

PRELIMINARY REPORTS ON THE FLORA OF WISCONSIN
SCROPHULARIACEAE

By

PETER JOSEPH SALAMUN

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PREFACE

The following report was compiled from the material in the herbaria of the Milwaukee Public Museum and the University of Wisconsin, together with supplementary specimens collected during the past year. This work received financial support from the Wisconsin Alumni Research Foundation, as a research project under the supervision of Dr. N. C. Fassett. Grateful acknowledgement is made to Mr. Albert M. Fuller, curator of the herbarium of the Milwaukee Public Museum; to Mr. James H. Zimmerman and Mr. Robert S. Ellarson for their contributions of flowering specimens; and to Dr. N. C. Fassett for his assistance and advice in the preparation of this report as well as for his critical reading of the manuscript.

This study is primarily an annotated catalogue of species of the family Scrophulariaceae which to date are known to grow wild in Wisconsin. For each species is listed the habitat, its distribution, and the usual time of flowering in the state. Keys for the identification of genera, species and varieties are included.

The nomenclature of genera and species is, with few exceptions, that of the Scrophulariaceae of Eastern Temperate North America, by Dr. Francis W. Pennell.¹ Although Dr. Pennell's monograph has been used extensively in the preparation of this report, it has seemed preferable to use the term "variety" for a geographic subdivision of a species rather than the term "subspecies". Where authorities other than those mentioned in this book are used, reference to them has been included in the text.

Cited specimens, which are in the herbaria of the Milwaukee Public Museum and the University of Wisconsin, are plotted on maps. Additional specimens which were cited by Dr. Pennell are also included, but the symbol used is plotted in outline only.

1 The Academy of Natural Sciences of Philadelphia. Monographs Number 1, 1935.

KEY TO GENERA
(Specimens with Flowers)

- a. Fertile stamens 5..... 1. Verbascum
- a. Fertile stamens 2 or 4.
 - b. Corolla spurred on lower side at the base.
 - c. Leaves narrowly linear to linear-lanceolate, or spatulate-linear, entire; plants erect.
 - d. Leaves narrowly linear to linear lanceolate, alternate, sessile; stem nearly glabrous; pedicels 2-6 mm. long..... 2. Linaria
 - d. Leaves spatulate-linear, opposite, with short petioles; stems with gland-tipped hairs; pedicels about 1 cm. long..... 4. Chaenorrhinum
 - c. Leaves reniform orbicular, toothed or lobed; plant creeping..... 3. Cymbalaria
 - b. Corolla not spurred on lower side at the base.
 - e. Fertile stamens 2.
 - f. Stamens exerted; corolla rotate or salverform; capsule somewhat flattened.

g. Corolla lobes much shorter than the tube; capsule acute, much longer than wide; leaves in whorls of 3-6..... 12. Veronicastrum

g. Corolla lobes nearly as long or longer than the tube; capsule rounded or notched, little if at all longer than wide; leaves opposite, rarely ternate, or alternate.

h. Plants with a basal rosette of large, long-petioled leaves; corolla yellow, lobes projecting; cauline leaves alternate.

..... 14. Besseya

h. Plants without a basal rosette of long-petioled leaves; corolla purplish or white, lobes spreading; cauline leaves opposite (bracts sometimes alternate).

..... 13. Veronica

f. Stamens included; corolla definitely 2-lipped; capsule not flattened.

i. Sterile filaments short or lacking; calyx usually subtended by 2 bracts, exceeding in length the calyx lobes; leaves lanceolate, narrowed to the base, or if broad at the base with minute dots..... 11. Gratiola

i. Sterile filaments nearly equalling the fertile pair in length; calyx not subtended by a long bracts; leaves mostly ovate, broadest usually at the base, and without minute dots.

..... 10. Lindernia

- e. Fertile stamens 4.
- j. Leaves alternate.
 - k. Galea short or absent; cauline leaves sessile;
 - l. Stem leaves bract-like; basal leaves oval to orbicular, on long petioles.....
..... 14. Besseya
 - l. Stem leaves with long ribbon-like lobes; basal leaves if present lobed.. 19. Castilleja
 - k. Lateral lobes of corolla fused into a galea, exceeding the lower lobes; cauline leaves petioled, lobed or pinnatifid..... 21. Pedicularis
 - j. Leaves opposite or whorled.
 - m. Leaves and bracts narrowly linear or linear-lanceolate to filiform, entire.....
..... 17. Gerardia
 - m. Leaves broad and flat, serrate, toothed or lobed.
 - n. Calyx prismatic, 5-angled. 9 Mimulus
 - n. Calyx not as above.
 - o. Margins of leaves serrate, toothed, sometimes nearly entire to slightly fringed at the base, never pinnatifid or lobed.
 - p. At least the uppermost stem leaves sessile and clasping by a broad base.
 - q. Sterile stamen conspicuous, as long or longer than the fertile ones, bearded; all stem leaves sessile and clasping...
..... 7. Penstemon

- q. Sterile stamen inconspicuous, not bearded;
lowermost stem leaves narrowed to the base
or petioled..... 5. Collinsia
- p. All stem leaves petioled or if sessile
narrowed to the base.
- q. Leaves and bracts entire or with a few
bristly teeth at the base.....
..... 20. Melampyrum
- r. Leaves serrate to dentate.
- s. Corolla maroon; leaves ovate-lanceolate,
coarsely toothed....6. Scrophularia
- s. Corolla white or purple; leaves lanceo-
late, serrate; corolla imbricated with
rounded overlapping concave bracts....
..... 8. Chelone
- o. Margins of leaves more or less pinnatifid
or lobed, sometimes only the uppermost or
lowermost ones on the stem lobed.
- t. Lateral lobes of the corolla fused into
a galea, exceeding the lower lobes....
..... 21. Pedicularis
- t. Corolla lobes not as above, or if a galea
present, not exceeding the lower lobes.
- u. Upper stem leaves with a few basal
lobes.

- v. Corolla purple; leaves sessile, with lobes oblong-lanceolate.....
..... 18. Tomanthera
- v. Corolla white with yellow palate; leaves petioled, with lobes tooth-like or long-pointed.....
..... 20. Melampyrum
- u. Upper stem leaves without lobes, or all pinnately lobed.
- w. Anthers glabrous; both anterior and posterior stamens of nearly equal length; upper stem leaves ovate-lanceolate, entire to serrate, lower ones lobed..... 16. Dasistoma
- w. Anthers villose; posterior stamens exceeding anterior stamens in length; both upper and lower stem leaves more or less pinnately lobed.....
..... 15. Aureolaria

1. VERBASCUM [Bauhin] L. Mullein

- a. Plants pubescent with gland-tipped hairs; leaves only slightly pubescent; pedicels usually 1-2.5 cm. long.

..... V. Blattaria

- a. Plants with branching glandless pubescence; leaves tomentose at least beneath; pedicels usually less than 1 cm. long.

- b. Filaments of the two longest stamens twice as long as the anthers; inflorescence interrupted, at least the lower clusters somewhat remote; leaves only slightly decurrent on the stem. V. Thapsiforme

- b. Filaments of the two longest stamens four times as long as the anthers; inflorescence densely crowded; leaves long-decurrent on the stem.....

..... V. Thapsus

1. V. Blattaria L. Moth Mullein. Map 1. Naturalized from Europe and found only occasionally in the state in dry fields, roadsides, and waste places; collected to date only from Dane, Jefferson and Milwaukee Counties. Flowering June to September.

A white-flowered individual has been described as f. albiflora (Don) House, but as yet has not been reported in the state.

2. V. thapsiforme Schrader. Reported only from LaCrosse and Dane Counties where it was found growing in disturbed fields. Introduced from Europe, and now spreading in waste places, waysides, and disturbed areas. Flowering July to September.

3. V. Thapsus L. Common Mullein. Common everywhere in the state, especially in disturbed fields, waysides, along railroad tracks and waste places. Introduced from Europe. Flowering July to November.

2. LINARIA [Bauhin] Miller Toadflax

a. Corolla yellow, 2-3 cm. long; leaves usually 2-10 mm. broad, 2-5 cm. long.....L. vulgaris

a. Corolla blue, 1 cm. or less long; leaves usually less than 2 mm. broad, 1-3.5 cm. long... L. canadensis

1. L. vulgaris. Hill. Butter and Eggs. Map 2. Common in pastures, waste fields, and roadsides throughout the state. Flowering May to September. Introduced from Europe.

2. L. canadensis (L.) Dumont. Blue Toadflax. Map 3. Prefers sandy plains, bars, bluffs and hillsides; Green County to Outagamie County, westward. Dr. Pennell suggests that this species may have survived glaciation in the Driftless area, and since has migrated outward slightly on sandy soils. Flowering May to August.

3. CYMBALARIA [Bauhin] Hill

1. C. muralis Gaetner, Meyer and Scherbius. Kenilworth or Coliseum Ivy. Collected only from Dane and Milwaukee Counties where it has probably escaped from cultivation. Introduced from Europe.

4. CHAENORRHINUM Reichenbach

1. C. minus (L.) Lange. Small Snap-dragon. Map 4. Locally abundant in cinders along railroad tracks; largely in eastern part of the state from Brown County to Walworth County, westward to Outagamie, Winnebago and Dane Counties. Introduced from Europe.

5. COLLINSIA Nuttall

1. C. verna. Nutt. Blue-eyed Mary. This species reaches the northern limits of its range in southern Wisconsin, having been collected near Janesville, Rock County, on a wooded hillside. Collected in May.

6. SCROPHULARIA [Bauhin] L. Figwort

- a. Sterile stamen greenish; panicle narrowly elongate, 4-8 cm. wide, its branches relatively stout and ascending; capsules dull, 6-9 mm. long... S. lanceolata
- a. Sterile stamen purplish; panicle usually broad, 5-18 cm. wide, its branches usually spreading; capsules usually glossy, 4-7 mm. long..... S. marilandica
1. S. lanceolata Pursh. Map 5. Locally abundant in open woods, dry meadows, pastured areas, and along railroad tracks throughout the state. Flowering mid-May to early August.
2. S. marilandica L. Map 6, dots. Locally abundant in open woods, along wooded river banks and at the foot of bluffs, largely in the southern half of the state, with one reported as far north as Oneida County. Flowering early July to late August.

There is considerable variation in the pubescence of the leaves, the most pubescent one is designated, f. neglecta (Rydb.) Pennell. Reported only from Grant County. Map 6, crosses.

7. PENSTEMON Mitchell. Beard-tongue

- a. Stem leaves serrate or toothed.
 - b. Lower lobes of the corolla scarcely exceeding the upper; middle and lower portions of the stem glabrous, glaucous..... P. Digitalis
 - b. Lower lobes of the corolla exceeding considerably the upper; middle and lower portions of the stem more or less pubescent.
 - c. Lower lip of the corolla projecting forward; middle and lower portion of the stem minutely granular-pubescent; corolla 15-25 mm. long.
 - d. All stem leaves except the uppermost pair glabrous..... P. gracilis
 - d. All stem and basal leaves minutely pubescent on under side...P. gracilis var. Wisconsinensis
 - c. Lower lip of the corolla upcurved so as to close the orifice to the throat; middle and lower portions of the stem and the leaves loosely pubescent with long crinkly hairs; corolla 20-30 mm. long.....P. hirsutus
- a. Stem leaves entire or obscurely undulate.
 - e. Corolla white, 15-20 mm. long, glandular-puberulent within on all sides; stem leaves ovate to lanceolate..... P. tubiflorus

e. Corolla purplish, 35-50 mm. long, glandless-pubescent within; stem leaves oval to orbicular, acute to acuminate at the tip...P. grandiflorus

1. P. Digitalis Nutt. Map 7. Occurs in open woodlands, fields, and occasionally roadsides, mostly in the southern half of the state, but extending northeastward to Marinette and Door Counties. Flowering early June to July.
2. P. gracilis Nutt. Map 8. This species has been most frequently reported in the western portion of the state, from Columbia County northwestward and westward, in open fields on prairie and sandy soils. Flowering late May to August.
3. P. gracilis var. wisconsinensis (Pennell) Fassett²
Map 9. This species is confined almost entirely to the Driftless Area, open woods, fields and occasionally roadsides. Sometimes grows with typical P. gracilis and grades into it. Flowering late May to August.
4. P. hirsutus (L.) Willd. Map 10. Confined largely to the eastern portion of the state, extending westward to Green Lake and Rock Counties. Occurrence usually in open areas on sandy and gravelly soils, along railroad tracks, and slopes of ravines. Flowering late May to July.

2 Penstemon gracilis Nutt. var. wisconsinensis (Pennell) Fassett, n. comb. P. wisconsinensis Pennell, Scrophulariaceae of Eastern Temp. N. Am. 234. 1935. P. gracilis [subsp.] wisconsinensis Pennell, l.c. 632. This combination has been used, but without proper validation, in Fassett, Spring Flora of Wisconsin 144. 1938.

5. P. tubaeiflorus Nutt. Map 11. Rare in Wisconsin; collected only in Burnett, Crawford and Dane Counties, where it is reported in fallow fields, roadsides and along river banks. Flowering early June to August.
6. P. grandiflorus Nutt. Map 12. A prairie species entering the state from the west and extending to Wood and Juneau Counties, with a single specimen from Sheboygan County. Confined largely to sandy soils, barrens and prairies. Flowering early June to July.

8. CHELONE [Tourn.] L. Turtlehead

- a. Lips of corolla purplish within; leaf blades lanceolate or elliptic, 2-4 cm. wide..... C. glabra var. typica
- a. Lips of corolla white within, the corolla externally greenish yellow; leaf blades linear to narrowly lanceolate, mostly 1-2 cm. wide..... C. glabra, var. linifolia
1. C. glabra L. var. typica (Pennell) Deam, Fl. Ind. 838. 1940. Balmony. Map 13, dots. Occurs throughout the state along river bottoms, swamps and other moist places, but is less abundant than var. linifolia. Flowering early July to September.

Individuals with leaves densely tomentose on the under side have been described as f. tomentosa Pennell. Map 13, crosses.

2. C. glabra var. linifolia Coleman. Map 14, dots. Locally abundant in swamps, bogs and moist shores of lakes and streams throughout the State. Flowering mid-July to early October..

Individuals with leaves densely pubescent beneath have been designated as f. velutina Pennell & Wherry. Map 14, crosses.

9. MIMULUS L. Monkey Flower

a. Corolla lemon-yellow; leaves reniform, nearly sessile to pedicelled.....M. glabratus var. Fremontii.

a. Corolla purplish; leaves oblong to lanceolate, sessile, clasping by a heart-shaped base.... M. ringens.

1. M. glabratus HBK var. Fremontii (Benth.) Grant, Map. 15. Moist places about springs, shores of lakes, cold streams and ponds throughout the state. Flowering June to September.

2. M. ringens L. Map 16. Common along moist banks of streams, in swales and marshy meadows throughout the state. Flowering June to September.

An individual with a pink corolla has been collected in Burnette County and has been described as f. roseus Fassett, Torreyia 42:181. 1943. Map 16, cross.

10. LINDERNIA Allioni False Pimpernel

- a. Lower pedicels shorter than the subtending leaves; upper pedicels shorter or only slightly exceeding the subtending leaves; leaf blades 1-3 cm. long, lower ones obviously narrowed at the base.
- b. Pedicels in upper portion of stem shorter than the subtending bract-leaves, ascending.....
..... L. dubia
- b. Pedicels in upper portion of the stem exceeding the subtending leaves, more or less divaricately spreading.....L. dubia var. riparia
- a. Both lower and upper pedicels obviously exceeding their subtending leaves; leaves 0.5-1.5 cm. long, nearly all widest near the base and somewhat clasping.....
..... L. anagallidea
1. L. dubia (L.) Pennell. L. dubia subsp. major Pennell; see Rhodora 44:441-446, 1942. Map 17. Locally common along sandy and muddy shores and banks of rivers, lakes and ditches throughout the state. Flowering July to September.
2. L. dubia var. riparia (Raf.) Fern., Rhodora 44:444. 1942. L. dubia subsp. typica Pennell. Map 18. Sandy and muddy shores of lakes, streams, moist ditches and sandy places, largely in the southern half of the state, extending northward to St. Croix and Marathon Counties. Flowering July to September.

3. L. anagallidea (Michx.) Pennell. Map 19. Edges of streams, ponds and moist places, usually on sandy soil; Dane, Iowa, Sauk, Columbia, and Eau Claire Counties. Flowering July to September.

11. GRATIOLOA [Bauhin] L. Hedge Hyssop

a. Corolla golden-yellow; stem leaves clasping by a broad base, densely punctate with dark glandular dots (submersed form lacks the glandular dots). G. lutea

a. Corolla greenish-yellow; stem leaves narrowed to a sessile or scarcely clasping base... G. neglecta

1. G. lutea Raf. Map 20, dots. Reported only from the northern part of the state, having been collected in Barron, Washburn, Price, Oneida and Vilas Counties, where it is reported along sandy, peaty and muddy lake shores. Flowering July to September.

Forma pusilla (Fassett) Pennell, a submersed sterile state, occurs in soft water lakes with sandy bottoms at depths of 1-4 meters. Map 20, crosses.

2. C. neglecta Torrey. Map 21. Frequently occurring along margins of lakes, ponds, kettleholes, ditches and drying depressions, mostly throughout the western half of the state, extending eastward to Oconto and Fond du Lac Counties. Flowering June to September.

12. VERONICASTRUM [Heister] Fabricius

1. V. virginicum (L.) Farwell. Culver's Root; Culver's Physic. Veronica virginica L. Gray's Manual, ed. 7. Map 22, dots. Fairly common along roadsides and railroad right-of-ways, wet meadows, prairies, sandy places and open woods throughout the state, except in the northernmost tier of counties. Flowering late June to August.

There is considerable variation in the pubescence of the lower surfaces of the leaves, and the most hairy form has been described as f. villosum Pennell. Map 22, crosses. Distribution as above.

13. VERONICA [Bauhin] L. Speedwell

- a. Main stem terminating in an inflorescence, its flowers either densely crowded in the terminal portion or remote and axillary; upper bract-leaves alternate.
- b. Stem leaves lanceolate, at least twice as long as broad.
- c. Plants 0.5-2 m. tall; leaves evidently dentate-serrate, acute to acuminate, short-petioled; inflorescence in a dense terminal raceme.....
..... V. longifolia
- c. Plants less than 0.5 m. tall; leaves remotely finely serrate to nearly entire, obtuse, sessile; flowers more remote, in upper bract-leaves.

