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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, Carleton R., draft of Salix for J. M. Coulter & A. Nelson -  
New manual Rocky Mountain botany, 1909.

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ROCKY MOUNTAIN SPECIES

1. *S. nigra* Marsh (*S. wrightii* And.)
2. *S. amygdaloides* And.
3. *S. lasiandra* Benth.
4. *S. fendleriana* And. [*S. lasiandra caudata* (Nutt.) Sudw.]
5. *S. serissima* (Bail.) Fernald
6. *S. exigua* Nutt. (*S. luteosericea* Rydb., *S. stenophylla* Rydb.)
7. *S. fluviatilis* Nutt. (*S. interior* Rowl., *S. linearifolia* Rydb.)
8. *S. melanopsis* Nutt.
9. *S. irrorata* Anderss.
10. *S. lutea* Nutt
11. *S. cordata* Muhl
12. *S. "* *Watsoni* Bebb. (*S. flava* Rydb.)
13. *S. mackenziana* Barr.
14. *S. pyrifolia* And. (*S. rotundifolia ovata* Nutt.)?
15. *S. "* *obscura* And. (*S. rotundifolia* Nutt.)? not. Trautv.
16. *S. pseudomyrsinites* And. (*S. curtiflora* And.)
17. *S. monticola* Bebb. (*S. padifolia* Rydb.) (*S. padophylla* Rydb.)
18. *S. barclayi* And. (*S. conjuncta* Bebb.)
19. *S. commutata* Bebb.
20. *S. wolfii* Bebb.
21. *S. "* *idahoensis* Ball
22. *S. tweedyi* (Bebb.) Ball (*S. barrattiana* Tweedyi Bebb.)
23. *S. dodgiana* Rydb.
24. *S. glaucops* (*S. pseudolapponum* v. Seem., *S. wyomingensis* Rydb.)
25. *S. "* *glabrescens* And.
26. *S. brachycarpa* Nutt. (*S. desertorum* auth. not Rich., *S. stricta* (And.) Rydb.)
27. *S. candida* Fluegge
28. *S. petrophila* Rydb. (*S. arctica* petraea)
29. *S. tenera* And.
30. *S. subcoerulea* Piper (*S. pellita* auth. non And., *S. covillei* Eastwood, *S. pachnaphora* Rydb.)
31. *S. bella* Piper. [*S. drummondiana* Barr (?) ]
32. *S. chlorophylla* And.
33. *S. Nelsoni* Ball
34. *S. discolor* Muhl.
35. *S. scouleriana* Barr. (*S. nuttallii* Sarg.) etc
36. *S. bebbiana* Sarg. (*S. rostrata* Rich. not...., *S. perrostrata* Rydb.)
37. *S. geyeriana* And. (*S. macrocarpa* Nutt.)
38. *S. vestita* Ph. (*S. fernaldii* (Blanch.))
39. *S. saximontana* Rydb. (*S. reticulata* auth. non L., *S. aemulans* v. Seem.)
40. *S. nivalis* Hook.

# Rocky Mountain Willows.

## KEY TO SECTIONS

### I. Capsule glabrous:

#### 1. Scales pale yellow, deciduous

A. Stamens 3-5, filaments hairy below; leaves lanceolate, finely serrulate; trees.

a. Petioles and leaf bases not glandular. I. Amygdalinae

b. Petioles and leaf bases glandular. II. Pentandrae.

B. Stamens 2, filaments hairy below; leaves linear or narrowly elliptical, remotely denticulate; shrubs.

III. Longifoliae

#### 2. Scales not pale yellow, mostly brownish to black, persistent.

A. Styles none; minute prostrate plant.

IV. Retusae

B. Styles distinct; erect or ascending shrubs.

a. Styles 0.5-0.7 mm. long; anthers pedunculate; leaves

and capsules glabrous. V. Commutatae

b. Styles 1-2.5 mm. long (sometimes shorter in No. 1), leaves more or less tomentose, at least above; capsules glabrous to tomentose.

\* Styles 1-1.5 mm. long; anthers pedunculate (if sessile, the leaves not glandular) VI. Commutatae

\*\* Styles 1.5-2.5 mm. long; anthers stout, sessile; leaves glandular. VII. Lanatae

### II. Capsules hairy:

1. Scales yellow, deciduous; filaments hairy below; styles none (in our species)

III. Longifoliae

2. Scales not yellow, mostly brown or black, at least at the tip, persistent.

A. Styles elongated, 0.5-2 mm. (over 1 mm. long, except in one species of Commutatae)

a. Leaves usually gray-tomentose on both sides, sometimes on the upper surface only; anthers mostly on long leafy peduncles; capsules gray- or white-tomentose.

- \* Capsules thinly villous-tomentose; stigmas entire, short. (two species of) VI. Commutatae

- \*\* Capsule densely white-tomentose; stigmas entire or usually divided, much elongated, about 1 mm. long. VIII. Arcticae

- b. Leaves glabrous on both surfaces or densely silvery-pubescent on the lower surface only; aments dense, sessile or on short, leafy peduncles; capsules silvery-pubescent.

- \* Leaves densely clothed with a fine satiny pubescence below, glabrate above; aments on short leafy peduncles. IX. Argenteae

- \*\* Leaves glabrous on both surfaces, bright green; aments closely sessile. X. Phyllifoliae

B. Style obsolete, or only .2-.3 mm. long.

- a. Tall erect shrubs; capsule conic-rostrate

- \* Aments stout, dense, sessile or subsessile, scales dark, long-villous; pedicel short or none; stigmas long, slender. XI. Capreae

- \*\* Aments slender and lax, the staminate small, on short leafy peduncles; scales pale, thinly villous; pedicel elongated; stigmas short.

XII. Rostratae

- b. Low depressed or creeping shrubs; capsules short, ovate-conic, subsessile

Aments small, few-flowered, short peduncled; leaves obovate, reticulate on both sides.

XIII. Reticulatae

## I. AMYGDALINAE

Trees, 3-15 meters high; bark brown; twigs long and slender, often drooping, usually gray; leaves linear-lanceolate to broadly lanceolate, acuminate, closely and finely serrulate, glabrous; stipules small and deciduous or none; aments coetaneous, slender, cylindrical, terminal on lateral leafy twigs; scales deciduous, light-yellow, lanceolate or broader, mostly glabrous outside, crisp-villous within; stamens 3-7, filaments hairy below; capsule small, glabrous, pedicellate; styles 0.3-0.5 mm. long; stigmas short.

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Leaves linear-lanceolate, deep green beneath.

1. S. nigra

Leaves lanceolate or broader, glaucous beneath.

2. S. amygdaloides

1. S. nigra Marsh. Black Willow.--Dark green in color; twigs gray or brownish; leaves linear-lanceolate, long-acuminate, often falcate, deep green on both sides, 6-11 cm. long, 7-12 mm. wide (often oblanceolate while unfolding); petioles short, 3-6 mm. long; staminate aments yellow, 2-5 cm. long; pistillate aments 2-6 cm. long in fruit; capsules ovate or ovate-lanceolate, 3-4 mm. long;

pedicels 1-1.5 mm. long.—River banks, common. Plains of eastern Colo. to N. Mex. and Calif. (*S. wrightii* Anderss. — ~~was~~ founded on a monstrous form with compact and distorted aments),

2. *S. amygdaloides* Anderss. Peach-leaved Willow.—Yellowish green in color; twigs gray or the youngest yellow; leaves lanceolate to ovate-lanceolate (frequently obovate or broadly oblanceolate and obtuse when unfolding), ~~acute~~ <sup>gradually</sup> ~~nate~~ or abruptly-acuminate, green above, glaucous beneath, 5-12 cm. long, 1.5-3 cm. wide; petioles slender, 5-15 or 30 mm. long; staminate aments yellow, 3-5 cm. long; pistillate aments lax in fruit, 4-6 cm. long; capsules lanceolate, 4-5 mm. long; pedicels filiform, 2 mm. long.—Common on banks of streams and wet ground throughout, to an altitude of 2000 m. A form with very narrow leaves, scarcely 1 cm. wide, is found on the high plains east of the Rockies.

## II PENTANDRAE

Tall shrubs or small trees (within our range) with sparingly caespitose stems, 3-6 m. high, and reddish-brown bark; twigs and obtuse buds stouter than in *Amygdalinae*, olive to reddish-brown, lustrous; leaves large, lanceolate or elliptical, acute to long-acuminate, closely glandular-

serrate, especially near the base, glabrous; petioles stout, glandular near distal end or naked; stipules small or none; aments coetanous, stout, dense, oblong, on short lateral leafy twigs, 1-2 cm. wide; scales pale yellow, deciduous, lanceolate to obovate, thinly pilose at the base; capsules rather large, 5-9 mm. long, glabrous; pedicels 1-2 mm. long; styles about 0.5 mm. long; stigmas short, notched or bifid.

