide, obovate to broadly obovate, densely pubescent var. keeweenawensis Farw.

The typical variety is most abundant; the second is recorded in seven counties, often with the typical; the third, a far-northern

form, is known from one specimen from Margaretta Ridge, Erie County (fide Ball). The var. microphylla (Anderss.) Fern., included in S. humilis by Fernald (1950), is here interpreted as a distinct species, S. tristis.

24. *Salix tristis* Ait. Dwarf Upland Willow

S. humilis Marsh. var. microphylla (Anderss.) Fern.

S. humilis var. tristis (Ait.) Griggs

A low shrub, usually in dry habitats. Similar to S. humilis but smaller in every way; leaves smaller and narrower than in that species, densely gray-tomentose beneath. Range similar to that of S. humilis, but more local.

25. *Salix purpurea* L. Purple Osier; Basket Willow

Introduced from Europe in colonial days for basket-making,

and now sparingly escaped. Our records, for 16 widely scattered counties, do not distinguish between planted and escaped specimens: Ashtabula, Auglaize, Belmont, Delaware, Erie, Fairfield, Franklin, Hamilton, Jefferson, Lake, Lorain, Montgomery, Ottawa, Ross, Scioto, Stark. The subopposite position of leaves and buds, usually seen on at least some of the branchlets, distinguished this from other willows.