- d. Plants glabrous.....V. peregrina var. typica
- d. Plants with gland-tipped hairs.....
.....V. peregrina var. xalapensis
- b. Stem leaves ovate, only slightly longer than broad.
 - e. Pedicels 1-2 cm. long, usually exceeding the leaves..... V. persica
 - e. Pedicels less than 1 cm. long, usually shorter than the leaves.
 - f. Pedicels shorter than the sepals, less than 2 mm. long..... V. arvensis
 - f. Pedicels mostly equalling or longer than the sepals.
 - g. Corolla 3-4 mm. broad, whitish or pale blue with darker stripes; pedicels and rhachis appressed-puberulent; capsule 3-4 mm. broad..... V. serpyllifolia
 - g. Corolla 0.5-1 cm. broad, deep blue; pedicels and rhachis pubescent with spreading viscid or gland-tipped hairs; capsule 4-6 mm. broad. V. humifusa
- a. Flowers in axillary racemes; main stem never terminating in an inflorescence; stem leaves all opposite.
 - h. Stem leaves with short petioles, or if sessile narrowed to the base.

- i. Leaves ribbon-like, very long and narrowed to the base, sessile, remotely toothed; sepals rarely more than half the length of the capsule..... V. scutellata
- i. Leaves lanceolate to ovate, more closely serrate evidently petioled; sepals nearly equal in length to the capsule.
 - j. Plants glabrous or with a few gland-tipped hairs; capsules glabrous.. V. americana
 - j. Plants densely pubescent; capsules pubescent..... V. officinalis
- h. Stem leaves sessile and clasping by a broad base.
- k. Racemes 30-60-flowered at maturity; pedicels 4-8 mm. long, with a few gland-tipped hairs; both racemes and pedicels strongly ascending; sepals acute to acuminate; plants wholly or partially emergent aquatics... V. Anagallis-aquatica
- k. Racemes mostly 5-35-flowered; pedicels 3-6 mm. long; racemes and pedicels more loose and divergent; sepals more nearly acute; pedicels and distal portions of the stem evidently glandular pubescent or wholly glabrous; plants frequently wholly submerged.
 - l. Distal portions of stem and pedicels with gland-tipped hairs....V. connata var. typica
 - l. Distal portion of stem and pedicels wholly glabrous.....V. connata var. glaberrima

1. V. longifolia L. Introduced from Europe, but occasionally escaping from cultivation to waste places, roadsides and along railroad tracks. Reported only from Dane and Milwaukee Counties.
2. V. serpyllifolia L. Thyme-leaved Speedwell. Map 23, dots. Occurs throughout the state in pastures, waysides, open woods, and along river bottoms. Introduced from Eurasia. Flowering May to July.
3. V. humifusa Dickson. Map 23, crosses. An alpine species that is found occasionally in the northern part of the state, especially in moist springy places. Reported only from Lincoln and Marathon Counties.
4. V. peregrina L. var. typica (Pennell) Deam, Fl. Ind., 847. 1940. Neckweed; Purslane Speedwell. Map 24, dots. Fairly common in the southern part of the state, frequenting cultivated gardens, abandoned fields and moist open places, where it usually occurs with the next. Flowering May to June.
5. V. peregrina var. xalapensis (HBK.) St. John & Warren, Northwest Sci. 2, No. 3:90. 1928. Map 24, crosses. A more widespread variety than the typical, especially in the western U. S. In the state it occurs in moist places, usually along streams, depressions, irrigation ditches, along railroad embankments, and cultivated and pastured areas; becoming quite an aggressive weed. Flowering May to June.
6. V. arvensis L. Corn Speedwell. Map 25. Locally common in dry fields, pastures and cultivated areas; Vernon County

to Door County, southward. Flowering May to June. Introduced from Europe.

7. V. persica Poiret, V. Tournefortii C.C. Gmel., V. Buxbaumii Tenore., and V. Bysantina (Smith) BSP. Introduced from Europe, and now occurring along roadsides, fields, and other waste places. Collected in Marathon, Sheboygan and Milwaukee Counties.

8. V. officinalis L. Common Speedwell. Map 26. This species is confined to the Lake Michigan shore from Kenosha to Door County, where it occurs in ravines, open woods, and dry places. Introduced from Europe. Flowering late May to August.

9. V. americana (Raf.) Schwein. American Brooklime. Map 27. Occurs in stream beds, roadside ditches, along ponds, swamps and other moist places throughout most of the state, except in the southern and southeastern portions. Flowering late May to early September.

10. V. Anagallis-aquatica L. Water Speedwell. Map 28. Collected only from Sheboygan and Door Counties. Habits ditches, ponds and slow moving streams. Flowering June to September. Naturalized from Europe.

11. V. connata Raf. var. typica (Pennell) Deam, Fl. Ind., 849. 1940. May 29, dots. Frequent in slow moving streams, shaded ditches, sloughs and brooks, largely in the limestone areas. Flowering late May to October.

12. V. connata var. glaberrima (Pennell) Fassett, Rhodora 41:525. 1939. Map 29, crosses. Apparently much more local along the eastern border of the Driftless Area and in Door County. This variety and the typical are often wholly submerged, and cannot be distinguished from it except by a comparison with emerged plants of the region.

13. V. scutellata L. Marsh Speedwell. Map 30, dots. Locally common throughout the state in marshy places, river bottoms, roadside ditches and depressions. Flowering late May to September.

Plants with white hairs throughout the stem and leaves have been described as f. villosa (Schumacher) Pennell. Map 30, crosses.

14. BESSEYA Rydberg

1. B. Bullii (Eaton) Rydb. Synthesis Bullii (Eaton) Heller. Gray's Manual, ed. 7. Map 31. Locally common on sandy and gravelly ridges, knolls, open woods and prairies; southernmost counties, northward to Dane and Milwaukee Counties; along St. Croix river, Pierce to Polk Counties. The two apparently separated regions are shown by Dr. Pennell's map actually to be connected by stations in Iowa and Minnesota. Flowering May to August.

15. AUREOLARIA Rafinesque Foxglove

- a. Stems glabrous, more or less glaucous...A. flava var. typica
- a. Stems more or less puberulent or pubescent.
 - b. Pubescence glandless.....A. grandiflora var. pulchra
 - b. Pubescence more or less glandular.
 - c. Distal portion of stem closely pubescent, only slightly glandular; pubescence of leaves, scarcely or not glandular; capsule usually 9-11 mm. long.....A. pedicularia var. typica
 - c. Distal portion of stem glandular pubescent to hirsute; pubescence of leaves more evidently glandular; capsule usually 11-15 mm. long.
 - d. Glands scattered throughout the distal portions of the stem.....
.....A. pedicularia var. intercedens
 - d. Glands crowded throughout the distal portions of the stem.....
..... A. pedicularia var. ambigens

1. A. flava (L.) Farwell var. typica (Pennell) Deam, Fl. Ind., 854. 1940. Smooth Foxglove. Map 33, diamond. Open oak woods on sandy or light loam soils. Reported by Pennell from southern Wisconsin, presumably Walworth County. Flowering late July to late September.

2. A. grandiflora (Benth.) Pennell var. pulchra Pennell, Map 32. Largely in the southern part of the state, north-eastward to Waupaca and Brown Counties. Prefers open oak woods. Flowering late July to mid-October.
3. A. pedicularia (L.) Raf. var. typica (Pennell) Deam, Fl. Ind., 855. 1940. Map 33, dots. Reported by Pennell to have been collected in Trempeleau and Pierce Counties. Occurs in dry oak woods. Flowering mid-August to late September.
4. A. pedicularia var. intercedens Pennell, Map 33, crosses. Reported only from Dunn and Green Counties, and growing in sandy open oak woods. Flowering early August to late September.
5. A. pedicularia var. ambigans (Fern.) Farwell, Map 34. Occurs largely in the sandstone areas of the central and northeastern portion of the state, and along rivers northwestward to Polk County, and southeastward to Walworth County. Dry sandy oak woods and wooded sand dunes. Flowering late July to early October.

16. DASISTOMA Rafinesque

1. D. macrophylla (Nutt.) Raf. Map 35. This species seems to be entering the state from the southwest along rivers and streams, known in Wisconsin only from Grant County, occurring on lightly wooded hillsides. Flowering late June to early September.

17. GERARDIA L. Gerardia

- a. Pedicels short, little if at all exceeding the calyx and capsule.
- b. Upper lobes of corolla only slightly spreading; capsule cylindric, decidedly longer than wide; upper portion of leaves and stem very scabrous; branches and pedicels strongly ascending. G. aspera
- b. Corolla lobes reflexed spreading; capsule globose to globose-ovoid; upper portion of leaves less scabrous and stem smooth; pedicels and branches more spreading.
- c. Corolla 25-35 mm. long..... G. purpurea
- c. Corolla 10-20 mm. long.
 - d. Corolla 15-20 mm. long, campanulate; anthers rather densely white-villose.....
..... G. paupercula var. typica
 - d. Corolla 10-17 mm. long, tubular-campanulate; anthers sparingly villose-pubescent with pale brownish or white hairs.....
..... G. paupercula var. borealis
- a. Pedicels long, usually exceeding the corolla, at least longer than the calyx and capsule.
- e. Stem leaves usually 2-4 mm. broad; plants relatively dark green or purplish, tending to blacken in drying; seeds dark brown or blackish.

- f. Anthers densely villose; leaves and branches spreading; axillary fascicles not or only slightly developed..... G. tenuifolia var. macrophylla
- f. Anthers sparingly villose; leaves and branches ascending; axillary fascicles usually conspicuously developed... G. tenuifolia var. parviflora
- e. Stem leaves usually less than 2 mm. broad, narrowly linear to filiform; plants yellowish green, not tending to blacken in drying; seeds yellow or yellowish brown.
- f. Stem leaves narrowly linear, 2-3 cm. long; stem terete, only slightly striate much branched; corolla lobes somewhat emarginate.....
..... G. Gattingeri
- f. Stem leaves linear to nearly filiform, 1-2.5 cm. long; stem conspicuously striate-angled, simple or moderately branched; corolla lobes truncate.
..... G. Skinneriana
1. G. aspera Douglas. Map 36. Locally common on prairies, dry sandy hills and southerly exposed bluffs; Sheboygan County to St. Croix County, southward. Flowering mid-July to mid-September.
2. G. purpurea L. Map 37. Mostly in southern part of the state, extending northward to Monroe and Waushara Counties, and northeastward to Oconto County. Prefers moist sandy

areas, frequently along the edges of streams, rivers and lakes, and occasionally on dry soil. Flowering early August to September.

3. G. paupercula (Gray) Britt. var. typica (Pennell) Deam, Fl. Ind., 852. 1940. Map 38. Occurs usually along shores of lakes, rivers, moist ditches, marshes and infrequently on prairies and bluffs, largely in the southern half of the state, extending northward to Polk county along the Mississippi and St. Croix Rivers. Flowering late July to September.

4. G. paupercula var. borealis (Pennell) Deam, Fl. Ind., 852. 1940. Map 39. Distribution appears to be wholly within the glaciated portion of the state, occurring along sandy shores of lakes and streams in the northern part, and in bogs and marshy places in the southern part. Extensive collections have been made in the northwestern part of the state, and Mr. W. T. McLaughlin, in Ecol. Mono. 2:344, 1932, has described the probable reasons for its presence along the shores of practically all the sandy lakes in this area. Flowering July to September.

5. G. tenuifolia Vahl var. macrophylla Benth. Map 40. Habits loam or clay soils along river bottoms, swales and ditches. Largely in the southern portion of the state, extending northeastward to Oconto County and northwestward to Dunn County. Flowering mid-August to mid-October.

6. G. tenuifolia var. parviflora Nutt. Map 41. Locally common along river banks, lake shores, moist fields and depressions, usually on sandy soil. Appears to be largely absent from the granitic rocks of the north central portion of the state. An apparent exception is a specimen in the Milwaukee Public Museum which was collected near Wausau, Marathon County. However a geological map of the region discloses an outcrop of basic igneous rock in this area which may explain this occurrence. It is suggested that a watch be kept for this plant on similar outcrops in this area. Flowering Mid-August to October.
7. G. Gattingeri Small, Map 42. Occurs on dry knolls, bluffs and open oak woods; Marquette and Green Lake Counties southward, with a collection from Polk County. These two apparently separate areas are probably connected through Iowa and Minnesota. Flowering mid-August to early October.
8. G. Skinneriana Wood, Map 43, crosses. Rare in the state, with only one reported from Arena, Iowa County. Prefers open sandy areas, bluffs, dunes and prairies. Flowering mid-August to September.

18. TOMANTHERA Rafinesque

1. T. auriculata (Michx.) Raf. Map 43, dots. Reported only from Dane, Lafayette and Racine Counties where it occurs in prairies, old fields, or rarely open woodlands. Flowering August to September.

19. CASTILLEJA Mutis Painted Cup

a. Bracts and leaves pale green, numerous; corolla 3-4 cm. long..... C. sessiliflora

a. Bracts scarlet, yellow, or whitish-tipped; corolla 1.5-2.5 cm. long..... C. coccinea

1. C. sessiliflora Pursh. Map 44. Locally common in prairies, and sandy and limestone ridges and knolls, from Milwaukee County diagonally across the state to Pierce County, thence southward and westward; often an indicator of undisturbed high prairie. Flowering May to late July.
2. C. coccinea (L.) Spreng. Scarlet Painted Cup. Map 45, dots. Locally abundant throughout the state, but largely absent from the north central portion. Usually occurring in moist meadows, sandy areas and moist open woods and roadsides. Flowering May to early September.

Individuals with whitish or yellowish-tipped bracts have been described as f. pallens (Michx.) Pennell. Including both f. alba Farwell and f. lutescens Farwell in Amer. Midl. Nat. 8:276. (1923). Map 45, crosses.

20. MELAMPYRUM [Bauhin] L. Cow Wheat

a. Foliage leaves and bracts linear, 1-4 (-6) mm. broad, all entire or the uppermost bracts rarely toothed at the base; stem simple, or loosely few-branched, 0.5-2 dm. high, the simple branches only 1-10 cm. long; mature capsules 3-5 mm. broad.... M. lineare var. lineare

a. Foliage leaves linear to lanceolate, 2-10 mm. wide; larger bracts linear-lanceolate to lanceolate-ovate, 3-20 mm. broad, some or all of them sharply toothed at the base; stem usually bushy branched (exceptionally unbranched), 2-5 dm. high; branches in well developed plants 0.2-2.5 dm. long; mature capsules 3.5-6 mm. broad..... M. lineare var. americanum

1. M. lineare Desr. var. lineare (Desr.) Beauv.; Fernald, Rhodora 44:450. 1942. Map 46, crosses. occurs in bogs and in sandy areas beneath coniferous trees in the northernmost tier of counties, including the tip of Door County. Flowering June to August.

2. M. lineare var. americanum (Michx.) Beauv.; Fernald, Rhodora 44:451. 1942. Map 46, dots. Collected largely in the northern portion of the state, extending southward in the central part to Juneau County, and in the eastern part to Milwaukee County; occurs in hogs, Jack Pine barrens and open sandy areas. Prefers acid conditions. Flowering June to August.

21. PEDICULARIS [Bauhin] L. Lousewort; Wood Betony

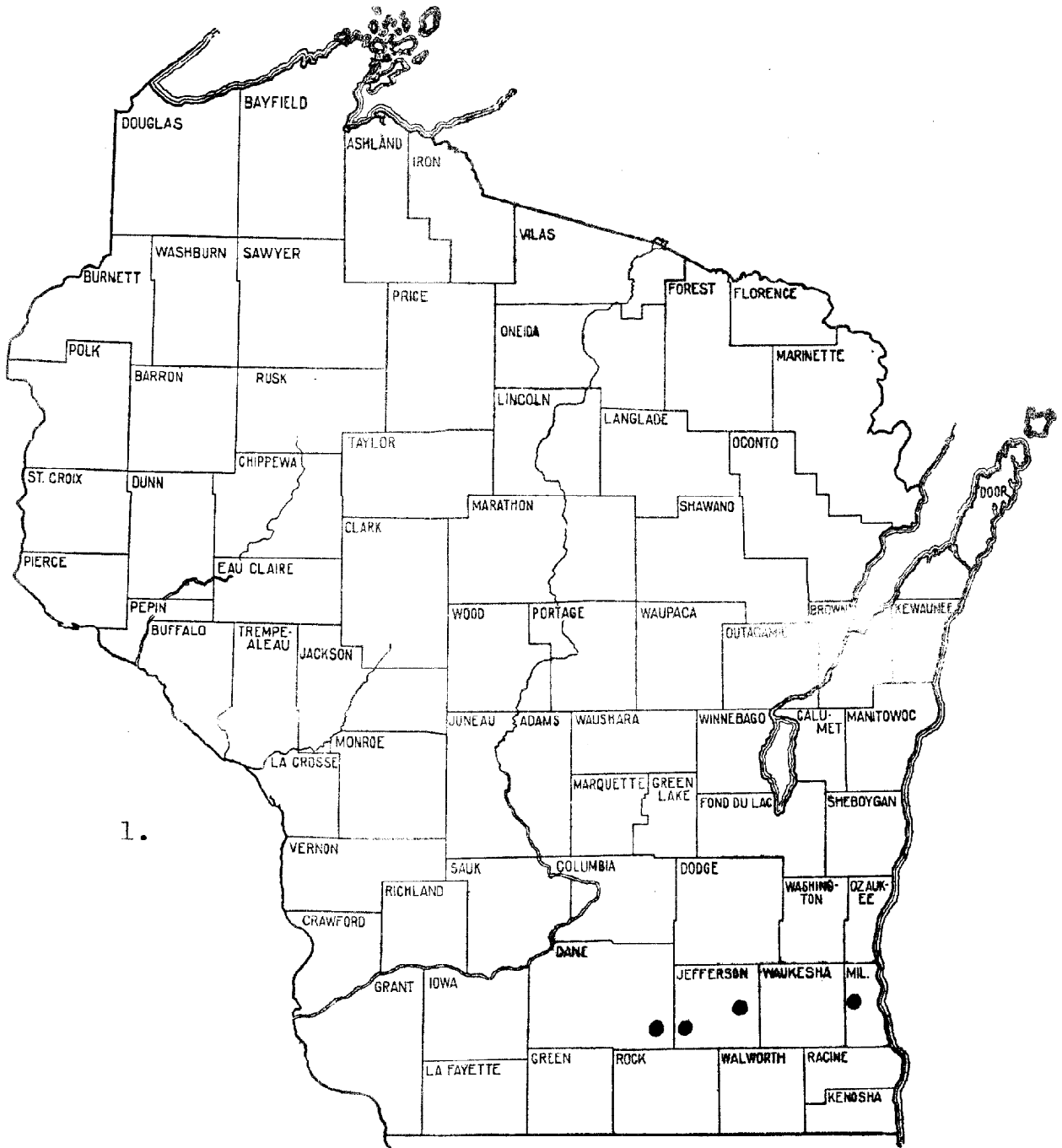
- a. Stem leaves alternate, on long petioles, deeply lobed;
galea with two short spurs..... P. canadensis
- a. Stem leaves opposite, on short petioles, pinnatifid;
galea without spurs..... P. lanceolata
1. P. canadensis L. Wood Betony; Woolly Lousewort. Map 47.