Fruiting in early summer; capsules thin-walled, 5-7 mm. long.

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Leaves short-acuminate, glaucous beneath.

3. S. lasiandra

Leaves long-acuminate, scarcely paler beneath.

4. S. fendleriana

Fruiting in late summer; capsules thick-walled, 7-9 mm. long.

5. S. serissima

3. S. lasiandra Benth. Willow.--A small tree within our limits; twigs rather stout, deep red, lustrous; leaves lanceolate to broadly lanceolate or sometimes oblanceolate, acuminate at the apex, acute to rounded at the base, dark green and shining above, glaucous beneath, 6-10 cm. long; 1.5-3.5 cm. wide; stipules small, acute, glandular; aments

on peduncles 1-6 cm. (usually 2-3) cm. long; staminate  
aments 2-6 cm. long, 1-1.3 cm. wide; pistillate aments 3-10  
cm. long, 1.2-2 cm. wide; scales lanceolate to ovate, some-  
times glandular at the apex; capsule pale straw-color or  
light brown, lanceolate, 5-7 mm. long; pedicel 1.5-2 mm.  
long, 4-6 times as long as the gland.---Rare in our limits.  
Sante Fe, N. Mex. to Calif., and northward.

4. *S. fendleriana* Anders. Fendler's Willow.---Twigs  
long, but not slender, shining, reddish or reddish yellow;  
leaves narrowly lanceolate to lanceolate, long-acuminate,  
dark green on both sides or somewhat paler but never glau-  
cous beneath, 6-12 cm. long, 1.2-3 cm. wide; stipules usual-  
ly none, if present, small, semi-cordate to reniform;  
staminate aments 2-4 cm. long, 1-1.2 cm. wide, pistillate  
2-5.5 cm. long, 1.5 cm. wide; scales lanceolate to oblance-  
olate; capsule pale straw color or brownish, 5-7 mm. long;  
pedicels 1-1.5 mm. long; styles 0.5-0.7 mm. long. Mountain  
streams and wet places, common. New Mex. to Canada and west  
to the coast, from 1500 to 3000 m. altitude. *(S. caudata (Nutt.) Heller)*

5. *S. serissima* (Bail.) Fern. Autumn Willow.---A  
shrub or small tree, sometimes 4 meters in height; twigs  
lustrous, bright red or brownish; leaves elliptic-lanceolate,  
acute at both ends or short-acuminate at the apex, closely  
glandular-serrulate, dark green and shining above with the

*(S. lasiocarpa caudata (Nutt.) Seward)*  
*(S. caudata (Nutt.) Heller)*

midrib whitish, pale or subglaucous beneath, coriaceous, 4-8 cm. long, 1-2.5 cm. wide; petioles more slender than in the related species; aments very short and stout; the staminate 1-2 cm. long, 1-1.2 cm. thick, scales broad, obtuse; pistillate ament 1.5-3 cm. long, 2-3.3 cm. wide, usually loosely flowered; capsules lustrous, long-conic, thick walled, olive brown to deep brown in color, 7-9 mm. long; pedicels thick, 1-1.5 mm. long, 2-3 times as long as the gland.—Wet ground, Mont. to Alb., eastward to N. Jersey and New England. Found within our limits only at Choteau, Mont.

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III LONGIFOLIAE

Shrubs 2-5 meters high with densely caespitose stems and gray or light-brown bark; twigs slender, brown or reddish, often lustrous; leaves linear to linear-lanceolate or narrowly elliptical, remotely denticulate or entire; petioles very short; stipules none; aments serotinous, terminating lateral leafy branches, the staminate often, and the pistillate occasionally in pairs or threes; scales light yellow, deciduous; stamens 2, filaments hairy below; capsules glabrous to thinly villous, 4-7 mm. long; styles none; stigmas short (in our species), divided.

~~Leaves linear; pistillate aments 1-2 cm. wide.~~

~~Leaves canescent; capsules 4-5 mm. long.~~

Leaves linear, acuminate; pistillate aments 1-2 cm. wide  
Leaves canescent, entire or remotely denticulate,  
capsules mostly 5 mm. long; pedicels 0.5-0.7 mm.  
long.

6. S. exigua

Leaves bright green, denticulate; capsules  
mostly 6-7 mm. long; pedicels 0.5-1.5 mm. long.

7. S. fluviatilis

Leaves elliptical-oblongate, rather closely denticulate; pistillate aments 7-8 mm. wide.

8. S. melanopsis

S. exigua Nutt.

Color affect grayish; leaves linear, acute at both ends or acuminate at the apex; 5-12 cm. long, 2-10 mm. wide, entire or remotely denticulate, opaque, more or less canescent on both surfaces or silky with a fine silvery tomentum beneath, or on both surfaces of young shoots (then frequently mistaken for S. argophylla); petioles 2-7 mm. long; peduncles sometimes 7 cm. long; staminate aments 2-4 cm. long, about 7 mm. wide; the pistillate 3-6 cm. long, 1-1.3 cm. wide; scales lanceolate in the pistillate aments, broader in the staminate, mostly acute nearly glabrous or white pilose on the margins, occasionally on the back also; capsules narrowly lanceolate, 4-6 (mostly 5) cm. long, sessile or on pedicels 0.5-0.7 mm. long, especially at the base of the ament, glabrous

or thinly villous; gland about 0.5 mm. long; stigmas divided.--  
Very common along mountain streams and in wet places throughout  
and westward. Variable in foliage characters and sometimes  
very difficult to distinguish from the next. (S. stenophylla  
Rydb. is an inconstant form. S. lutescens Rydb.).

7. S. fluviatilis Nutt. Sandbar Willow. Color  
effect bright green or slightly grayish; leaves linear or  
linear lanceolate, acute or acuminate at the apex, acute at  
the base, 5-12 cm. long, 2-15 mm. wide, remotely denticulate  
to spinulose-denticulate; pure green and veiny on both sides,  
glabrous when mature, often thinly villous with long white  
hairs when young; petioles 1-3 mm. long; bracts and scales  
as in the preceding but the pistillate 1.2-2 cm. wide (some-  
times 10 cm. long in low humid regions); scales more nearly  
glabrous; capsules 5-8 (mostly 7) mm. long, longer east of  
our limits, glabrous, or silky with long white hairs, espe-  
cially when young, pedicellate; pedicels 0.5-1.5 mm. long;  
gland often 1 mm. long. (S. interior Rowlee, S. linearifolia  
Rydb.). Most common in eastern Colo. and Wyo., and in Mont.  
and Idaho but not abundant anywhere in our limits. Exceeding-  
ly abundant eastward across the continent.

8. S. melanopsis Nutt. Dusky Willow. ↗

— A tall, dark green shrub or small tree, 3-5 meters  
high, more divaricately branched than the related species;

twigs brown or blackish, often lustrous; leaves oblanceolate or elliptical, acute at both ends, 4-7 or 8 cm. <sup>long</sup>~~wide~~, 6-15 mm. wide, rather closely denticulate, often spinulose-denticulate, especially near the apex, or subentire, the margin somewhat revolute in drying, dark green and glabrous above, paler, strongly veined, and usually thinly silky-villous beneath; stipules lanceolate to semi-cordate, dentate; anthers slender, 3-4 cm. long, the staminate 5-6 mm. wide, the pistillate 7-8 mm. wide; scales oblong to obovate, sometimes erose at the apex, thinly pilose, the pistillate often plainly striate with 3-5 nerves; capsules ovate-lanceolate, glabrous, sessile or subsessile, 4-5 mm. long. Type locality, old Ft. Hall near Pocatello, Idaho. Common in N. E. Oreg., E. Wash., and B.C. as far east as the Selkirks.

IV RETUSAE

Low, depressed or creeping species, less than 1 dm. in height; leaves minute, entire, glabrous; aments 2-4-flowered; capsules glabrous; stigmas sessile. A single species within our limits.

9 S. dodgeana Rydb.

Delicate, suffruticose, 3 cm. high or less, from short, slender, subterranean stems; twigs yellowish-green, very leafy; leaves oblong or oval, 4-5 mm. long, acutish or obtuse, light green, strongly veined; pistillate aments generally 2-flowered; scales oblong, truncate, sparingly villous-ciliate; capsule oblong-ovoid, glabrous; stigmas sessile, 2-cleft; staminate ament generally 3-4-flowered; stamens 2; filaments glabrous.—Covering acres of ground on Electric Peak, Yellowstone Nat. Park, at 3200 m. alt.; also on Sheep Mt., Teton Forest Reserve.