Locally abundant throughout the state in dry open woods and fields, usually on sandy soils, and occasionally on light loam soils. Flowering May to June.

A red-flowered form has been collected near the town of Mequon, Ozaukee County, in red-clay along the bluff-sides of Lake Michigan. This individual has been designated f. praeclara A. H. Moore, Rhodora 16:128. 1914. Map 47, crosses. This form has been reported as being locally abundant in some areas of the New England States.

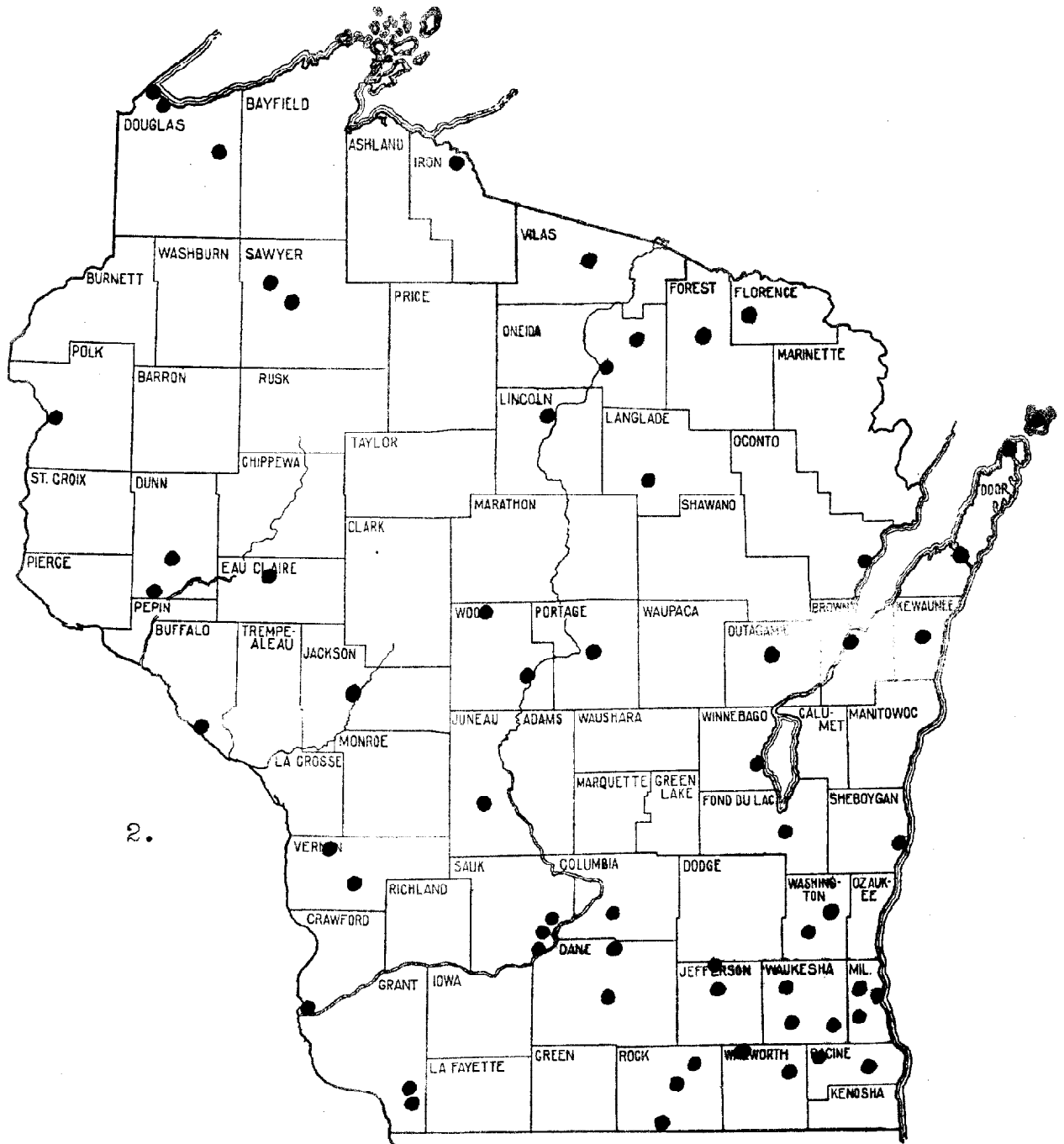
Var. Dobsii Fern. Rhodora 48:59. 1946, has been described as an individual with a stoloniferous habit and an apparently less caespitose tendency. An examination of the specimens in the two herbaria, as well as extensive collections during the past summer has failed to distinguish any appreciable differences to warrant distinction at this time.

2. P. lanceolata Michx. Betony. Map 48. Distributed mostly in the southern portion of the state, extending northward to Polk, Langlade and Marinette Counties. Prefers moist woods, tamarack bogs and low places, usually on loam soils. Flowering early August to October.

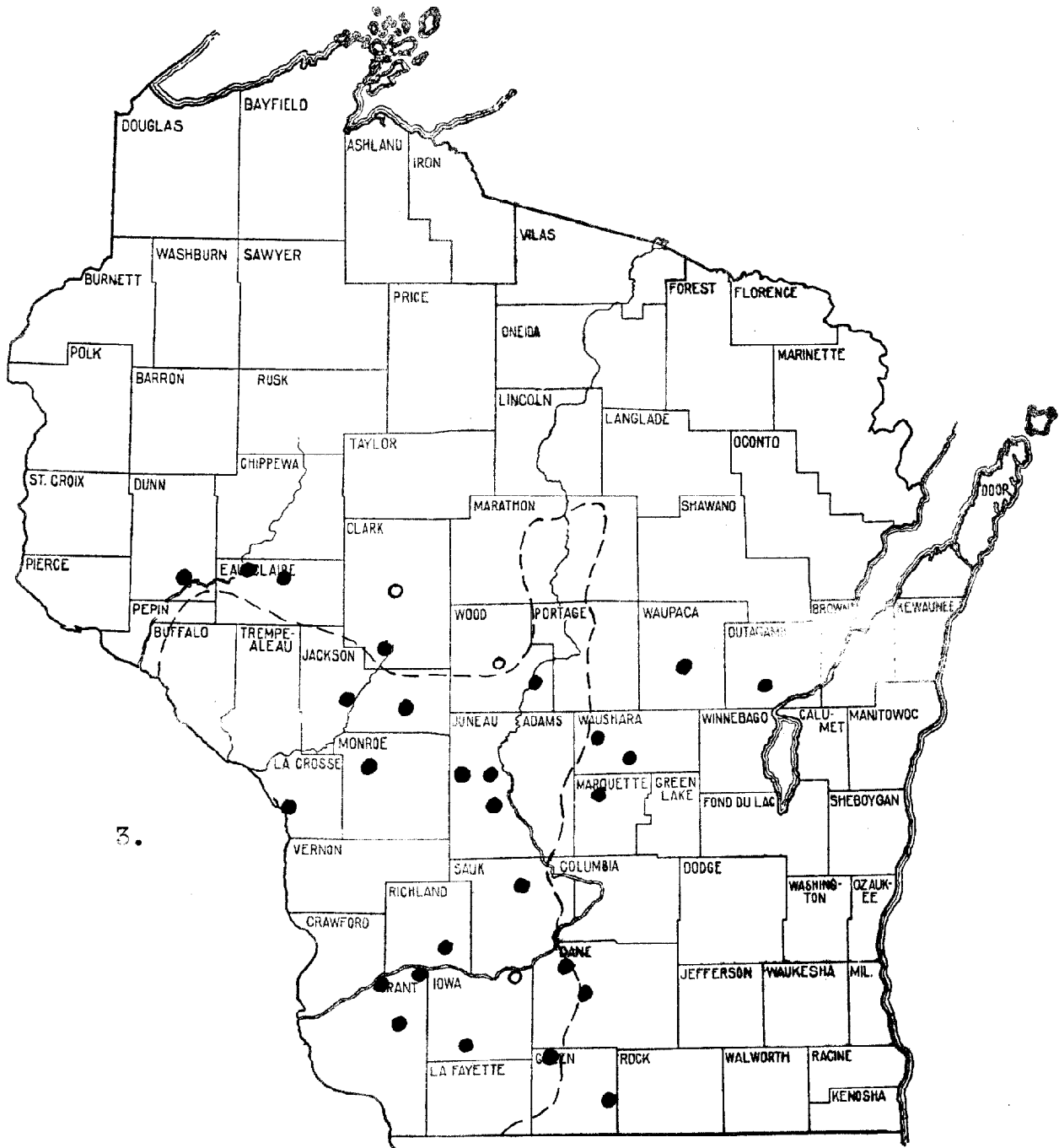


1.

Verbascum Blattaria

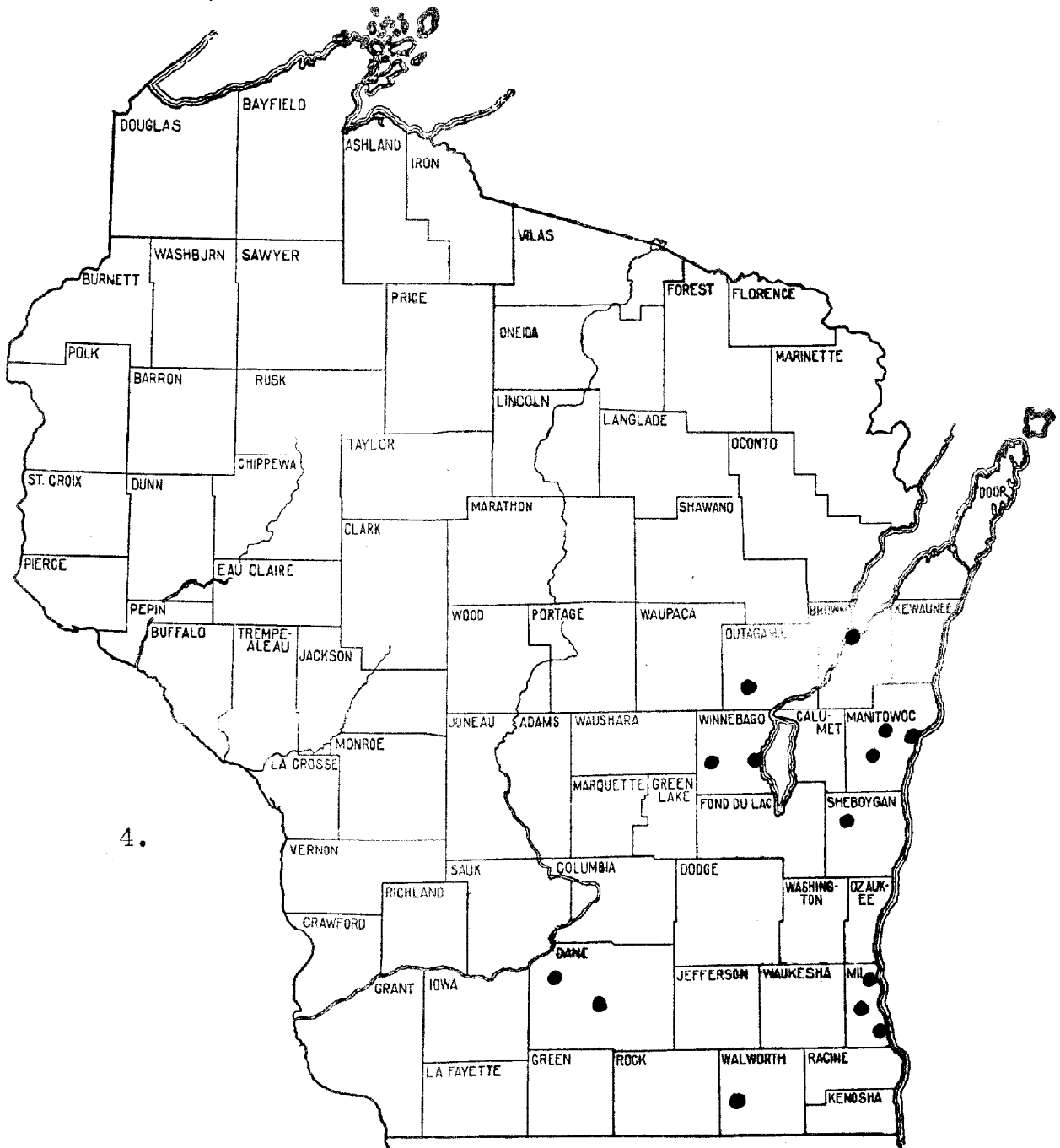


Linaria vulgaris



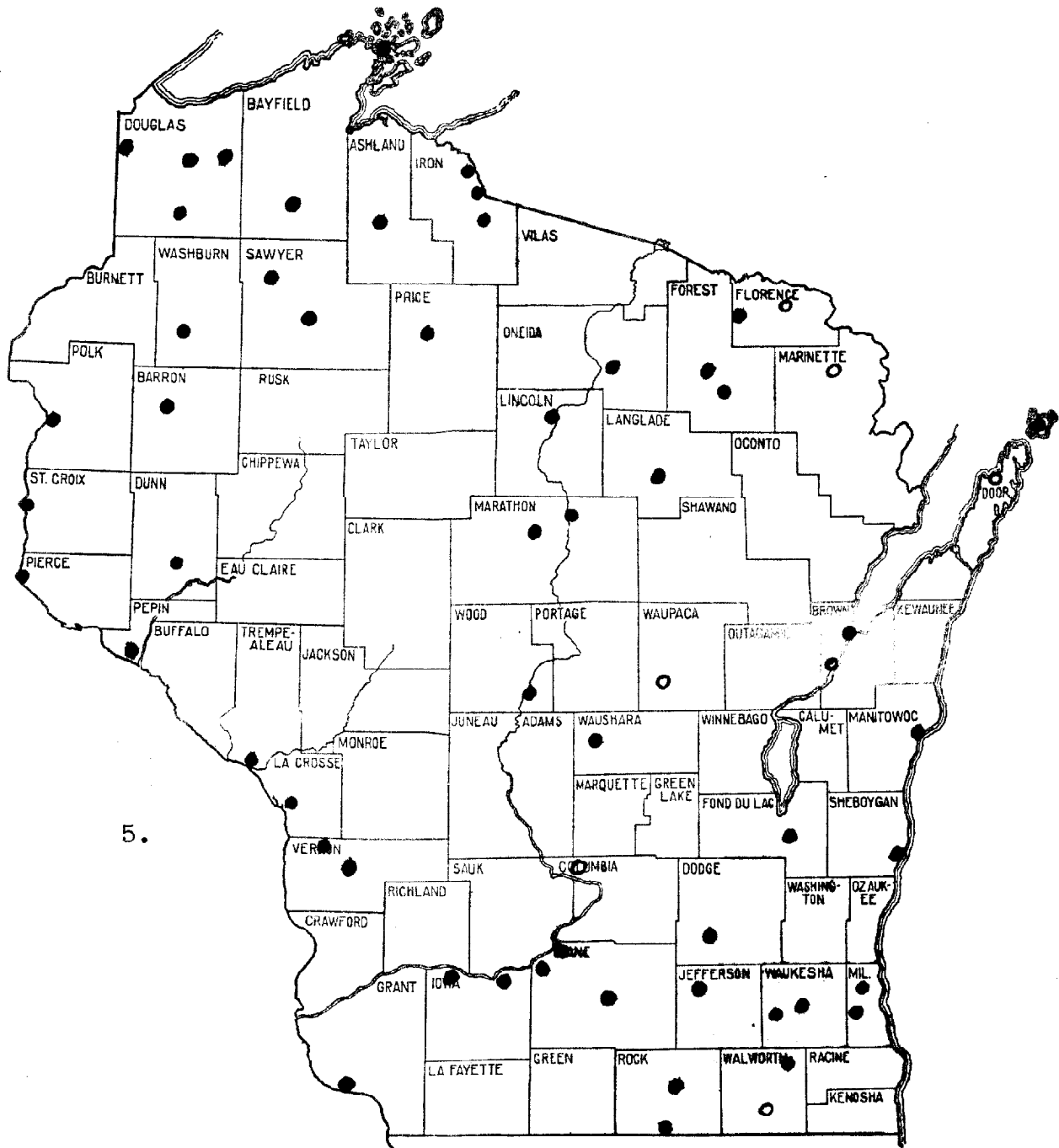
3.

Linaria canadensis



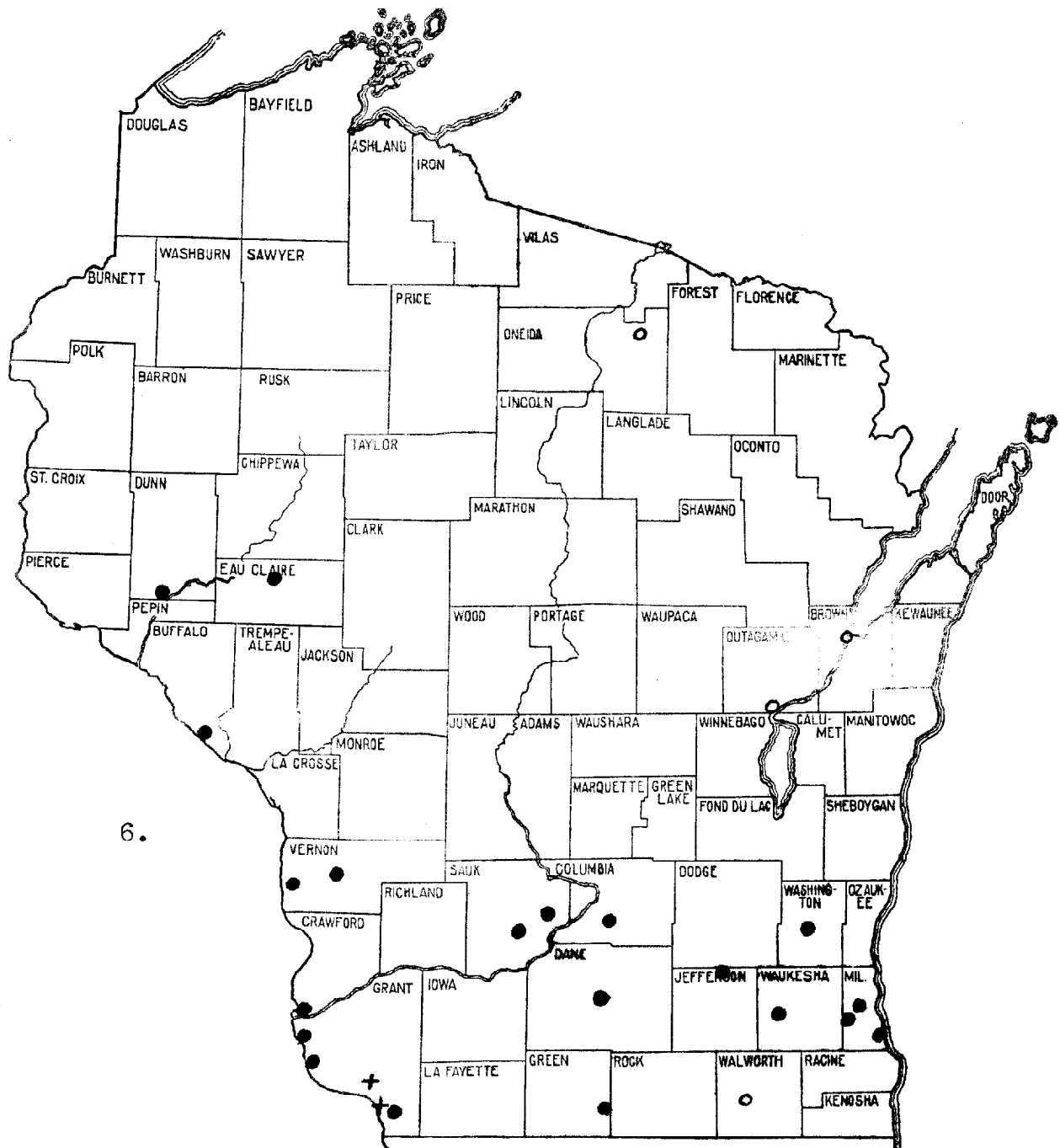
4.