V. Cordatae. Shrubs, 2-5 m. high; stems densely  
cespitose; twigs brown to yellow, mostly slender, lustrous;  
leaves linear-lanceolate to ovate or broadly oblanceolate,  
acute to long acuminate, stipulate, glabrous; buds and  
slender petioles yellowish; aments precocious or coetane-  
ous, rather slender, subsessile or on short, bracted  
peduncles; scales tawny to fuscous; capsules glabrous,  
pedicellate; styles distinct.

Leaves glaucous or at least distinctly pale beneath.

Leaves linear-lanceolate; young branches with a bluish  
bloom; capsules subsessile.

10. S. irrorata

Leaves lanceolate or broader; branches without a bloom;  
capsules distinctly pedicellate.

Pedicels 1-2.3 mm. long

Leaves lanceolate, dark green above, mostly  
sharply serrate.

11. S. cordata

Leaves broadly lanceolate or ovate-lanceolate,  
yellowish green, crenate-serrulate or subentire

12. S. lutea

Pedicels 3-4 mm. long; leaves oblanceolate or obovate.

13. S. mackenziana

Leaves deep rich green on both surfaces, never pale beneath

Leaves ovate or obovate, thin; pedicels 2.5-4 mm. long.

14. S. pyrifolia

Leaves elliptic-lanceolate or oblong, thick; pedicels 1-3  
mm. long.

15. S. pseudomyrsinites

10. *S. irrorata* Anderss. Shrub 2-3 m. high; twigs dark brown to yellowish, glabrous or downy puberulent, often covered with a bluish glaucous bloom, not shining; buds stout, broadly ovate, brown to yellow; leaves linear-lanceolate or linear-oblong-lanceolate, acute to acuminate at both ends, 6-10 cm. long, 0.7-1.7 cm. wide, entire or undulate-serrulate, glabrous, dark green and veiny above, with the whitish midrib prominent; glaucous and finely reticulate beneath; stipules none; aments precocious, sessile, without bracts; the staminate 1-2 cm. long; the pistillate 2-4.5 cm. long, 7-10 mm. wide, densely-flowered; capsules ovate-conic, 3-4 mm. long, subsessile, glabrous; pedicels 0.5-1 mm. long; styles 0.5-0.7 mm. long; stigmas short, entire or emarginate; scales small, fuscous, obtuse, clothed with long white woolly hairs. Fairly common along streams and in wet places in the mountains, at 1200-2500 meters elevation. S.W. Tex. to So. Ariz., northward to No. Colo. Shoots with large leaves resemble *S. lasiolenis* very strongly.

11. *S. cordata* Muhl. A shrub, 2-5 m. high; twigs long, stoutish, brown or often yellowish, glabrous to pubescent; leaves lanceolate or oblong-lanceolate or

somewhat oblanceolate, acute to long-acuminate, usually narrowed at the base, 6-10 cm. long, -3 cm. wide, shallowly to deeply serrate, dark green above, glaucous and reticulate beneath; stipules large, ovate to reniform, serrate; aments on short, bracted peduncles; staminate 2-3 cm. long, 7-9 mm. wide; pistillate 2-3.5 cm. long, 1-1.3 cm. wide, scales tawny, or fuscous at the tip; thinly pilose; capsules 5-7 mm. long; styles 0.3-0.5 mm. long; pedicels 1-2 (mostly 1.5) mm. long. Sparingly distributed throughout the Rockies and westward, up to 2000 meters.

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Var. *angustata* (Ph.) Anderas. Leaves narrower, about 1 cm. wide, acute or acuminate at both ends. Wet places on the high plains and in the foot hills east of the Rockies.

Var. *watsoni* Bebb. Twigs often yellow, shorter and more divaricate; leaves smaller and more slender, subentire, mostly dark green above, pale or subglaucous beneath; pedicels 1.5-2 mm. long. (*S. flava* Rydb., *S. watsoni* (Bebb.) Rydb.). Rockies westward to the coast. Intermediate in some respects between *S. cordata* and *S. lutea*.

12. *S. lutea* Nutt. Shrub, 2-5 m. high; twigs mostly yellow, reddish-brown on the sunny side, glabrous to puberulent; leaves lanceolate to ovate-lanceolate, acute to short acuminate at the apex, rounded to cordate at the base, 4-8 or 10 cm. long, 1.5-4 cm. wide, entire to serrulate, mostly yellowish green, glaucous beneath; stipules ovate to lunate, entire or serrulate; anthers nearly sessile, on very short-bracted peduncles; staminate 2-3 cm. long; pistillate 3-4 cm. long, 1 cm. wide; scales oblanceolate, acute to obtuse, tawny, thinly pilose; capsules ovate-conic, 4 mm. long; pedicels 0.7-2 mm. long; styles less than 0.5 mm. long.

Common plants of stream banks and wet places, ~~W.~~ Colo. to Calif., northward to Canada. Distinguished only with difficulty from *S. cordata* and may perhaps prove to be only of that species.

↑ a variety

13. *S. mackenziana* Barr. Shrub 2-4 m. high; twigs usually divaricate, lustrous; leaves oblanceolate or narrowly obovate, sometimes lanceolate, mostly acuminate at the apex, cuneate to rounded at the base, 3-6 or 7 cm. long, 1-1.8 cm. wide, entire or serrulate, light green above, glaucous beneath, reticulate on both sides; stipules lunate, entire to serrate-dentate; anthers coo-  
taneous, on leafy peduncles 0.5-1 cm. long; pistillate

aments 2-6 cm. long, 1.5 cm. wide, rather lax in fruit; staminate aments 2-4.5 cm. long; filaments free or united only at the base; scales mostly oblanceolate, tawny or fuscous, thinly pilose; capsules ovate-conic, 4-5 mm. long, greenish; pedicels 3-4 mm. long, about three times as long as the scales; styles 0.3-0.4 mm. long; stigmas entire or sometimes emarginate. Very closely related to S. cordata and S. lutea. Fairly common along streams and in wet places. N.W. Wyo. to Sask., west to Nev., Calif., and B.C.

14. *S. pyrifolia* And. Shrub, 1-3 m. high;

trigs slender, glabrous, bright chestnut to brown, lustrous; leaves ovate-lanceolate, ovate, or obovate-oval, abruptly cuspidate to short-acuminate at the apex, rounded or cordate at the base, 3.5-7 cm. long, 1.5-3.5 cm. wide, shallowly glandular-serrulate, thin, translucent, pure dark green and reticulate with slender veins on both sides; stipules lunate or broadly ovate, glandular-serrate to dentate; peduncles short, leafy; aments coctaneous, long, lax; the staminate slender, flexuous, 4-6 cm. long, 8-10 mm. wide; filaments united for 1/3 to 3/4 their length; pistillate aments 3-6 cm. long, 1.2-1.8 mm. wide; capsules 3-4.5 mm. long; pedicels 2.5-4 mm. long, about three times as long as the scales;

styles 0.3-0.7 mm. long, stigmas usually deeply divided;  
 (S. rotundifolia ovata Nutt.) Fairly common, Mountains  
 of Ida., Oreg., Wash., and B.C. <sup>#</sup> Var. obscura And.  
 Leaves obovate-oval to subrotund, abruptly cuspidate to  
 rounded at the apex; pedicels 2-3 cm. long; stipules  
 more ovate. Presenting a transition to S. pseudomyr-  
sinites.

15. S. pseudomyrsinites Anderss. -- Shrub 1-3 m.  
 high; twigs slender, mostly short, divaricate, leafy,  
 bright chestnut to dark brown, lustrous; leaves ellip-  
 tic-oblong to lanceolate-oblong, acute to acumi-  
 nate at the apex, mostly rounded at the base, 3-6 cm.  
 long, 1-2 cm. wide, shallowly glandular-serrulate or  
 subentire, dark green above, pure green, scarcely  
 paler and coarsely reticulate with broad veins beneath, <sup>petioles</sup>  
 3-8 mm. long, glabrous or thinly villous; stipules  
 lanceolate to ovate, acute or acuminate, glandular-  
 serrate, 4-8 mm. long; peduncles 0.5-1 cm. long, leafy;  
 anthers coetaneous (?), small, 2-3 cm. long in both  
 sexes; scales oblong, or oblanceolate, acutish to  
 truncate, thinly clothed with long white woolly hairs;  
 capsules greenish, 4-5 mm. long; pedicels 1-1.5 mm. long;  
 stigmas thick, entire. At middle to high elevations,  
 infrequent. N. Mex. to Sask., west to E. Oreg. & E. Wash.

Var. equalis Anderss. Leaves smaller, entire, less strongly  
 reticulate; capsules sub-rostrate, 5-7 mm. long, green or rufescent.  
 Young leafy shoots strongly resemble those of S. wolfii but differ  
 in being glabrous and less oblanceolate. S.E. Wyo. to the Uinta  
 Mts., Utah and north to the Yellowstone National Park.