Chaenorhynchus minus



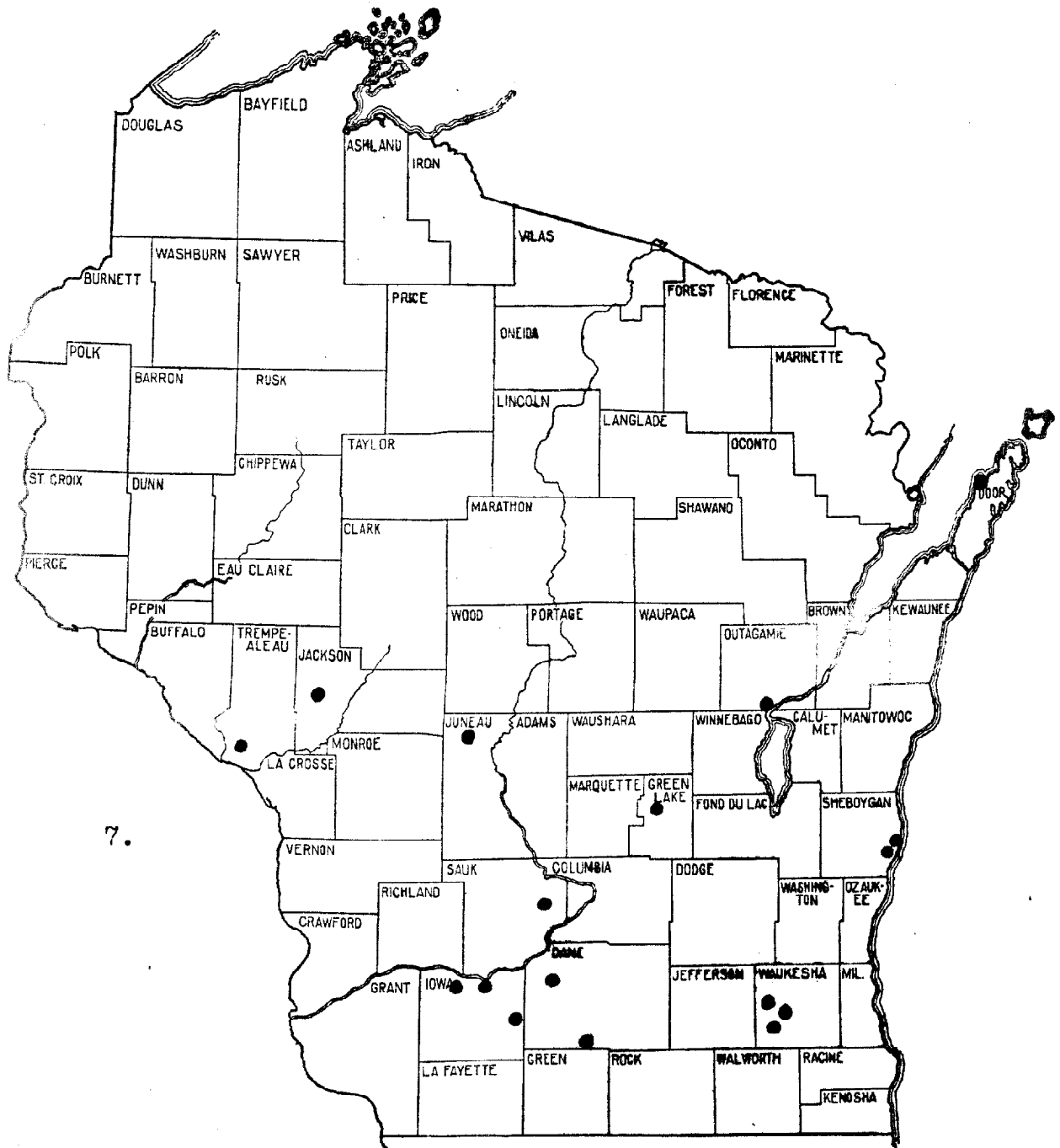
5.

Scrophularia lanceolata



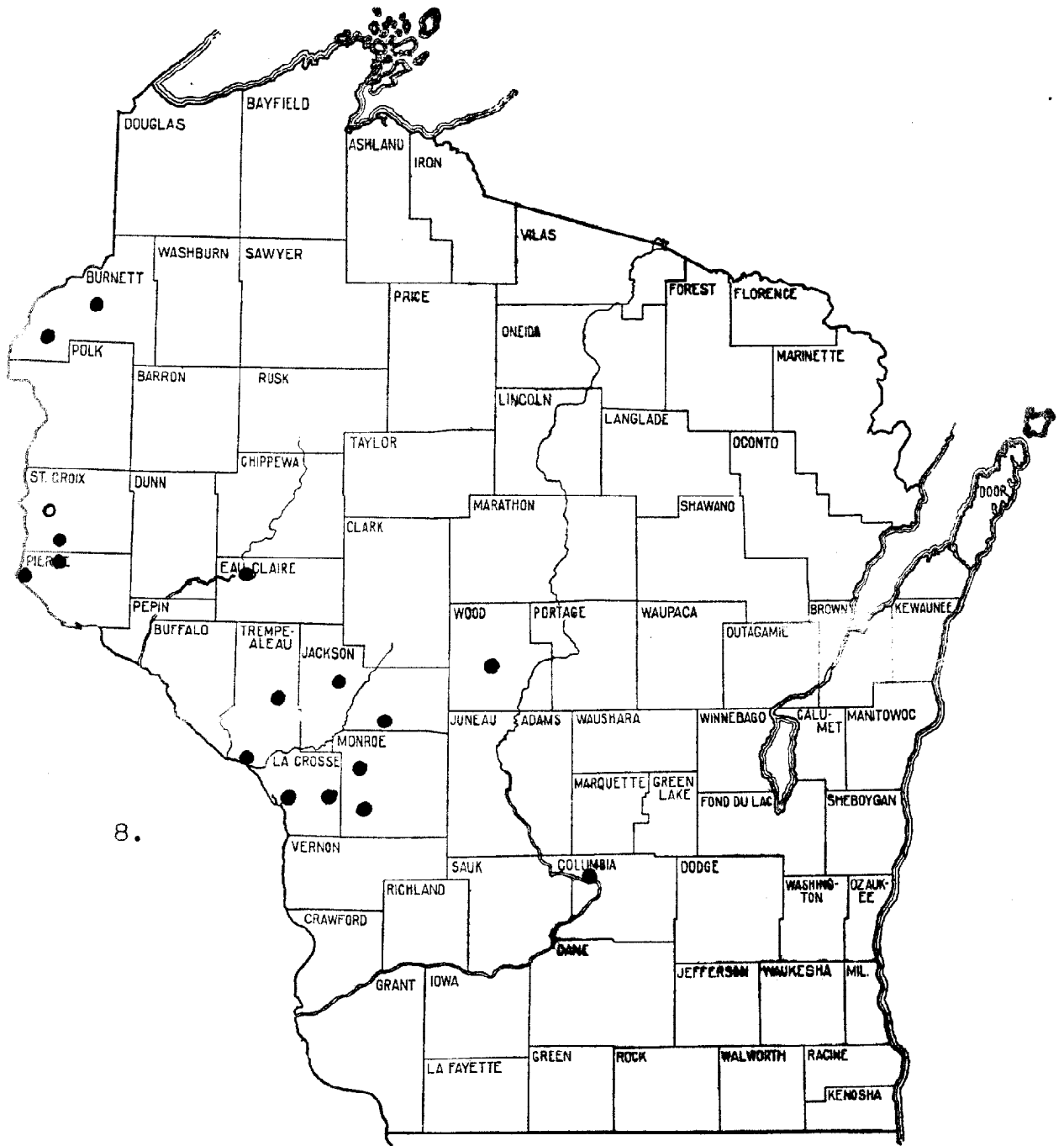
6.

● *Scrophularia marilandica*
 + *f. neglecta*



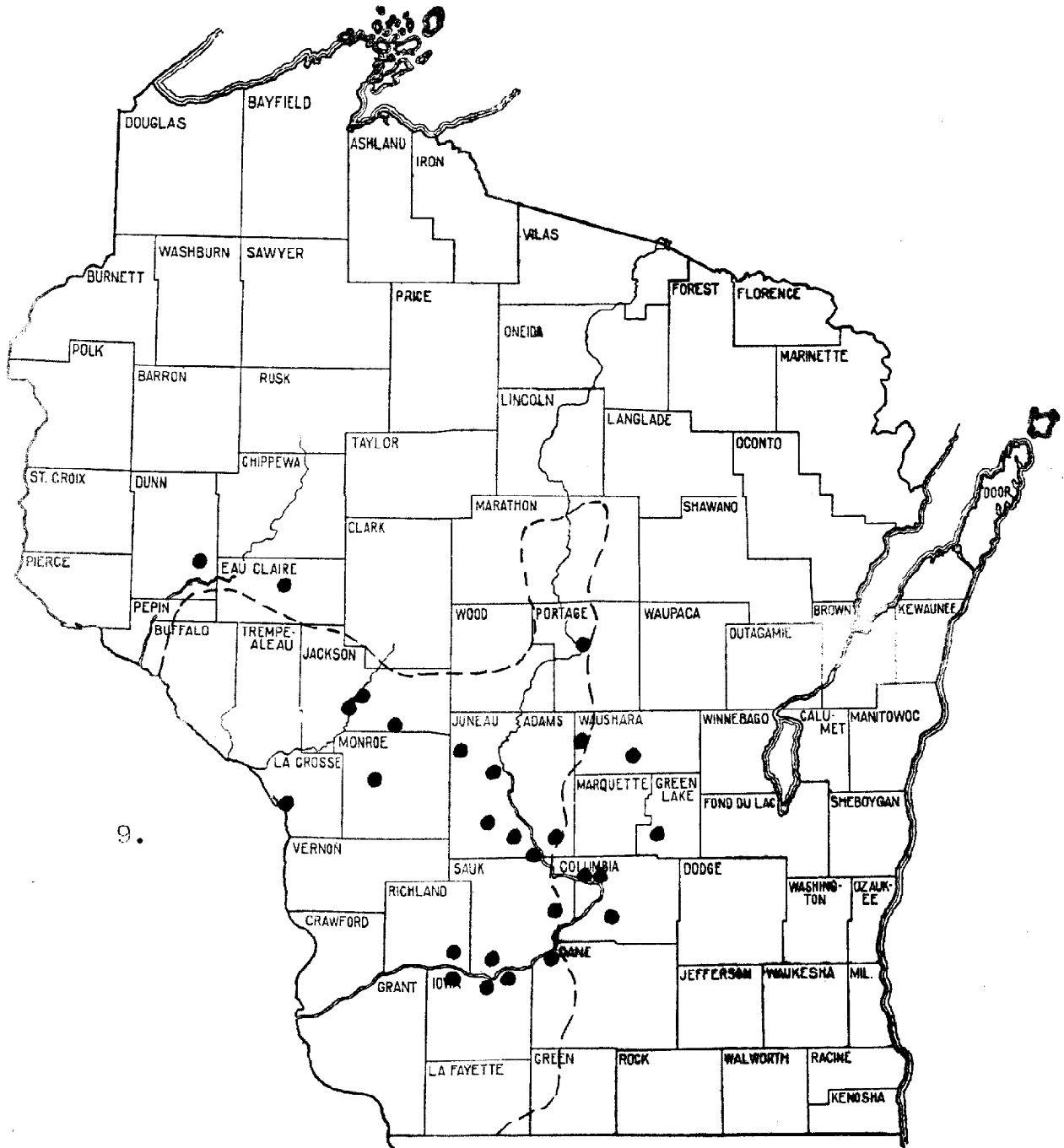
7.

Penstemon Digitalis



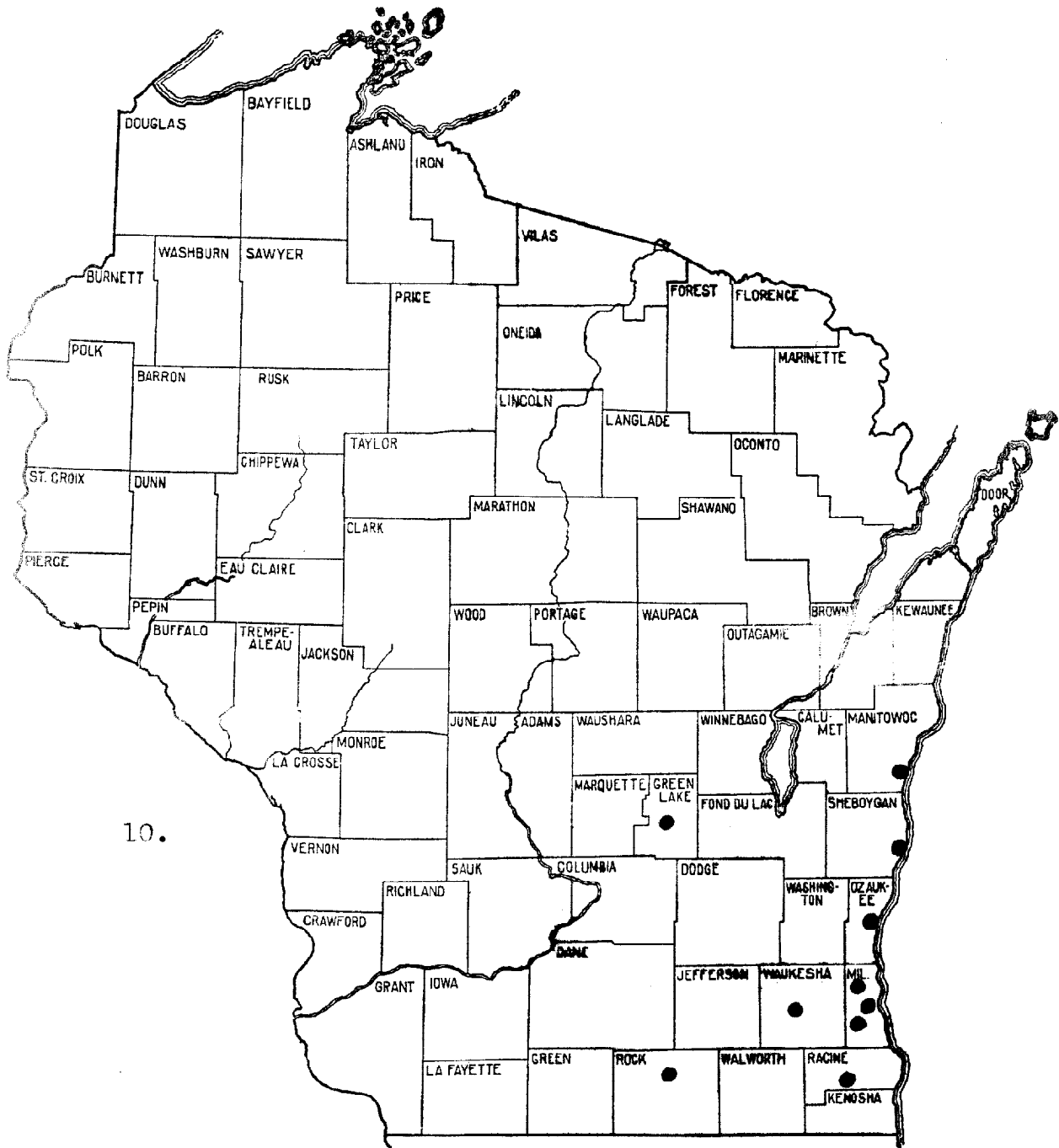
8.

Penstemon gracilis



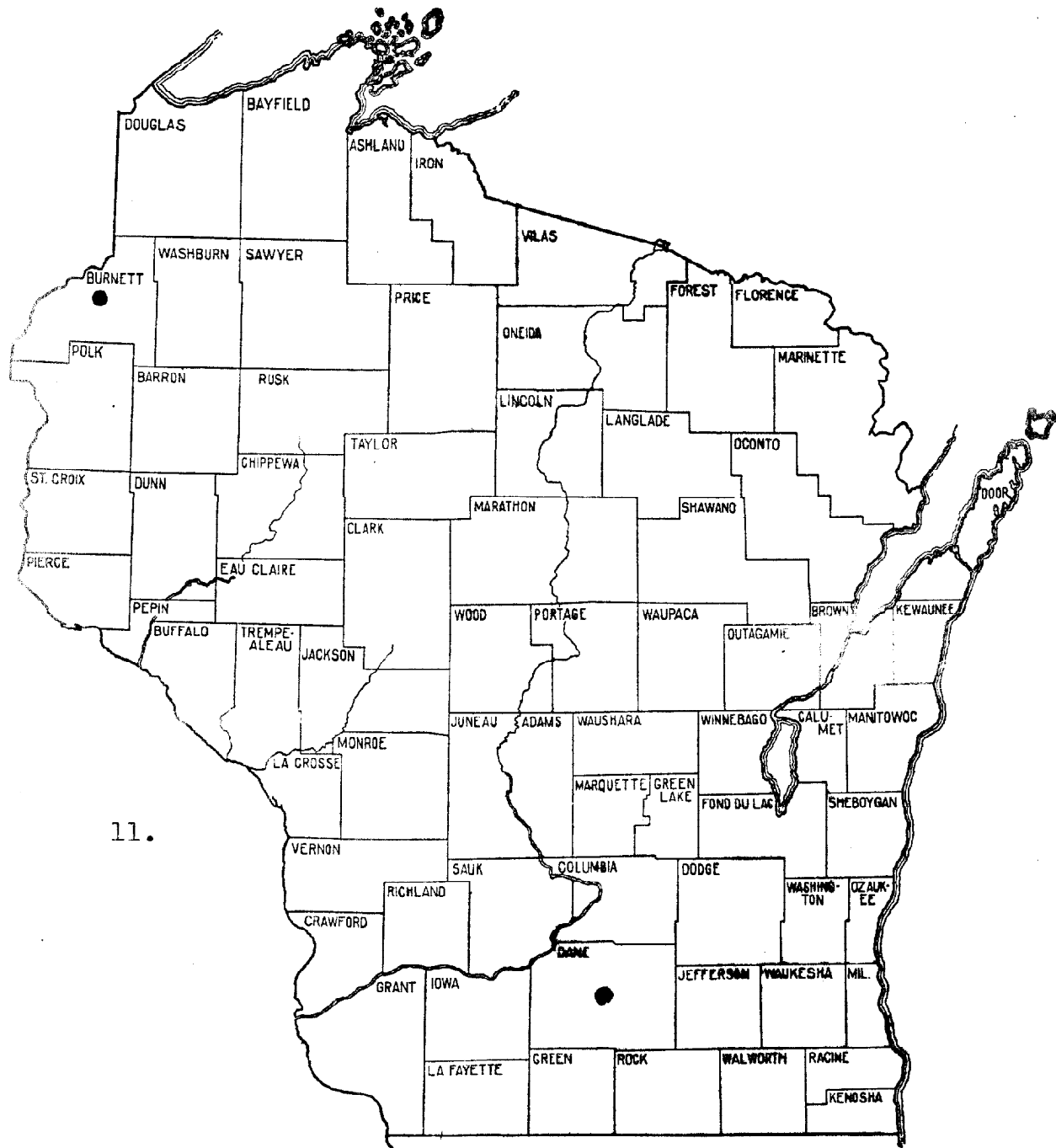
9.