S. rotundifolia Nutt., not Hart.  
 styles 0.5-0.7 mm. long

VI. *Commutatae*. Shrubs 1-4 m. high; stems densely caespitose; twigs dark brown, lustrous; leaves oblanceolate to obovate-oval or elliptic-oval, entire or shallowly serrulate, densely to thinly villous-tomentose, at least above, stipulate; aments on leafy peduncles (sessile in No. 16), precocious or coetaneous; scales fuscous, broad, obtuse, villous; capsules ovate or rostrate, glabrous or tomentose; pedicels 0.5-1.5 mm. long; styles 1-1.5 mm. long (except in No. 18).

Leaves glabrate above, glabrous and glaucous beneath, crenate or serrulate

Aments sessile

16. *S. monticola*

Aments leafy-pedunculate

17. *S. barclayi*

Leaves densely ~~villous~~ villous tomentose to glabrate on both sides, dull green beneath

Capsule glabrous

18. *S. wolfii*

Capsule thinly tomentose

18a. *S. wolfii* idaho-  
ensis.

16. *S. monticola* Bebb. Shrub, 3-6 m. high; twigs rather stout and divaricate, usually glabrous, deep reddish-brown; lustrous; leaves at first oblanceolate, obovate or oval, finally more elliptical or oblong-elliptical, acute or abruptly short-acuminate at the apex, usually narrowed and rounded at the base or

sometime subcordate, 5-7 or more cm. long, 2-4 cm. wide, crenate-serrulate, dark green above, subglaucous to glaucous beneath, glabrous or thinly puberulent or pubescent above, especially on the pale yellow midrib and the primary veins, strongly reticulate beneath; stipules large, ovate or semi-cordate, acute, serrate; buds large; anthers sessile, stout, naked or the pistillate with a few broad bracts at the base; 2-3 cm. long, the pistillate becoming 3-5 cm. long in fruit; scales dark, obovate-oval, obtuse, densely villous with long white hairs; capsule glabrous, sessile or subsessile, trigonate, rufescent, 5-7 mm. long; styles 1-1.5 mm.

long. (*S. paucifolia* Rydb., not Anders.; *S. radiophylla* Rydb.). Common at high elevations, 2400-3500 meters.

N. Mex. to Mont. and Alb.

17. *S. barclayi* Anderss. Shrub 1-4 m. high; twigs short, stout, divaricate, blackish, tomentose to glabrate; leaves ovate-lanceolate to oval ~~ovate~~<sup>or</sup> obovate, acute or cuspidate at the apex, cuneate to rounded, cordate on vigorous shoots, 3-7 cm. long, 1.5-2.5 or more cm. wide, crenate-serrulate, the glandular teeth inflexed, or subentire, thinly tomentose above, especially on the midrib and veins, becoming glabrate,

glabrous, reticulate and mostly glaucous beneath; stipules large, ovate- acuminate, serrate; aments stout, on leafy peduncles 1-3 cm. long; staminate aments 1-3, and the pistillate 2-3 cm. long, 1.5 cm. wide; scales fuscous, mostly acute, thinly to densely villous with long hairs; capsules glabrous, or sometimes thinly sericeous, greenish, rostrate, 5-7 mm. long; pedicels 0.5-1 mm. long; styles 1-1.5 mm. long (*S. conjuncta* Bobb.). High elevations, mtns. of Colo. and S.E. Wyo. to Oreg., Wash. and Alaska,

17. *S. wolfii* Bobb. Low shrub, 6-10 dm. high; twigs chestnut, leafy, the younger yellowish, lustrous; leaves oblanceolate, or rhomboid-oblanceolate, or elliptical, acute at the apex, rounded at the base, 3-4.5 cm. long, 8-13 mm. wide, entire, dull green and silky-villous with shining hairs on both sides, becoming somewhat glabrate; petioles yellow, villous; stipules small or wanting; peduncles short, bearing several leaf-like bracts which often exceed the ament; pistillate aments 1-2.5 cm. long, subglobose to oblong, densely flowered; staminate aments 0.5-1.5 cm. long; scales dark, obovate, sparsely long-villous; capsules glabrous, greenish or rufescent, 3.5-4.5 mm. long; pedicels about 0.5 mm. long; styles variable, 0.5-1 mm. long (*S. desertorum wolfii* Bobb.). At middle to high elevations, So. Colo. to Wyo. and Idaho.

Var. *idaheensis* Ball. Leaves larger, 3-6 cm. long, 1-1.8 cm. wide, oblanceolate; aments longer, 1-3.5 cm. in length; peduncles proportionate; capsules about 5 mm. long, greenish, thinly tomentose. This includes most of the material called "*S. glauca villosa*" in herbaria. Big Horn Mts. of N. Wyo. to E. Oreg. and No. Ida. Abundant in the region of the Yellowstone Nat. Park.

## VI LANATAE

Mostly shrubs, 1-4 m. high; twigs stout, divaricate, tomentose; leaves large, broadly elliptical to obovate-oval or suborbicular, more or less tomentose; aments very large, stout and dense, sessile or short-peduncled, 3-8 cm. long, lateral or <sup>terminal</sup>; capsules large, sessile or subsessile, glabrous (in our species) tomentose; styles much elongated. Only one species certainly within our limits.

19. *S. tweedyi* (Bebb) Ball. *Tweedy's Willow.*

Low (?) shrub. <sup>twigs</sup> ~~with stout, divaricate twigs~~ the youngest <sup>twigs</sup> more or less tomentose with long hairs; leaves broadly elliptical to oval or ovate, acute or obtuse at both ends to rounded or cordate at the base, 5-7 cm. long, 2-4 cm. wide, green above, paler but not glaucous beneath, glabrous throughout or sparsely gray tomentose above, finely glandular-denticulate or mature leaves irregularly spinulose-denticulate; petioles tomentose, 8-15 mm. long; stipules large, clasping, broadly reniform, glandular-denticulate; aments precocious, the pistillate sessile, ~~stout, dense~~, 4-6 cm. long, 1.5 or more wide; scale obovate, black, clothed with long white hairs; capsule large, green, glabrous or finely

pubescent at the apex, 7-8 mm. long; pedicel 1 mm. long; styles 1.5-2.5 mm. long; stigmas divided; gland 1 mm. long. (S. barrattiana tweedyi Bebb.) In bogs and along mountain streams, 2500-3000 m. alt.--not common. Known only from the Big Horn Mts. of No. Wyo., the Yellowstone Park and Teton Basin.

VIII ARCTICAE

Low, erect or creeping alpine shrubs, 1-10 or 15 dm. high; branches full of leaf-scars; leaves small to medium, narrowly elliptic or oblanceolate, occasionally broader, entire, more or less tomentose; stipules small or none; aments appearing with the leaves, on short, leafy peduncles; scales brown or brown-tipped, villous; capsules sessile or short-pedicelled, gray-or white-tomentose; styles 1-1.5 mm. long; stigmas medium, notched.

Erect or spreading subalpine shrubs 2-15 dm. high.

Capsules and leaves gray- or yellowish-tomentose or leaves glabrate.

Aments much longer than broad; leaves gray-tomentose, drying black. 20 S. glaucons

Aments subglobose, leaves yellowish-tomentose beneath, not drying black. 21 S. brachycarpa

Capsules and lower leaf-surfaces densely white-tomentose 22 S. candida

Depressed, creeping alpine plants, less than 1 dm. high  
Leaves broadly elliptical to obovate, pale beneath, 2-4 cm. long 23 S. petrophila

Leaves narrowly elliptical or obovate, scarcely 10-12 mm. long 24 S. tenera

20. *S. glaucops* Anderss.

Subalpine shrub, 4-15 dm. high; branches and twigs short and stout, shining, chestnut brown or darker, the bark separating from the older branchlets in thin gray papery flakes; leaves elliptic-lanceolate, or oblanceolate to oblong-ovate, entire, obtuse or subacute at the apex, obtusish to subcordate at the base, 3-5 or 6 cm. long, 1-1.7 or 2 cm. wide; gray-tomentose or glabrate on both sides; dark green above, glaucous and reticulate beneath; petioles yellowish, 5-10 mm. long; stipules minute, ovate or semicordate; peduncles 2-3 cm. long, tomentose; staminate aments 1-3 cm. long, 1-1.5 cm. wide, pistillate 3-5 cm. long and 1.5 cm. wide; scales oblong, dark to pale brown, villous; capsules conic, gray-tomentose, 6-7 or 8 mm. long; pedicels stout, pubescent, 1-1.5 mm. long; styles fuscous or yellowish 0.7-1 mm. long. (*S. pseudolapponicus* v. Seem., based on an immature specimen; *S. wyomingensis* Rydb.). Common in boggy places at middle to high elevations. N. M. to Canada and westward. ---Var. *glabrescens* Anderss. Leaves more rigid, glabrate, intensely glaucous beneath; aments stouter, capsules sometimes glabrescent. Range of the species but less common.

21 *S. brachycarpa* Nutt.

A small alpine shrub, scarcely more than 1 m. in height; branches stoutish and divaricate within our limits, longer and more slender northward, reddish brown to yellowish or gray; twigs tomentose; leaves elliptical-oblong or oblanceolate to narrowly obovate, obtusish to abruptly acute at the apex, acute to semicordate at the base, entire, light green and somewhat tomentose above, pale yellowish green and densely yellowish-tomentose to glabrate beneath, not glaucous, 2-3.5 cm. long, 6-12 mm. wide; petioles 3-5 mm. long; stipules none; aments

numerous, often crowded, subglobose to oblong, 0.5-2 cm. long, mostly about 1 cm. long; capsules ovate-lanceolate,

subsessile, 5-7 mm. long, densely gray or white-tomentose; styles 1-1.5 mm. long, stigmas medium. *(S. desertorum, authors, not Rich.)*  
*S. stricta* (And.) Rydb.

Wet places in the mountains above 2000 meters, fairly common. Colo. and northward to the plains of Canada.

22 *S. candida* Fluegge. Sage-leaved or Hoary Willow.--A low, branching shrub, 2-10 dm. or more; branches stout, divaricate, glabrous, light brown or yellowish; twigs densely white-tomentose; leaves linear-oblong to narrowly oblanceolate or occasionally much broader, usually acute at both ends, margins revolute, entire, or rarely crenulate and glandular, dark green, dull and thinly tomentose above, with deeply sunken veins, resembling sage leaves, densely white-tomentose beneath, 3.5-8 or 10 cm. long, 0.7-2 cm.

wide, petioles short, tomentose; stipules very narrow, acute, glandular, tomentose; aments on short leafy tomentose peduncles, the pistillate 1-3 cm. long, 1-1.3 cm. wide; capsule lanceolate, short-pedicelled, white tomentose, 6-8 mm. long; scales obovate, white-woolly; styles reddish or orange, 1-1.5 mm. long; stigmas short, divaricate notched.--Infrequent, in cold bogs, east of the Divide, from Southern Wyo. to Alb., Sask. and eastward.

23. *S. petrophila* Rydb. ~~Rock Willow~~.--Stems horizontal, creeping; branches erect, glabrous, brown or yellowish, 5-10 cm. in height; leaves broadly elliptical to obovate, abruptly acute to obtuse, entire, deep green above, distinctly pale to subglaucous beneath, rather strongly veined; 1.5-4 m. long, 1-1.5 cm. wide, glabrate or glabrous; petioles slender, yellow; staminate aments 1-2, the pistillate 3-4 cm. long, slender, lax at base; capsules lanceolate, sessile, gray-tomentose, 4-6 mm. long; styles 1-1.5 mm. long. (*S. arctica petraea* Anderss.).

*Among rocks, alpine summits, above 5500 m. Colo., Utah, and northward.*

- 24 *S. tenera* Anderss. *Slender Rock Willow*.

[Scarcely 5 cm. in height from horizontal creeping stems; leaves narrowly elliptical to obovate, acute at both ends or sometimes obtuse at the apex, deep green and shining on both sides or slightly paler beneath,

very strongly nerved, 0.8-1.2 mm. long, 4-8 mm. wide; petioles 2-5 mm. long; aments subglobose, few-flowered, the staminate 5-10 mm. in length, the pistillate 7-20 mm. long; capsules sessile, 4-5 mm. long, gray-tomentose.—Rare, alpine summits from Wyo. to Wash. Perhaps only a variety of the preceding.

IX ARGENTAE

Shrubs, 1-5 or 4 meters tall; twigs rather long, brownish or yellowish, often lustrous and mostly pruinose; leaves narrowly oblong or oblanceolate, acute, entire or subentire, densely silvery-sericeous or silvery-tomentose beneath; aments sessile or very short-pedunculate, 1-4 cm. long; stamens 2; scales brown or black, hairy; capsules small, silvery-sericeous, sessile or short-pedicelled; styles elongated.

Leaves densely clothed beneath with short silvery pubescence, 2-6 or 8 cm. long, exstipulate.

25 S. subcoerulea

Leaves densely clothed beneath with long silvery-white tomentum, 4-8 or 12 cm. long, stipulate.

26 S. bella

25 *S. subcoerulea* Piper

(Erect shrub 1-3 meters high; twigs glabrous, usually covered with a dense bluish bloom; leaves oblong-lanceolate or oblanceolate, acute or acuminate at the apex, acute at the base, 2-5 or 7 cm. long, 0.8-2.5 cm. wide, entire or slightly crenulate, green and sparsely pubescent above, densely covered with a fine short silvery pubescence beneath; petioles 2-7 mm. long; stipules none, or occasionally very small and lanceolate on vigorous shoots; pistillate anthers sessile or short-pedunculate (peduncles sometimes 5 mm. long, with 1 or 2 small bract-like leaves at base), 2-4 cm. long, densely flowered; staminate anthers sessile, stout, 1-2 cm. long; stamens 2; scales brown or black, oblong, ovate or obovate, acute or obtuse, thinly pilose; capsules ovate or ovate-lanceolate, subsessile or short-pedicelled, 3-5 mm. long, silvery sericeous; pedicels never more than 1 mm. long; styles 1-1.5 mm. long, brown or yellowish. (*S. pellita* of authors, not Anders., *S. covillei* Eastwood, *S. pachnophora* Rydb.)

Mountain streams and wet meadows from N. M. and Calif. north to Mont. and Oregon. The pruinose branches and oblanceolate, acuminate leaves suggest *S. geyeriana* Anders., very strikingly.

26 *S. bella* Piper.

(Erect shrub, 2-4 meters high; bark gray; twigs glabrous or puberulent, sometimes with a slight bluish bloom;

leaves lanceolate, oblong or oblong-obovate, mostly acute, 3-7 or 10 cm. long, 1-3 cm. wide, entire or somewhat glandular-crenulate, dark green and sparsely pubescent above, densely velvety with long, silvery-white tomentum beneath; midrib yellow, conspicuous; petioles 5-10 mm. long; stipules rather large, lunate to semi-cordate, obtuse or acute, entire to glandular, 3-10 mm. long; aments sessile, or subsessile with 1 or 2 small, bract-like leaves at the base, stout and dense; staminate 1-3 cm. long, oblong; stamens 2; pistillate aments 3-4 or 5 cm. long, 1.2-1.5 cm. wide; scales black, oblong or obovate, villous with very long hairs; capsules short-pedicelled, ovate-lanceolate, 4-6 mm. long, grayish-pubescent; pedicels 1-2 mm. long; styles 1-1.5 mm. long; stigmas thick. (*S. pellita* Anders. (in part); *S. drummondiana* (?) Barr.) ↗

(Streams and wet meadows, from Pullman and Spokane, E. Wash., across No. Idaho and into B. C. and Alb.)

#### X PHYLICIFOLIAE

Much-branched alpine or subalpine shrubs, 1-3 m. high; twigs short, divaricate, lustrous, brown; leaves small, elliptic-ovate, obovate or oblanceolate, usually entire, bright green and shining above, pale or sub-glaucous beneath, glabrous throughout, or very thinly villous beneath with short silvery hairs; aments sessile, stoutish, densely compact; capsules sessile, gray-pubescent; styles elongated; stigmas thick.

Leaves broadly elliptic-ovate or obovate, mostly obtuse at the apex; styles 1-1.5 mm. long.

27 S. chlorophylla

Leaves oblanceolate, acute at both ends; styles 0.5-1 mm. long.

28 S. nelsoni

27 S. chlorophylla Anderss.

□ Twigs ~~glabrous~~, bright chestnut to deep rich brown; leaves broadly elliptic-ovate or obovate, 2-3.5 cm. long, 0.8-2 cm. wide, obtuse at both ends or <sup>the</sup> acutish at base and abruptly acute at the apex, entire or occasionally somewhat glandular crenulate or serrulate; ~~bright green, glabrous and shining above, pale to somewhat glaucous and glabrous to thinly silky pubescent beneath;~~ petioles 2-5 mm. long, glabrous; stipules none; buds large, chestnut or darker; anthers appearing with the leaves, ~~slenderly sessile, stout, densely compact,~~ 1-3 cm. long, 1-1.3 cm. wide, scales ovate, acute, clothed on both sides with long white hairs; capsules ovate-conic, ~~sessile, gray pubescent,~~ 4-6 mm. long; styles 1-1.5 mm. long, somewhat pubescent at the base; stigmas thick, mostly entire, rather long. -- Fairly common at 2500 to 4000 meters. <sup>From</sup> New Mex., <sup>a</sup> Utah and Calif. northward into Canada.