Penstemon gracilis var. *wisconsinensis*



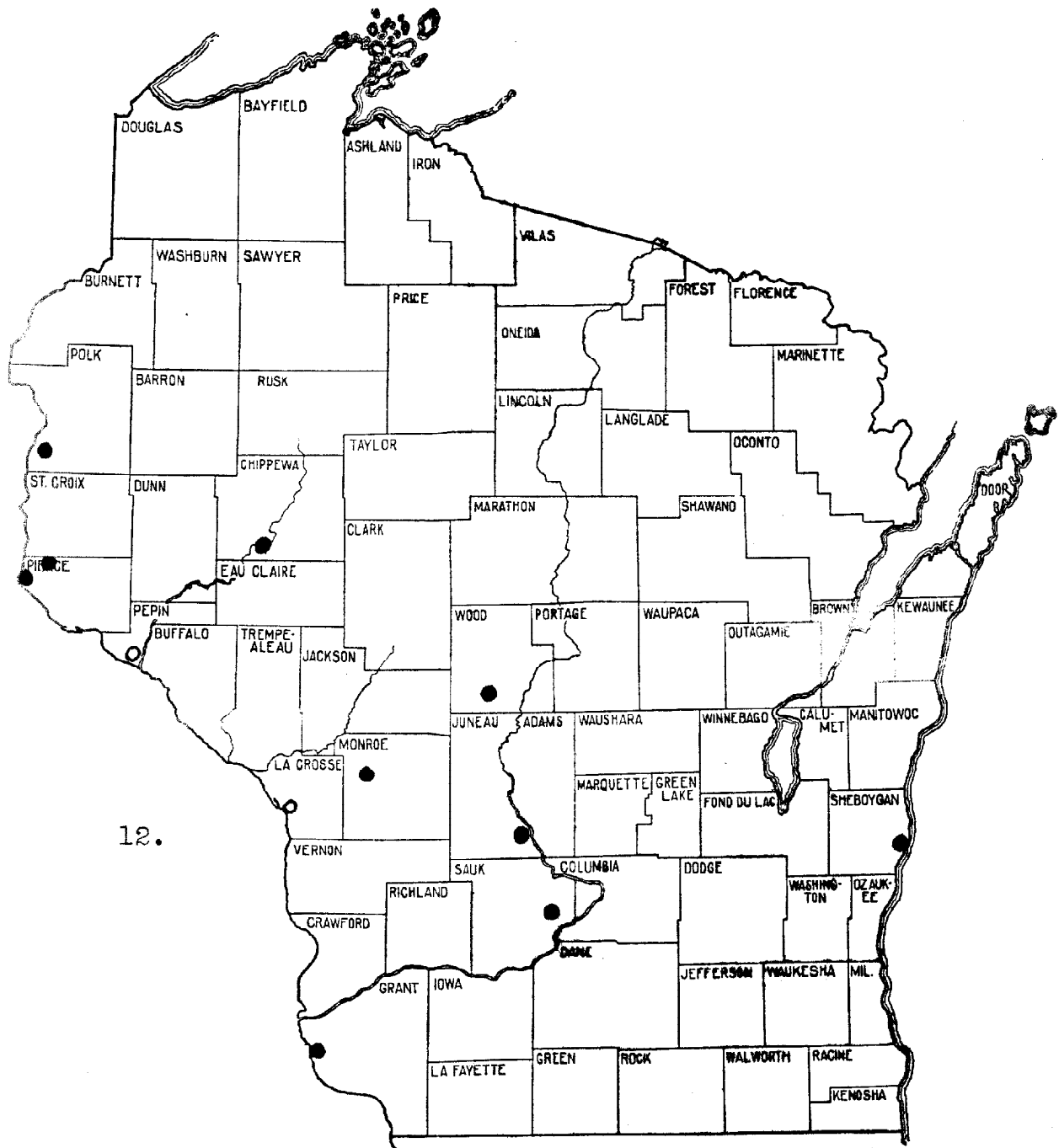
10.

Penstemon hirsutus

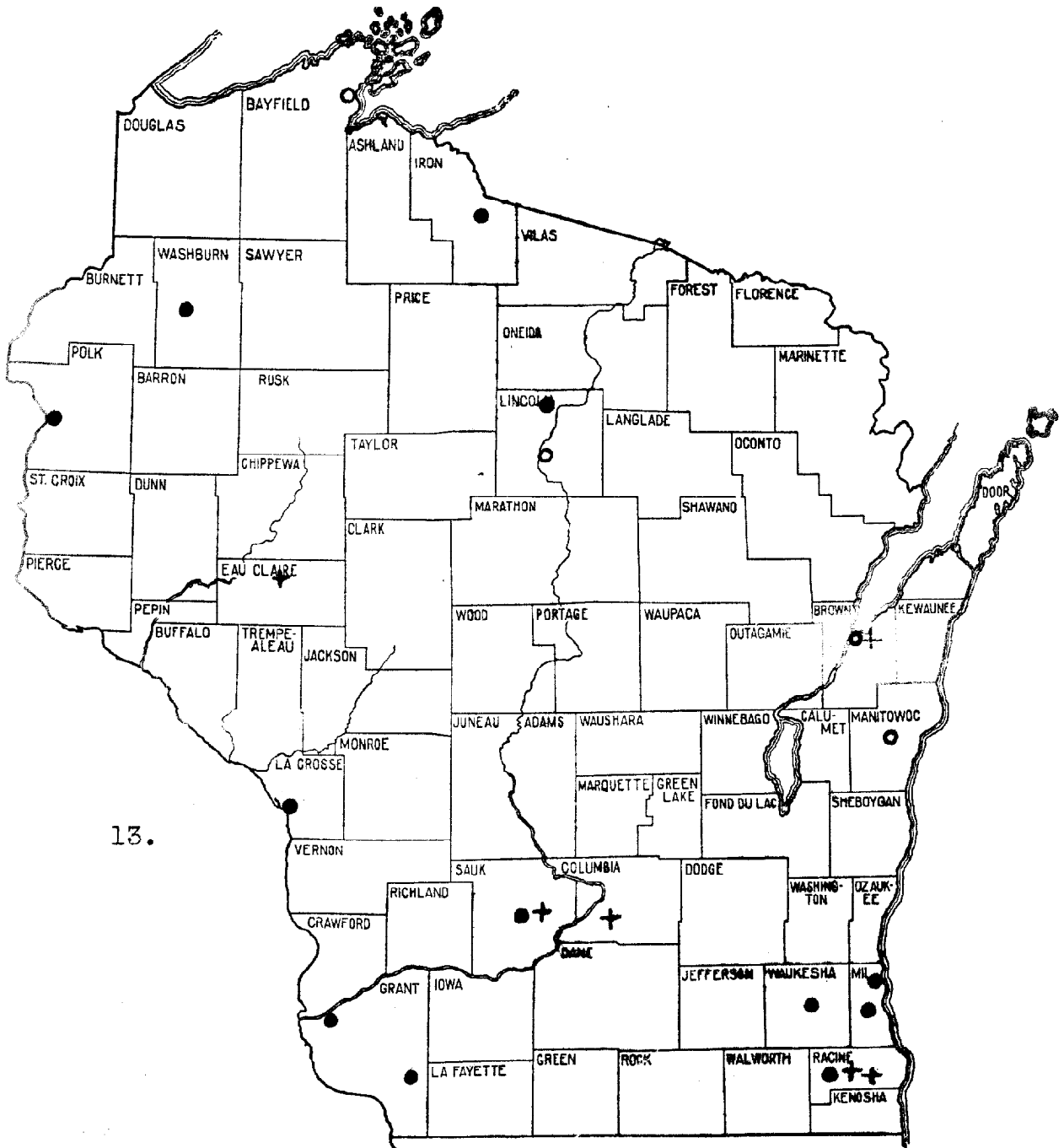


11.

Penstemon tubaeiflorus



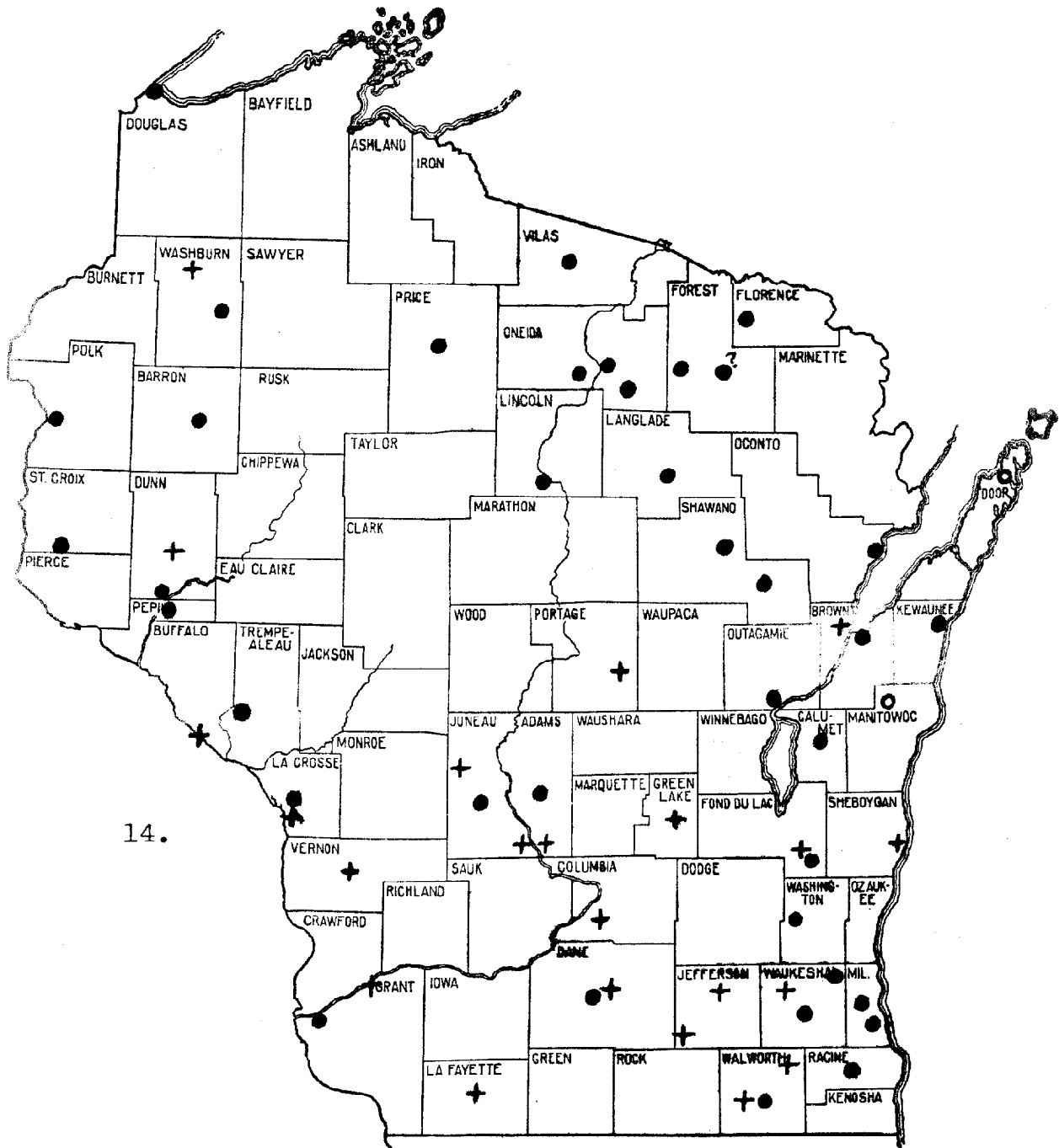
Penstemon grandiflorus



13.

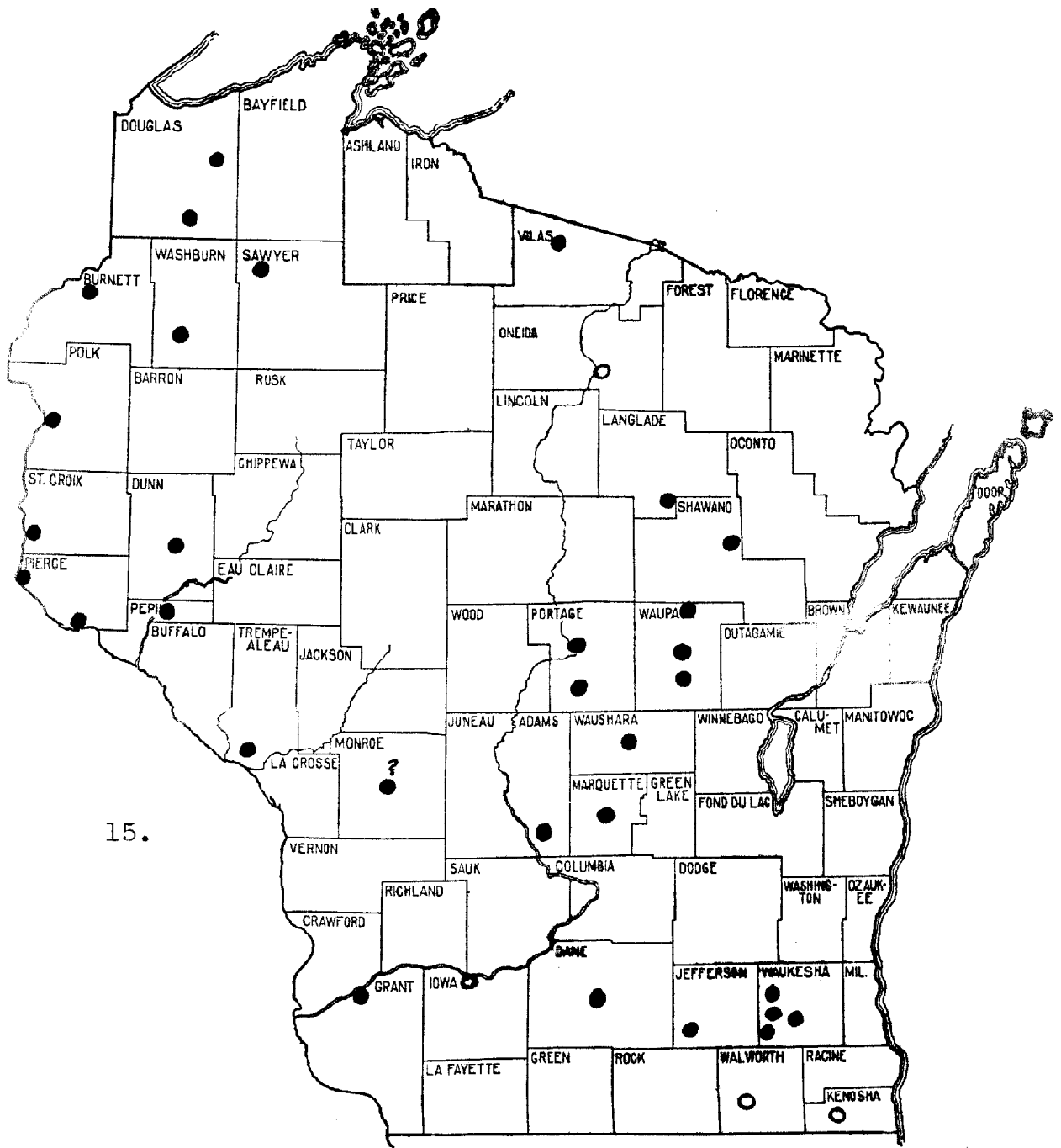
● *Chelone glabra* var. *typica*

+ *Chelone glabra* f. *tomentosa*



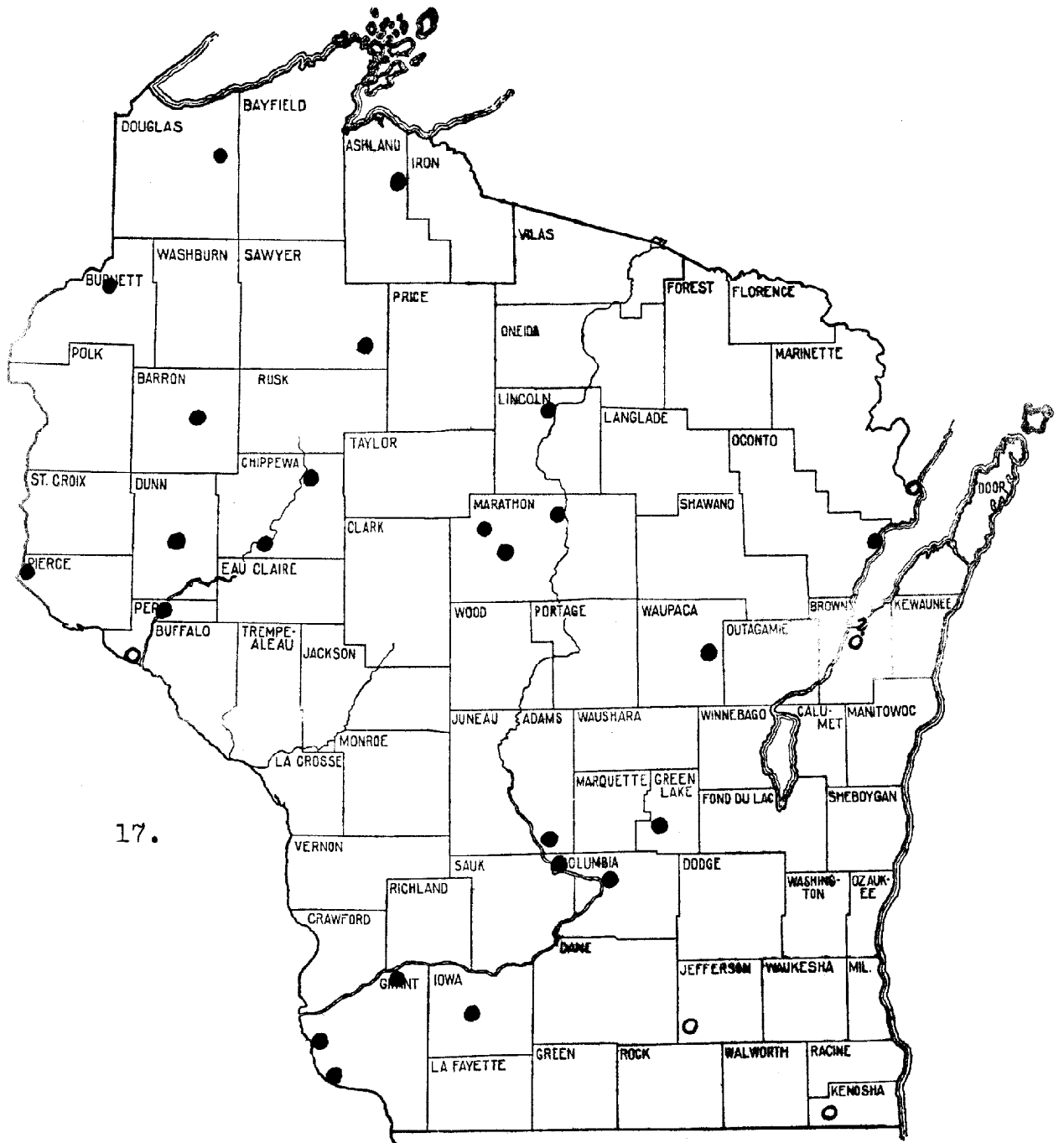
14.

● *Chelone glabra* var. *linifolia*
 + *Chelone glabra* f. *velutina*



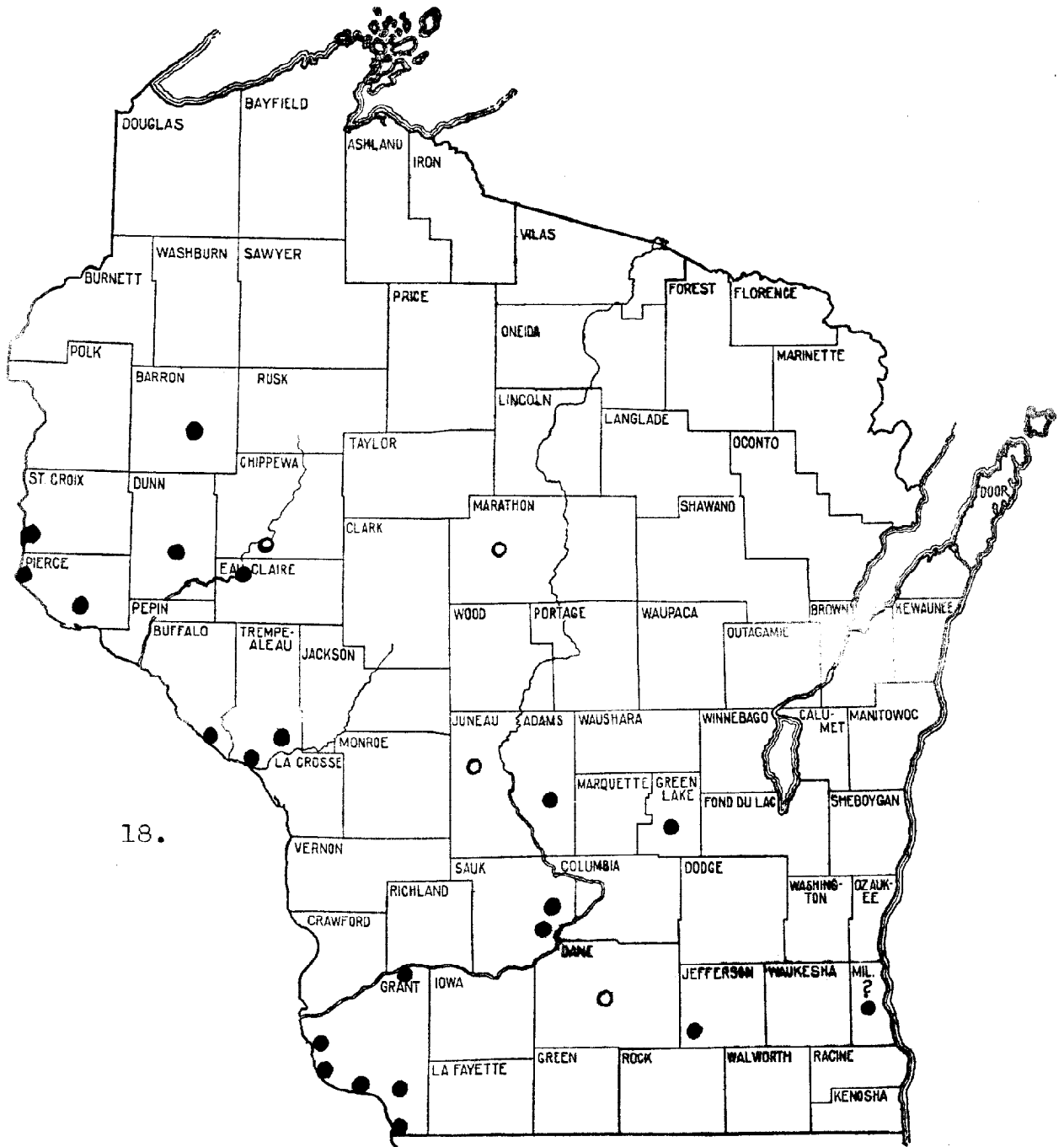
15.

Mimulus glabratus var. *Fremontii*

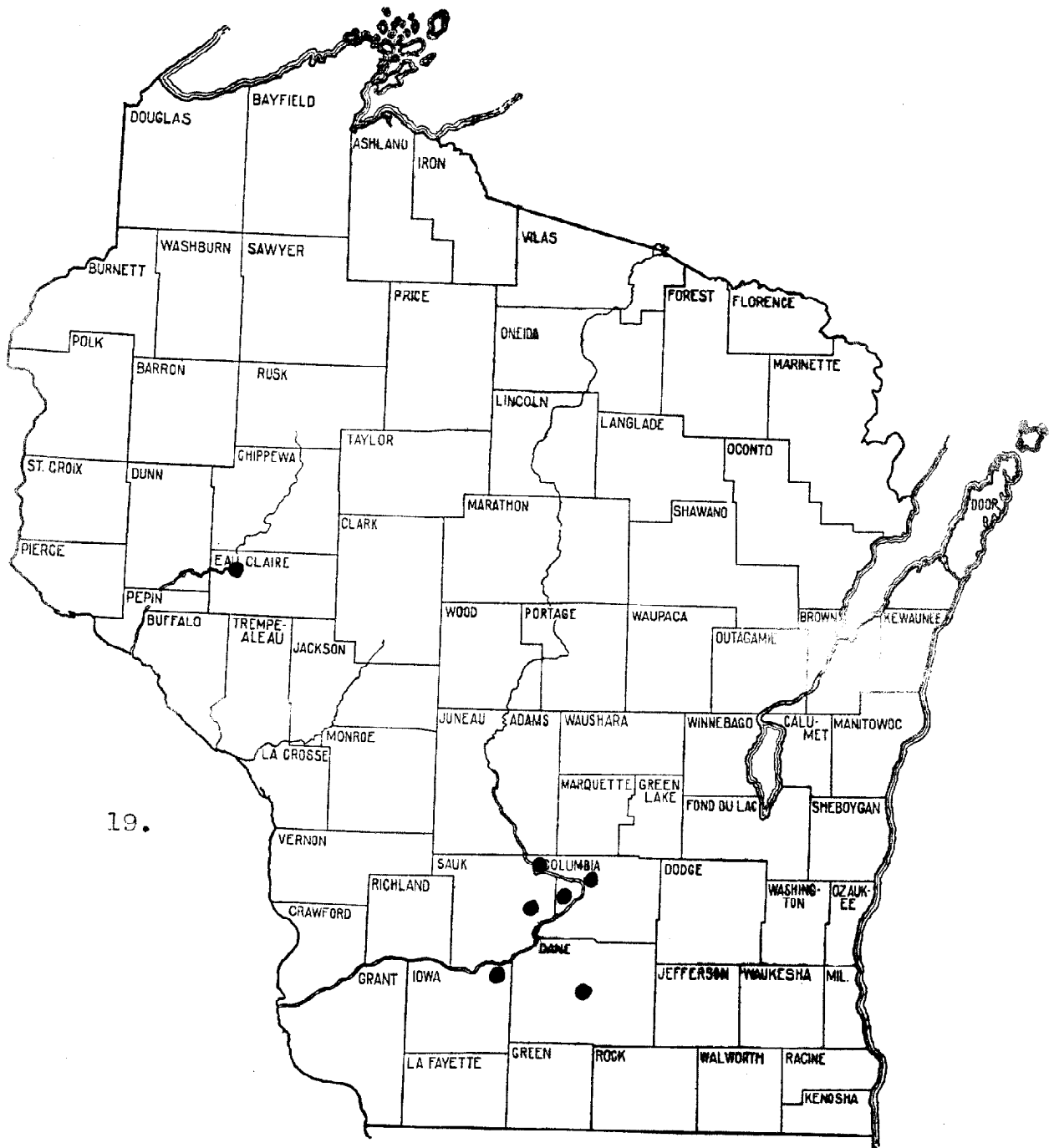


17.

Lindernia dubia

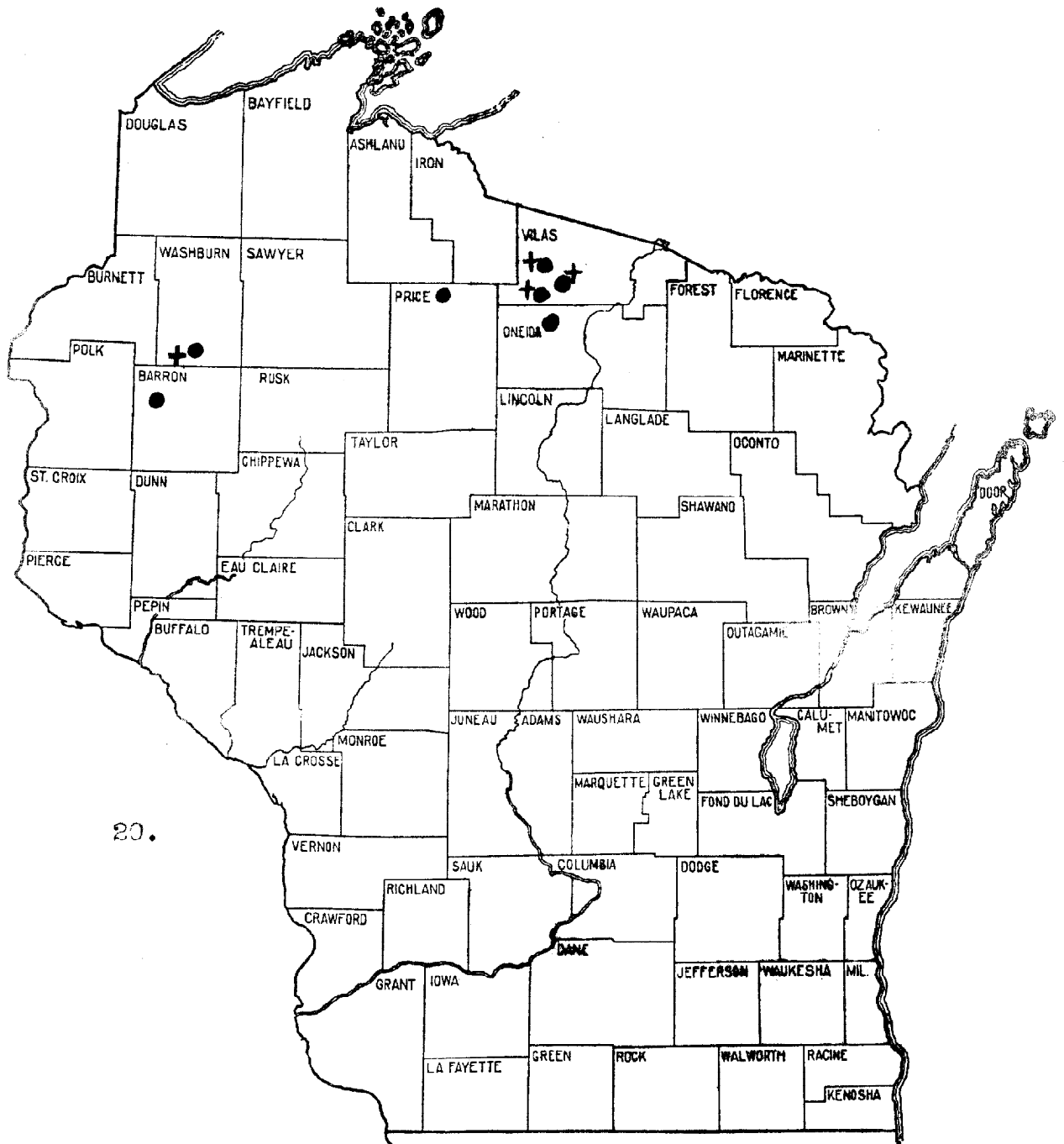


Lindernia dubia var. *riparia*



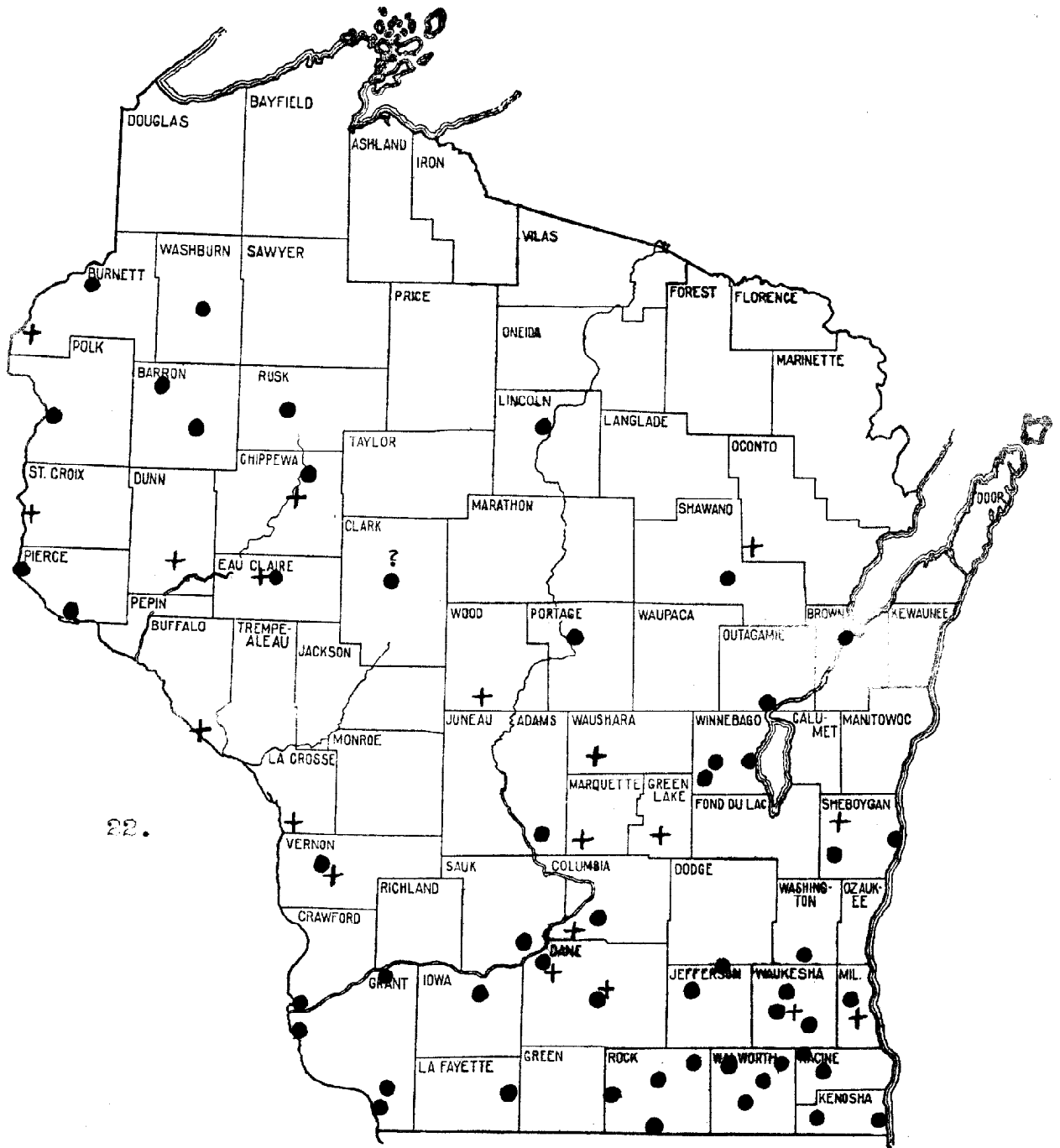
19.

Lindernia anagallidea



20.