28 S. Nelsoni Ball. Nelson's Willow. -- A shrub 1-3 meters tall, similar to the preceding; leaves oblanceolate

or rarely narrowly lanceolate, acute or short-acuminate at the apex, cuneate at the base, 2-5.5 cm. long, 0.8-1.5 cm. wide, entire or the apical somewhat glandular-crenulate; rather strongly veined on both surfaces; stipules none; pistillate aments naked or sometimes with 1-3 small bracts at the base, 1.5-5 cm. long; scales black, ovate, acute, clothed on both sides with long, white hairs; capsules 5-6 mm. long; styles 0.5-1 mm., somewhat pubescent at the base; stigmas long, stout, glabrous. Fairly common at high altitudes, 2500-4000 meters, from Cent. Colo. to Alb.

XI CAPREAE

Tall shrubs of wide distribution; 2-4 meters in height; bark gray, twigs dark brown to black; leaves rather large, lanceolate-oblong to obovate, entire to crenulate or crenulate-dentate, more or less pubescent to tomentose, especially beneath, glabrate in age, dark green above, glaucous and strongly reticulate beneath; aments precocious, stout, dense, sessile or subsessile, scales broad, blackish, long-villous; capsule gray-pubescent, long-rostrate, 7-9 mm. long; pedicels 1-2.5 mm. long; styles short or none; stigmas long, divided.

Leaves elliptic-lanceolate to oblong, obtuse or acute at base, acute or shortacuminate at apex.

29 S. discolor

Leaves oblanceolate to obovate, cuneate at base, obtuse or abruptly acute at apex.

30. S. scouleriana

29 S. discolor Muhl.

Shrub with rather stoutish brown to blackish twigs, glabrous or the youngest pubescent; leaves lanceolate-oblong to elliptic-oblong, acute or rounded at the base, short-acuminate at the apex, 4-8 cm. long, 15-25 cm. wide, shallowly crenulate-serrate to dentate, mostly glabrous at maturity, dark green above, glaucous and reticulate beneath; stipules mostly large, semi-cordate, acute, irregularly dentate; aments stout, the staminate sessile, the pistillate very short-pedunculate and rather lax in fruit, 3-5 or 6 cm. long, 1-2 cm. wide; scales brown or darker, oblanceolate to obovate, villous with long white hairs; capsules *lanceolate*-rostrate, 7-9 or 10 mm. long, pubescent; styles 0.5 mm. long, stigmas 0.5-0.8 mm. long, entire or bifid.

Streams and wet places in the Black Hills and in Mont. A common species in the eastern and central states.

30. S. scouleriana Barr.

Shrub, with rather slender twigs, glabrous to densely pubescent; leaves obovate or oblanceolate, obtuse or mostly

abruptly acute at the apex, cuneate at the base, 3-8 cm. long, 1.5-3.5 cm. wide, entire or shallowly crenulate-serrulate, dark green and glabrate above, glaucous, strongly reticulate-veined, and sometimes densely tomentose beneath; stipules minute, entire, or small, finely dentate; staminate aments sessile, 2-3 cm. long, 1.5 cm. wide; pistillate longer, short-peduncled, 3-5 cm. long, 1.2-1.5 cm. wide; scales black, obovate, long-villous; capsules rostrate, 7-9 mm. long, tomentose; pedicels 1-2 mm. long, pubescent; stigmas about 1 mm. long.---Common along mountain streams at elevations of 1500-3000 meters. N. M. to Alb. and west to the coast. (S. flavescens Nutt., S. brachytachys Benth., S. capreoides Anders., S. Nuttallii Sarg.). Forms with short, stout aments may be referred to var. crassijulis Anders., as may also the above-cited species of Benth<sup>am</sup> and Andersson.

## XII ROSTRATAE

Shrubs 2-5 meters high; twigs slender, divaricate, full of leaf-scars, the younger very leafy; leaves linear-oblongate to elliptic-oval, mostly entire, more or less pubescent on both sides; stipules *usually none*; aments coetaneous, the staminate small, subsessile with small leafy bracts at the base, the pistillate on pubescent

leafy peduncles, rather lax in fruit; scales linear oblong, acute, thinly pilose, tawny, reddish at the tips; capsules long-pedicelled, conic-rostrate, 5-10 mm. long, pubescent; styles short or none, stigmas short, divided.

Leaves elliptic oval, pedicels 1.5-2.5 <sup>mm. long;</sup> branches  
without bloom.

31 S. bebbiana

Leaves linear-oblongeolate, pedicels 2-5 mm. long;  
branches with a bloom.

32 S. geyeriana

Digitized by S. bebbiana Sarg. for Botanical Documentation

A tall shrub with few stems, or a small tree, 2-5  
meters high; twigs short, ~~divaricate, slender~~, brown or  
darker, pubescent or glabrate; ~~full of bud scales~~; leaves  
small to medium, narrowly elliptical and acute at both  
ends to broadly oblanceolate or obovate-oval and abruptly  
short-acuminate, 2-4 or 5 m. long, 1-2 or 2.5 cm. wide,  
entire or occasionally glandular-crenulate, dull green  
above, paler or subglaucous and reticulated beneath, more  
or less pubescent on both surfaces or glabrate in age;  
stipules none, or small, dentate; staminate aments sub-  
sessile or on short peduncles, ~~with small leafy bracts at~~  
~~base~~, slender, 1-2 cm. long, 5-7 mm. wide, yellowish;

filaments capillary; pistillate aments (on peduncles 0.5-2 cm. long) 2-4 or 6 cm. long, 1-3 cm. wide, very lax in fruit; scales in both sexes lanceolate-oblong, 1-2 mm. long, acute, capsules 6-9 or 10 mm. long, thinly pubescent; pedicels slender, pubescent, 2-5 mm. long; stigmas deeply divided.

(S. perrostrata Rydb.) Along streams and in wet ground, throughout, ascending to 3000 meters altitude.

32. S. geyeriana Anderss. Shrub 1-3 or 4 m. high, twigs glabrous, very leafy, black with a bluish bloom; leaves small, linear-oblongate or elliptical, acute or short-acuminate at apex, acute at base, 2-4 or 6 cm. long, 5-10 mm. wide, dark green above, more or less glaucous beneath, thinly or densely silky-pilose on both surfaces, margins entire, revolute; stipules none; aments on pubescent leafy peduncles, the leaves often exceeding the ament, 0.5-1 cm. long, the staminate 1 cm. or less, oblong; the pistillate subglobose, numerous, 1 or occasionally 2 cm. long, 1-1.5 cm. wide; scales linear-oblong, acute, thinly pilose, the base tawny, the tip red; capsules 5-7 mm. long, rostrate; pedicels stout, pubescent, 2-2.5 mm. long; styles short or none; stigmas short, divided. (S. macrocarpa Nutt.) A plant of stream banks and wet places, at middle altitudes. Colo. to Mont., west to the coast.

## XIII RETICULATAE

Densely caespitose, low or creeping alpine shrubs, 0.5-3 dm. high, with elliptical-oblong, obovate or suborbicular leaves, strongly reticulate and glaucous beneath; petioles slender, channeled; stipules none; aments on naked peduncles arising opposite the last leaf; capsules small, sessile, tomentose; styles none; stigmas short, divided.

Ascending, 3-9 dm. high; leaves long-villous beneath.

33. S. vestita

Creeping, 0.3-1 dm. high; leaves glabrous beneath.

Leaves 1.5-2.5 cm. long; aments many-flowered.

34. S. saximontana

Leaves 7-13 mm. long; aments few-flowered.

35. S. nivalis

33. S. vestita Pursh. A shrub with rather stout, light brown to yellowish, glabrous, angular twigs; leaves elliptic to oblong-obovate or suborbicular, rounded to retuse at the apex, acute to obtuse at the base, 3-4.5 cm. long, 2-3.5 cm. wide, obscurely crenulate, deep green and glabrous above, clothed beneath with long white silky hairs, especially on the midrib and veins; petioles 3-10 mm. long; buds large, obtuse, light brown; aments on villous peduncles; the staminate linear, 2-3.5 cm. long, 0.5 cm. wide; pistillate aments 2 cm. long, 1 cm. wide; scales oblong-ovate, tomentose; capsules ovate-conic, 4-5 mm. long, ~~sessile~~, ~~tomentose~~. (S. fernaldii Blankinship) Among rocks, not common. E. Oreg. and Mont. to B. C. and Alb.