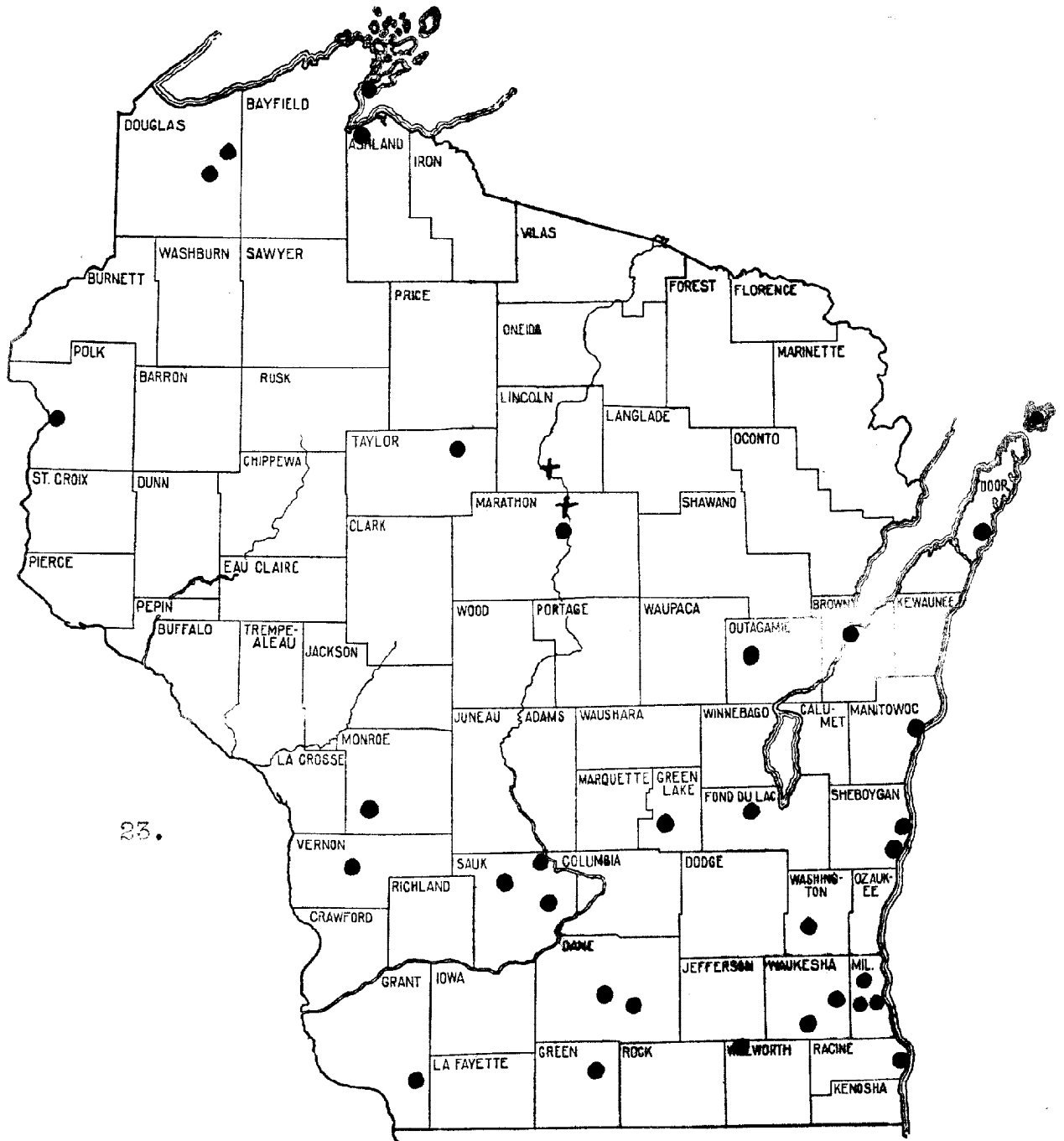
● *Gratiola lutea*
 + *f. pusilla*



22.

● *Veronicastrum virginicum*

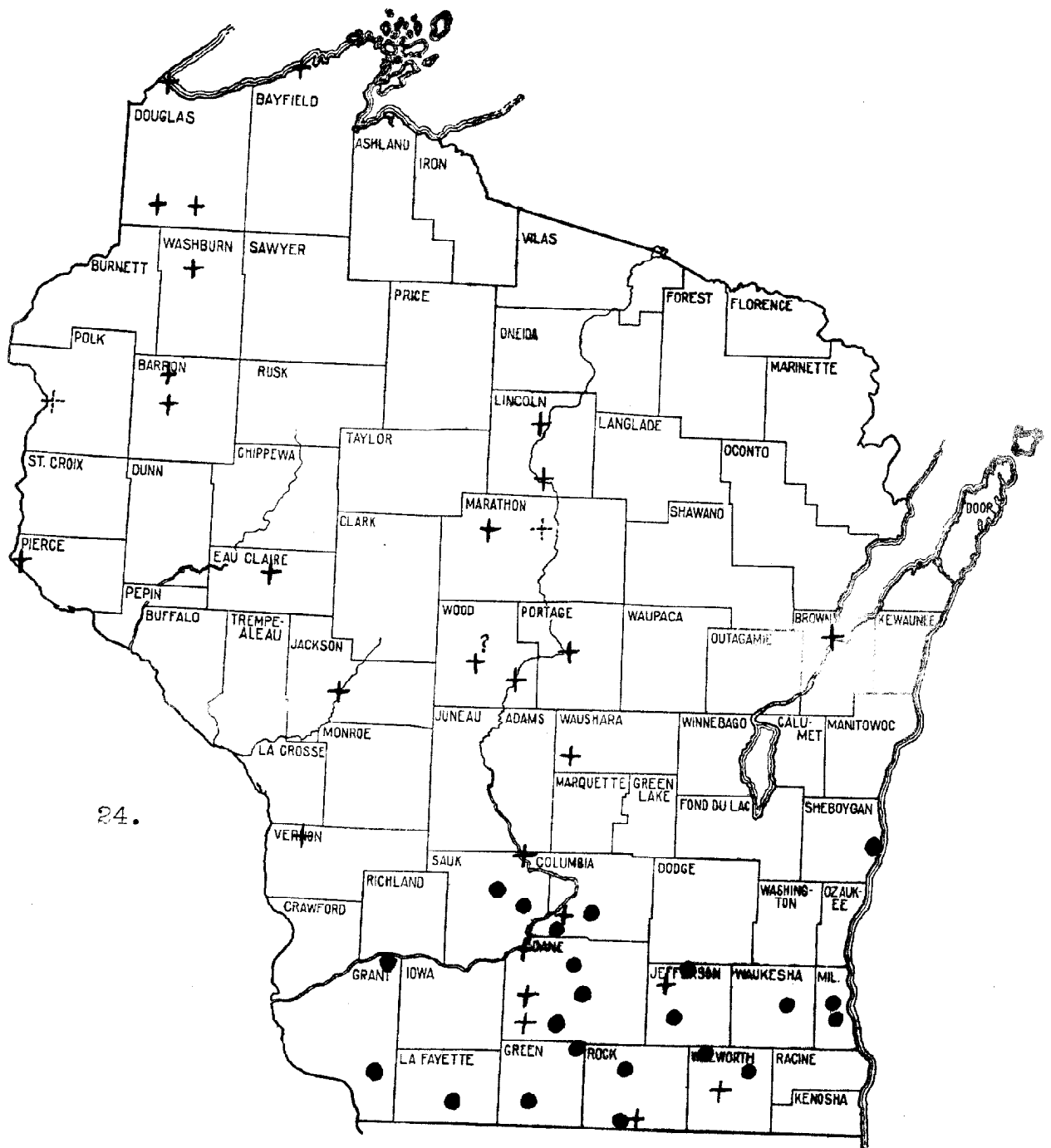
+ *f. villosum*



23.

● *Veronica serpyllifolia*

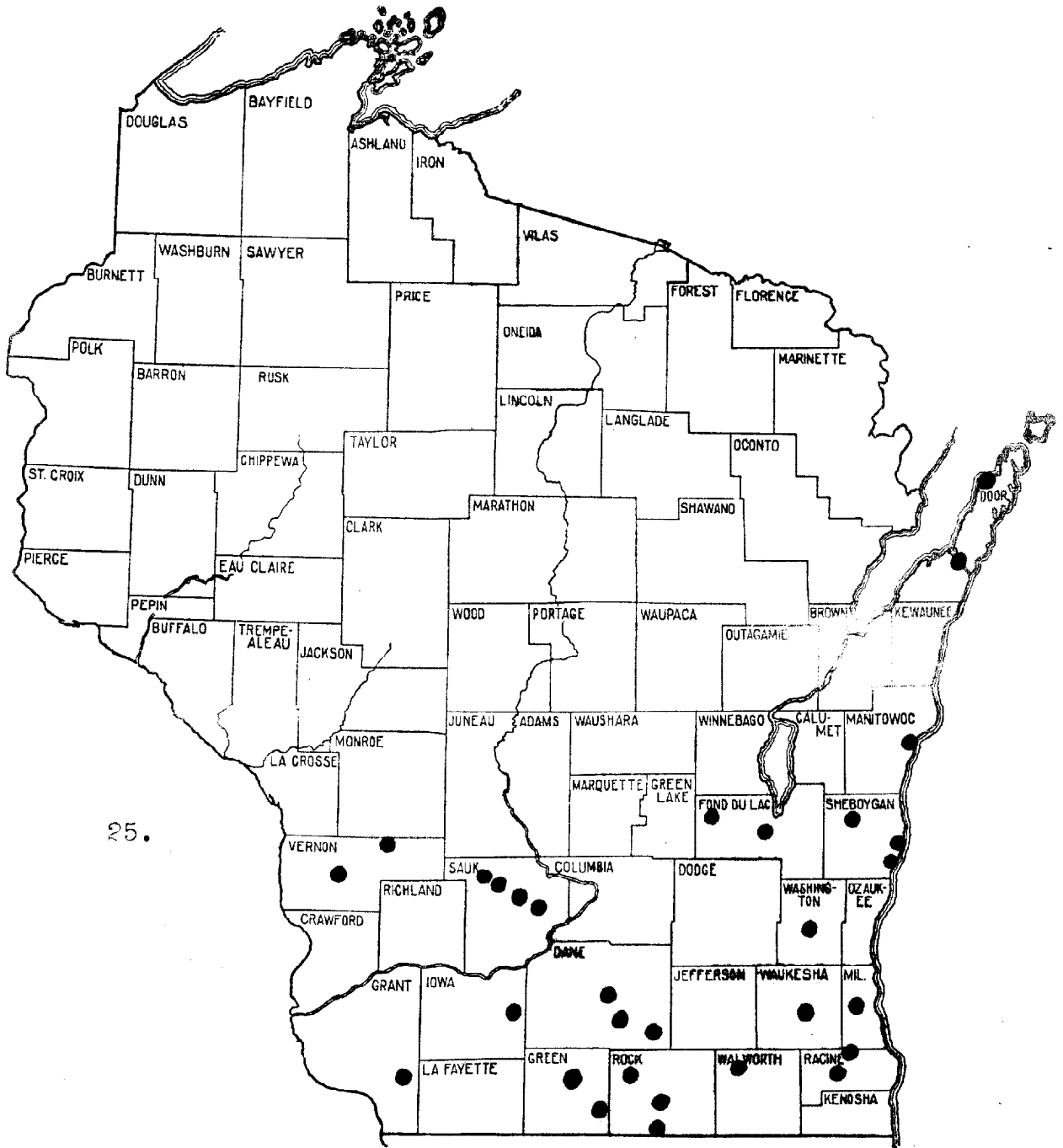
+ *Veronica humifusa*



24.

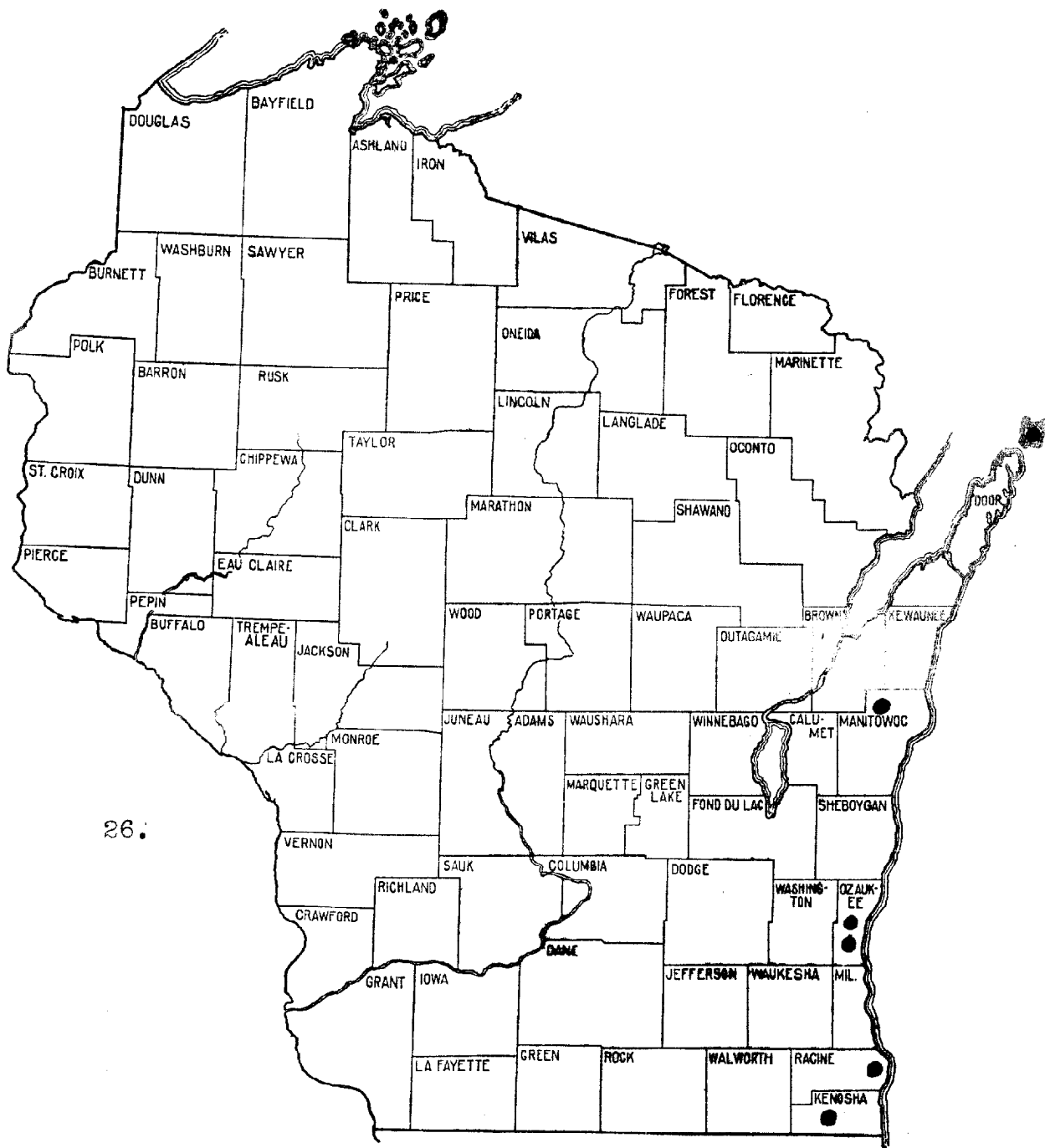
● *Veronica peregrina*

+ *Veronica peregrina* var. *xalapensis*



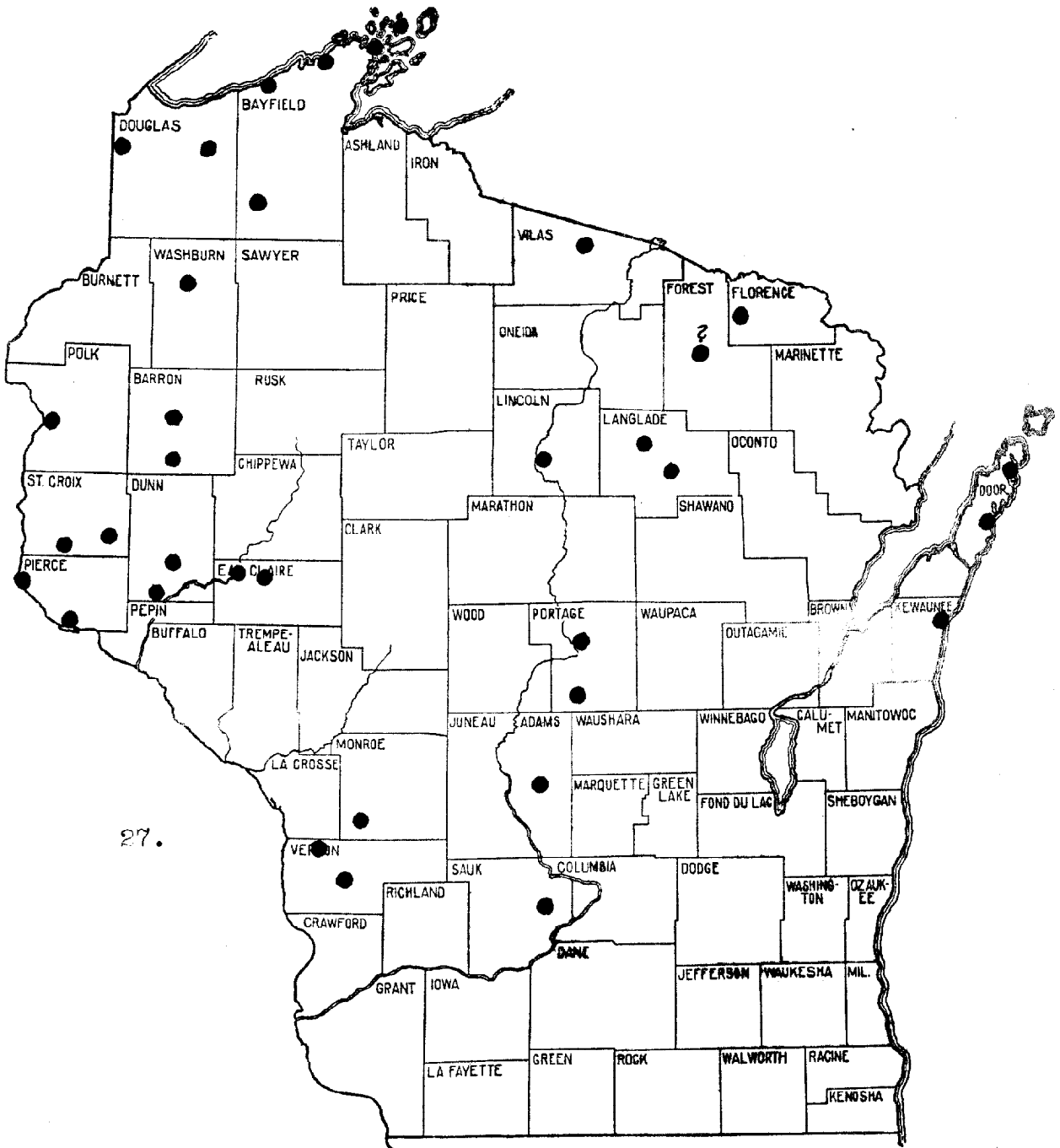
25.