34. *S. saximontana* Rydb. Densely caespitose and much branched, 3-6 cm. high; leaves elliptic-oblong to sub-orbicular, obtuse or abruptly acute at apex, acutish to rounded at the base, 1.5-3.5 cm. long, 1-1.5 cm. wide, light green above, glabrous throughout, margin entire and revolute; aments 1-2 cm. long, many-flowered; scales broadly obovate, obtuse or rounded at the apex, cuneate at the base, yellowish, nearly glabrous; capsules sessile, 3-4 mm. long, densely white-tomentose. (*S. reticulata* of authors, not L., *S. acutula* v. Seem.) Alpine summits, 3000 m. alt. and upward. So. Colo. to Mont. and west to Calif. and Oreg.

35. *S. nivalis* Hook. Scarcely 2 cm. high, from buried stems; leaves elliptic, oblong-obovate, or suborbicular, acute, obtuse or retuse, 7-12 mm. long, 4-8 mm. wide, green and shining above, margins entire and revolute; petioles 2-7 mm. long, yellowish; aments globose or oblong, 3-6-flowered, 1 cm. or less in length; scales oblong-obovate, obtuse, yellowish, nearly glabrous; capsules 2.5-3 mm. long, tomentose. Alpine summits, Mont. to Alb. and westward.

*S. candida* Fluegge. Sage-leaved or Hairy Willow.

A low, much-branched shrub, 2-10 dm. high, branches stout, divaricate, <sup>full of scars</sup> globose, light-brown or yellowish; twigs densely white-tomentose; leaves linear-oblong to narrowly oblanceolate, or occasionally much broader, mostly acute at both ends, margins revolute, entire or occasionally somewhat crenulate, with conspicuous glands, dark green, dull, and thinly white-tomentose above, with sunken veins, resembling sage leaves above, densely white-tomentose beneath; <sup>3.4-8 or even 10 cm. long, 0.7-2 cm. wide,</sup> petioles 2-7 mm., yellowish, tomentose, stipules narrowly lanceolate or broader, <sup>acute</sup> glandular, white-tomentose.

anthers appearing with the leaves, on tomentose leafy peduncles 1-3 cm. long

staminate anthers 1-3 cm. long, about 1-1.3 cm. wide,

capsule lanceolate, short pedicelled, white-tomentose, 6-8 mm. long

scales obovate, white woolly,

styles reddish or orange, 1-1.5 mm. long,

stigmas short, divaricate, <sup>notched</sup>

Infrequent, cold bogs from Northern Colo. and SE. Wyoming northward to Alb. and eastward.

12-16-02

The University of Chicago

Department of Botany

The Botanical Gazette

December 12, 1902.

My dear Sir:-

With the assistance of Professor Aven Nelson I am engaged in a much needed revision, or rather rewriting, of my Manual of the Rocky Mountain Flora. We are not attempting to do all the work ourselves, but are asking the assistance of those who are interested in special groups. Would it not be possible for you to write up the Rocky mountain willows for that sort of presentation? I am sure it would be a great assistance, not only to us but to the cause of willows; since one not acquainted with the group is apt to leave them in a bad mess and so breed further trouble.

Yours sincerely,

*John M. Coulter*

Mr. Carleton E. Ball,  
Washington, D.C.

The University of Chicago

Department of Botany

The Botanical Gazette

December 19, 1902.

My dear Mr. Ball:-

I am very glad that you are willing to undertake *Salix* for the Rocky Mountain Manual. Those of us who are at work upon it are so busy that I doubt whether it can be pushed through to completion before next fall. In that event, you will have a chance to take your summer trip and get in your fresh impressions.

Of course I shall be very glad to help you secure the material at the Field Columbian Museum.

Yours sincerely,

Digitized by Hunt Institute for Botanical Documentation  
*John m. Coulter*

Mr. Carleton R. Ball,

Washington, D.C.

March 22, 1910

Prof. John M. Coulter  
Department of Botany,  
University of Chicago,  
Chicago, Ill.

Dear Professor Coulter:-

Do you consider the New Manual of Rocky  
Mountain Botany as having been published in December  
1909, or January 1910? I suppose it is a matter of not  
very great importance, since there was no new species  
published therein, but I shall be glad to learn which you  
hold to be the authentic date of its appearance.

Very sincerely yours,

Agronomist in Charge of Grain  
Sorghum Investigations.

CRB-MH

The University of Chicago

Department of Botany

The Botanical Gazette

March 26, 1910.

Mr. Carleton R. Ball,  
Bureau of Plant Industry,  
Washington, D. C.

Dear Mr. Ball:

I have your letter in reference to the date of the publication of the New Manual of Rocky Mountain Botany. This is a publisher's blunder, and I am sorry to say that many of them are deliberately guilty of just this thing.

Of course it is necessary to know the date. Copies were received at this office and also at the Field Museum in January, 1910. I suppose this might indicate the date of publication.

Yours truly,

*John M. Coulter*

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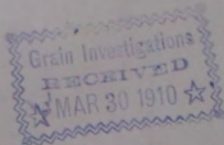
The University of Chicago

Department of Botany

The Botanical Gazette

March 28, 1910.

Mr. Carlton R. Ball,  
Bureau of Plant Industry,  
Washington, D. C.



Dear Mr. Ball:

I have just discovered that the exact date of publication of my New Manual of Rocky Mountain Botany is December 22, 1909. You will find this date given in connection with the review of the book in the April number of the BOTANICAL GAZETTE.

Yours truly,

*John M. Coulter*

Digitized by Hunt Institute for Botanical Documentation

April 2, 1910

Dr. John M. Coulter,  
The University of Chicago,  
Chicago, Ill.

Dear Dr. Coulter:-

Your favors of the 26th and 28th ultimo are received. I note that the exact date of publication of the New Manual is December 22, 1909, and thank you for this information.

Very sincerely yours,

A

3/13/09

Prof. Aron Nelson,  
Rocky Mountain Herbarium,  
Laramie, Wyo.

My dear Prof. Nelson:

In a recent conversation with Prof. Coulter, I learned that the manuscript of the new Manual of the Rocky Mountain Botany has already been sent to the printer. I was surprised to hear that, because I had understood that I would be notified when my manuscript on the Salices would be needed. Prof. Coulter suggested that there was probably still time to insert this, if you desired it.

I am enclosing herewith the key which I had prepared for the separation of the sections merely for your inspection. In the text I have described each section rather fully and the species included therein sufficiently to make them ready recognizable, but not at as great a length as would have been necessary if I had not described the sections. I have done this because I consider it the natural way of presenting relationships,

and more satisfactory than the artificial, because ordinarily employed. The key to the sections which I enclose is, to a certain extent, artificial of necessity, but I trust less so than many which have appeared.

I can send you the entire manuscript in ten days, if you wish it, and there is still time for its insertion. All it needs is a final revision.

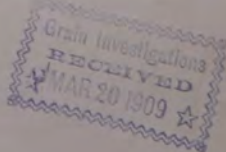
I find myself in doubt regarding the inclusion of one species, namely, *S. myrtilloides* L. This is found as far west as British Columbia and Washington, and I had supposed that material had been collected within our limits, but am unable to find any record thereof, either in the way of material or printed statements. If you know of any collections of this species within our limits, I shall be delighted to be referred to them.

With kindest regards, I am,

Sincerely yours,

RMK

## The University of Wyoming.

DEPARTMENT OF BOTANY,  
LARAMIE, WYOMING.

March 17th, 1909.

My dear Mr. Ball:--

I hasten to acknowledge your valued favor of the 13th instant in regard to the Willows for the Manual.

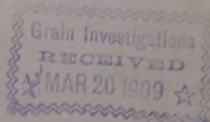
When Dr. Coulter invited me to join him in the revision of the Manual it was our plan to ask several who were specializing in the difficult groups each to contribute the manuscript for his particular group. If my memory serves me right, Dr. Coulter extended most of said invitations. As the years slipped by it developed that said specialists were busy with other important matters, and I heard nothing from anyone concerning the group which he was supposed to have in hand. I therefore kept grinding away, taking the families much in the order in which they are to occur in the present classification. Not knowing who were going to contribute, when I reached these difficult groups I simply compiled the available information to the best of my ability and let it go at that. I realize that by doing it in this way the book is not uniform in quality. Since <sup>in</sup> such groups as *Carex*, *Salix*, and a few others in which I have not specialized at all, it must be that the results are not worthy the term "revised".

Not having made the arrangements with those who were to collaborate, I took it for granted that unless I heard either from them or from Dr. Coulter that there was "nothing doing". Possibly in this I was mistaken. At least, you are the first one to report progress or even a beginning.

I am indeed glad to hear from you now; and I hope that we may be able to use your revision yet. The publishers have not reported any proof to me, though I am looking for some every day. But I think that the Willows can be held out and inserted as soon as we can get your manuscript lined up. The key to the groups which you have submitted seems to be a most excellent and usable one; and, if followed by one of the species in each group, should make the determinations as simple as in any other comparatively large genus. The method of description which you mention, namely, giving the group characters in detail and the specific descriptions in brief would not be quite in harmony with the rest of the volume; but I do not see that it will make any material difference, and I shall be glad to use the manu-

The University of Wyoming.

DEPARTMENT OF BOTANY,  
LARAMIE, WYOMING.



C. R. B. --2.

script in the form which you believe to be best.

I will write to the publishers and ask them to return the Salix sheets with a view to substituting yours when they shall be completed.

Regretting exceedingly that I had not written you on this subject before, I am,

Sincerely yours,

AN/ME.

A handwritten signature in cursive script, reading "Aven Nelson".

Mr. Carleton R. Ball,  
Bureau of Plant Industry,  
Washington, D. C.

Digitized by Hunt Institute for Botanical Documentation

*I find no evidence of  
S. myrtilloides in our range*

3/27/09

Prof. Aven Nelson,  
University of Wyoming,  
Laramie, Wyo.

My dear Prof. Nelson:

Your kind favor of the 17th instant received on the 20th. It is now four days past the date when I told you I could probably furnish this manuscript and it is not yet complete. I have, however, finished the revision of 11 out of 13 sections, and hope to complete the entire job now within a very few days. I am handicapped by this being the busiest time officially in the year in connection with the distribution of seed of our selected crops. I think now I can certainly mail it not later than Saturday, April 3. I hope the usual printers' delays will give me these days of grace; if not, it cannot now be helped, though if it ~~can still be~~ <sup>is needed</sup> ~~used, if sent~~ immediately, wire me at my expense, and I shall rush it.

The fact that you are not a specialist in this or any other large and complex genera would not necessarily signify that your treatment of such genera

would not be satisfactory and worthy in every way to be called "revised." If you think either before or after seeing my "revision" that I am myself satisfied with it, you will be greatly mistaken. Perhaps, however, my knowledge of the species enables me to see its faults and weaknesses more clearly than others will.

I think that characterizing each section before describing the species included therein will probably not be especially out of harmony with the rest of the text. These descriptions of sections will, in most cases, be quite brief, and will shorten the specific descriptions only by the omission of the characters common to all the Manual species included in that section.

I thank you for the note on S. myrtilloides. There will probably be 37 species without it, none of them new.

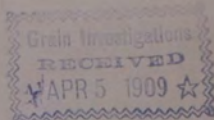
Yours sincerely,

RMK

The University of Wyoming.

DEPARTMENT OF BOTANY,

LARAMIE, WYOMING.



April 1st, 1909.

My dear Mr. Ball:--

I have your kind letter of the 27th ult. in regard to the willows. I think you need not hurry especially since in a letter from the publisher he informs me that he has directed the compositors to go right on with the work, omitting that group for the present.

In my treatment of the willows I had only thirty-two species; and now of course I am curious to know whether I reduced some to synonymy that you have recognized, or whether you have included a larger range. I wonder if in your paper you are indicating synonyms. Throughout the Manual I have given the names of all recently (the last fifteen years) proposed species, placing the synonyms in parenthesis, in italics, immediately following the description.

Sincerely yours,

Mr. Carleton R. Ball,

Bureau of Plant Industry,

Washington, D. C.

AN/ME.

*Aven Nelson*

4/22/09

Prof. Aven Nelson,  
Laramie, Wyo.

Dear Prof. Nelson:

I sent you yesterday, by registered mail, the completed manuscript of the revision of the Rocky Mountain willows, and trust that it reach you promptly and in satisfactory condition. I am enclosing herewith a few lines covering the variety equalis, which should be inserted under S. pseudomyrsinites at the bottom of page 17.

With reference to your letter of some days ago, I may say that I too am curious to know wherein we have differed in our treatment of this group. I think it likely that two species I have included will need to be removed because not coming within the accepted range of the Manual. The first is S. melanopsis Nutt., the type locality of which is the mountains in the vicinity of Fort Hall near Pocatello, Idaho. It occurs quite abundantly in Oregon, Washington and British Columbia, but apparently only sparingly in Idaho and not at all in the Bitter Root range. The

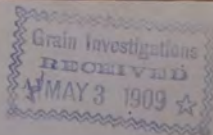
second species is S. bella Piper, which is found in eastern Washington and northern Idaho as far east as the eastern side of Latah County, but has not yet been reported from the Bitter Root range. I have included S. discolor, common in the Black Hills and rare in Montana, which perhaps you might not have included. As my total number of species is 35, the difference of these three above-mentioned would not leave us very far apart in our conclusions.

If the two species first mentioned need to be removed, kindly do this and change the numbers of the remaining subsequent species in both descriptions and keys.

I should like to have some separats of this portion of the text printed for my own use, if that will be permissible. If there is no objection to its being done, kindly inform me the name and address of the publishers and I shall take the matter up direct with them unless you care to handle it from that end of the line. I should also like to see proof when this section goes into type.

With kindest regards and best wishes, I am,

Very sincerely,



The University of Wyoming.

DEPARTMENT OF BOTANY,  
LARAMIE, WYOMING.

April 29th, 1909.

My dear Mr. Ball:--

Your manuscript of salix was received some days since. I am delighted with it. It is much fuller than the presentation that I had made, probably occupying one half more space. In that regard also it will be more helpful to those who really wish to study the genus.

Not having given you any specific directions as to punctuation, capitalization, arrangement, citation, etc. that I have followed in the other families, of course yours did not fit in with mine. On that account I had to rearrange and interpolate and then have the paper rewritten. I did not, of course, change the descriptions nor nomenclature in the least, confining my efforts to bringing it as nearly into line with the rest of the work as possible.

I have not yet definitely checked up our agreements and disagreements in regard to species; but really the disagreements were comparatively few. As soon as I can find time I am going to just "for the fun of it" check this matter up accurately. When the galley proof is received I will send you <sup>the</sup> a corrected copy which you may then turn over to Dr. Coulter who, as you probably know, is now in Washington.

In regard to the separates I can make no statement. Of course the publishers and Dr. Coulter must be consulted. I can imagine that the publishers would take the ground that if you distributed separates of your chapter that those who are interested merely in willows would therefore not care for the volume as a whole. The Manual is being issued by the American Book Co., and I suggest that you write to the managing editor, Mr. Russell Hinman at 100 Washington Sq., New York City.

Thanking you for the excellent treatment of this group and into which you have put so much time and thought,  
I am,

Cordially yours,

5/11/09

Prof. Aven Nelson,  
Laramie, Wyo.

Dear Prof. Nelson:

Yours of the 29th ultimo duly received. I regret that you were obliged to have the manuscript rewritten in order to bring the punctuation, citation, etc., into accord with the remainder of the work.

Thank you for the note regarding separates.

I shall take the matter up with Dr. Coulter and Mr. Hinman of the American Book Co. I appreciate the objection which may be raised to the issuance of separates. In this case I hardly think that it will prove a serious matter, as I shall ask for but a small number and shall wish to use them more particularly for placing in the hands of collectors, who could use them to advantage during field trips, but who would certainly wish to own the entire volume for reference.

Very sincerely,

Agronomist.

The University of Wyoming,

DEPARTMENT OF BOTANY,  
LARAMIE, WYOMING

6 January 1910

Mr. C.R. Ball,  
Bureau of Plant Industry,  
Washington, D.C.

My Dear Mr. Ball:

I assume that Dr. Coulter requested the publishers to send you a copy of the new Manual. I hope that you may find the form in which the Salices has been set up to your satisfaction. Again I wish to thank you for the help that you rendered in the preparation of the manuscript. Wishing you a happy new year, I am,

Sincerely yours,

*Aven Nelson*

JDL

Jan. 12, 1910.

Prof. Aven Nelson,  
The University of Wyoming,  
Laramie, Wyo.

My dear Professor Nelson:-

Your kind letter of the 6th instant at hand.

I have received a copy of the new Manual with the compliments of Dr. Coulter and the publishers. I am very much pleased with the form in which my treatment of the willows has been presented and with the volume as a whole. My only regret in the matter was that the volume sent me was defective, entirely lacking eight pages, of which fact I promptly notified the American Book Company.

Thanking you for the opportunity of preparing the manuscript on the Salices for this work, and with best wishes, I am,

Very sincerely yours,

Agonomist.

CRB-MH

The University of Wyoming.

DEPARTMENT OF BOTANY,  
LARAMIE, WYOMING.

19 January 1910

Mr. Carleton R. Ball,  
Bureau of Plant Industry,  
WASHINGTON. D.C.

My Dear Mr. Ball:

I wish to thank you for your kind words concerning the Manual. I am glad to know that the publishers have set up the willows to your satisfaction. I hope that the entire work may prove of some service to those who have occasion to need it. I feel sure that the book company will send you another copy for the imperfectly bound one.

Sincerely yours,

*Aven Nelson*

JDL