Veronica arvensis



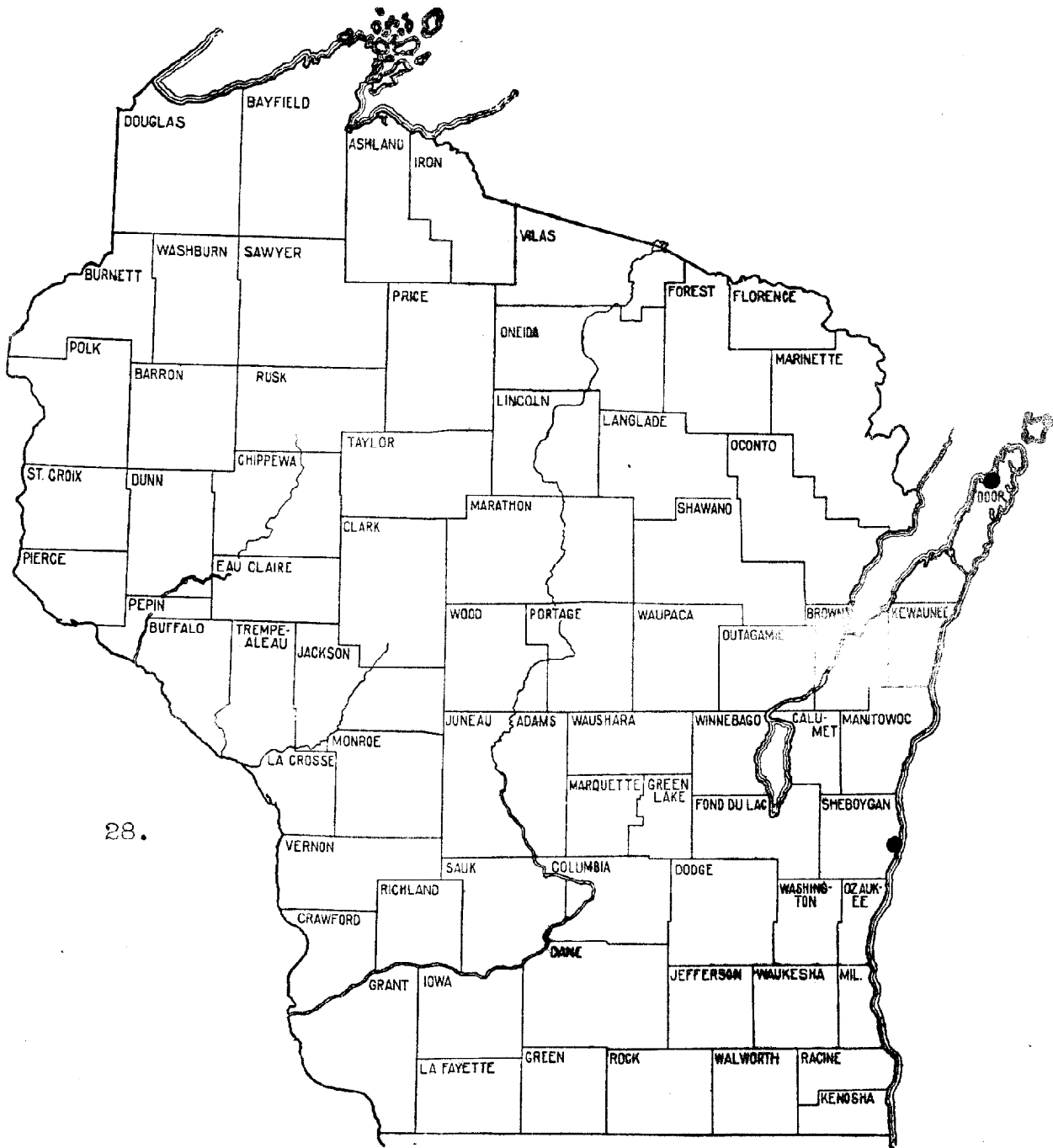
26.

Veronica officinalis



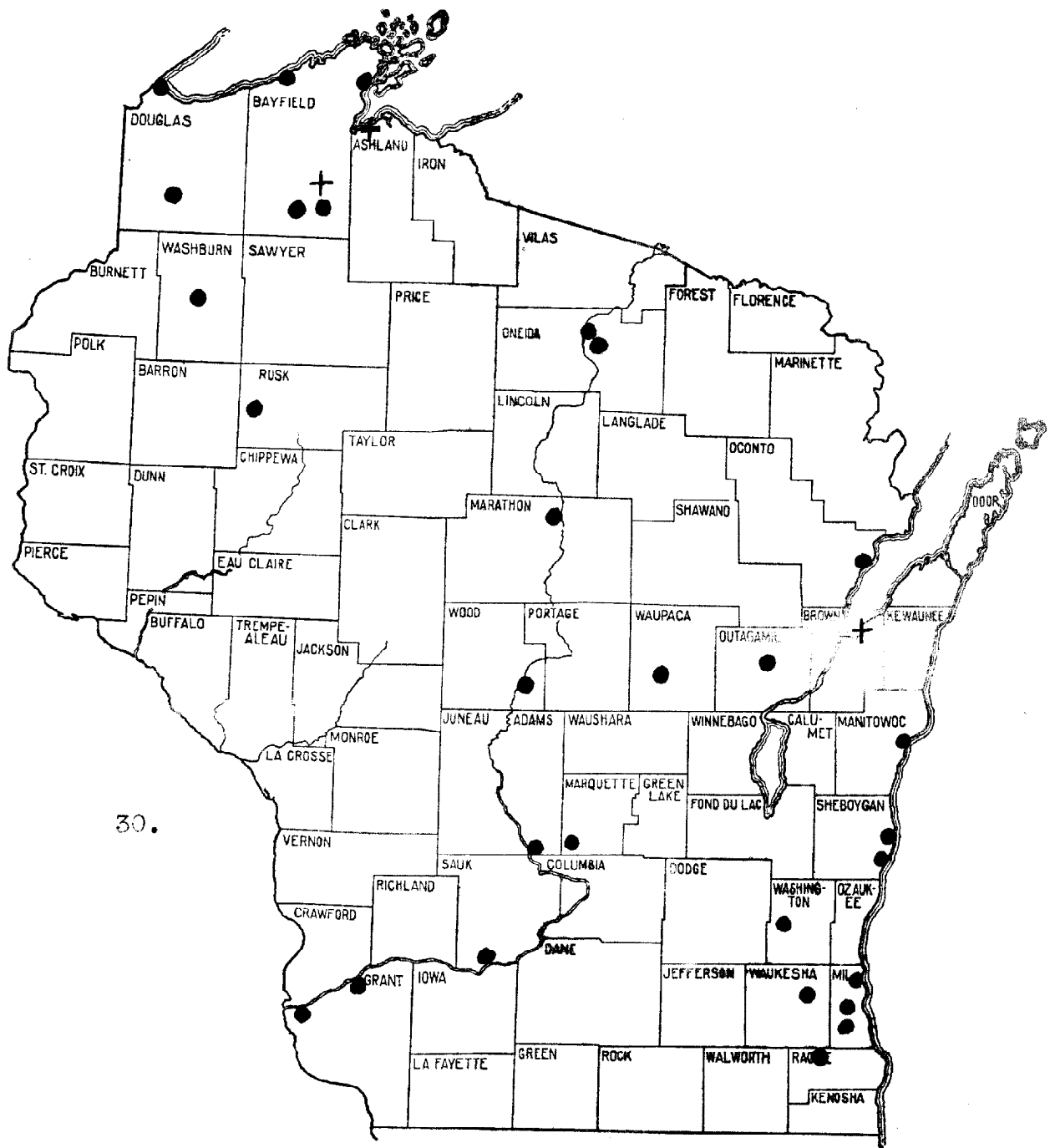
27.

Veronica americana



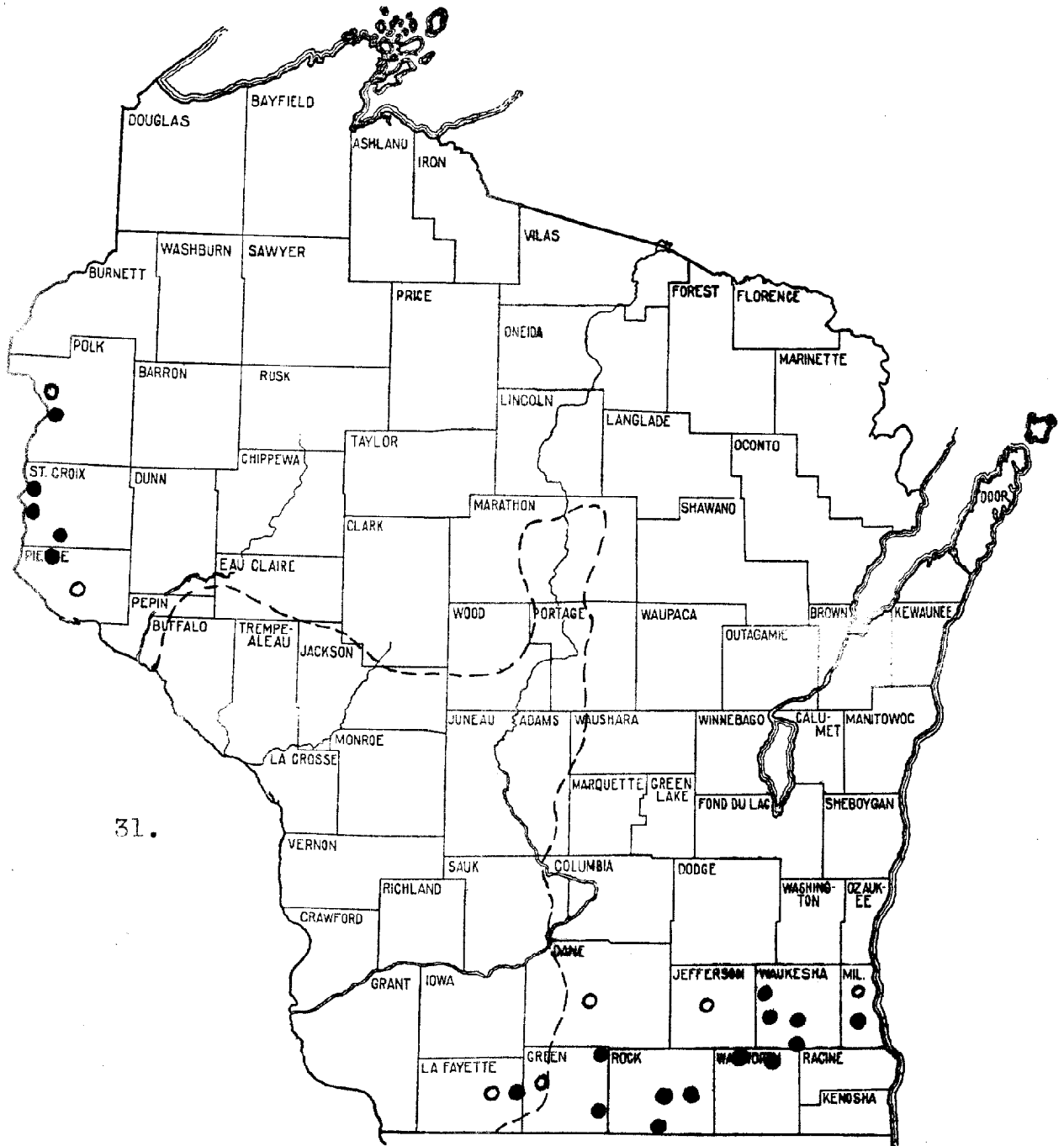
28.

Veronica Anagallis-aquatica



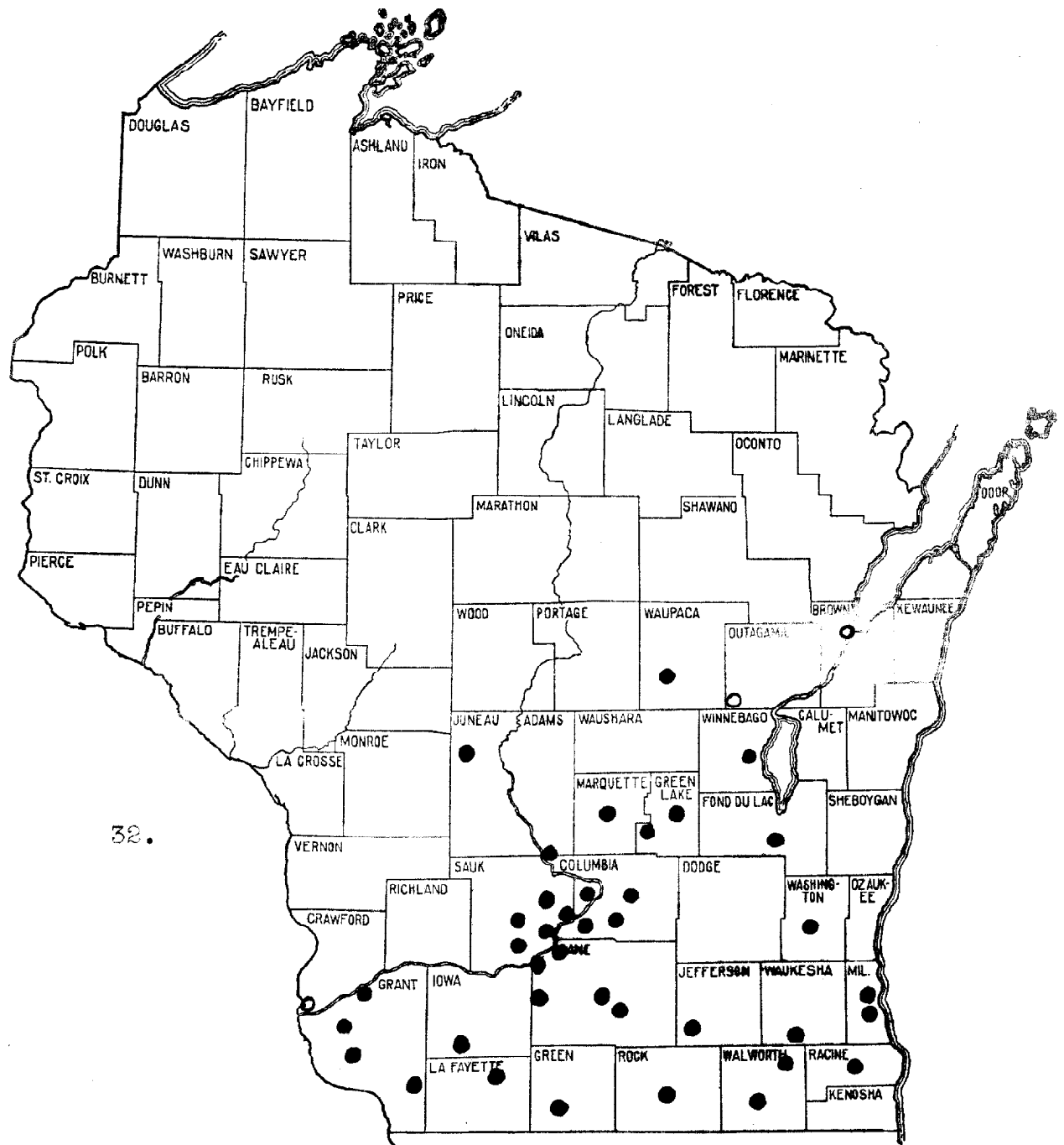
30.

● *Veronica scutellata*
 + *f. villosa*



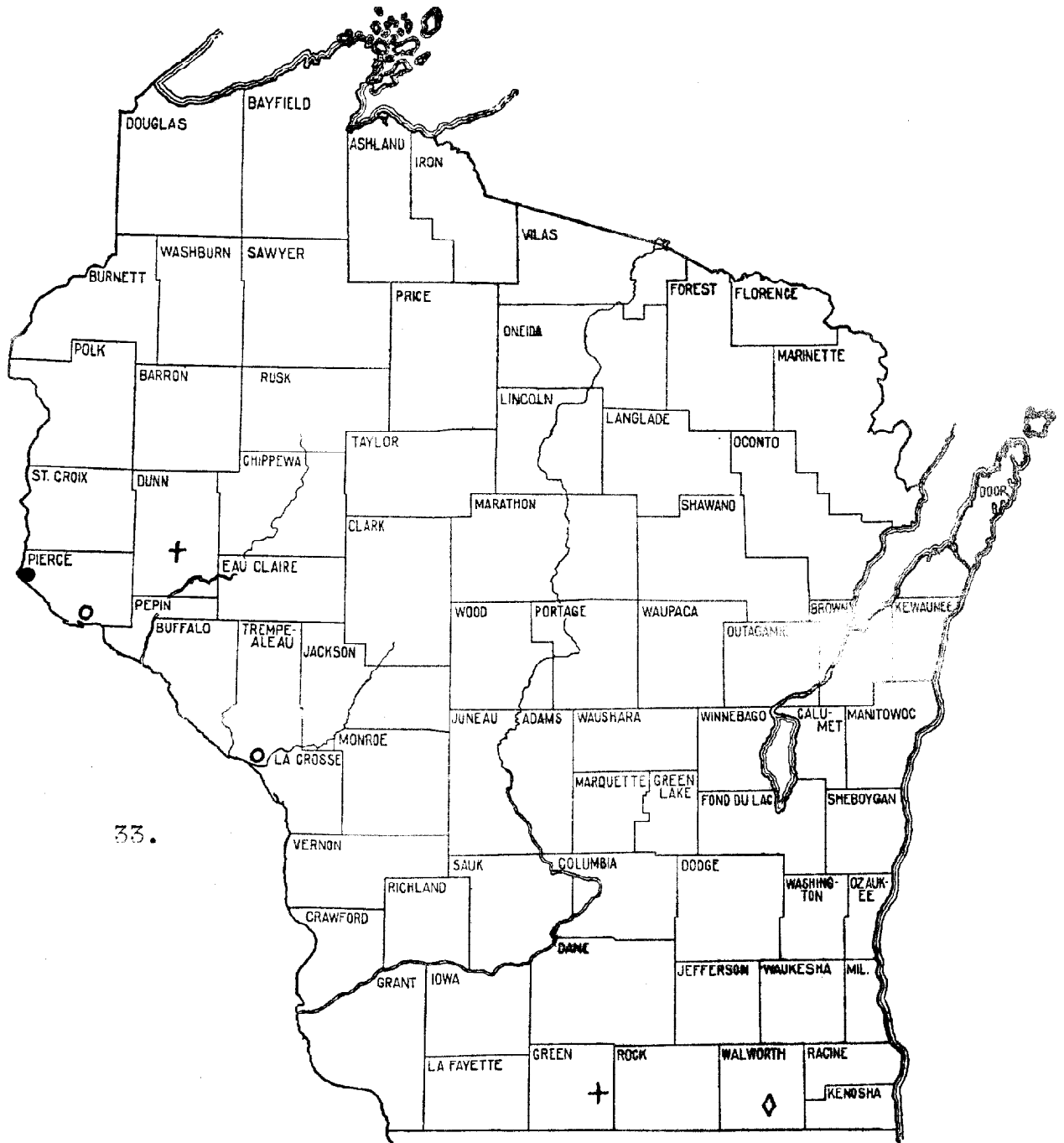
31.

Besseyia Bullii



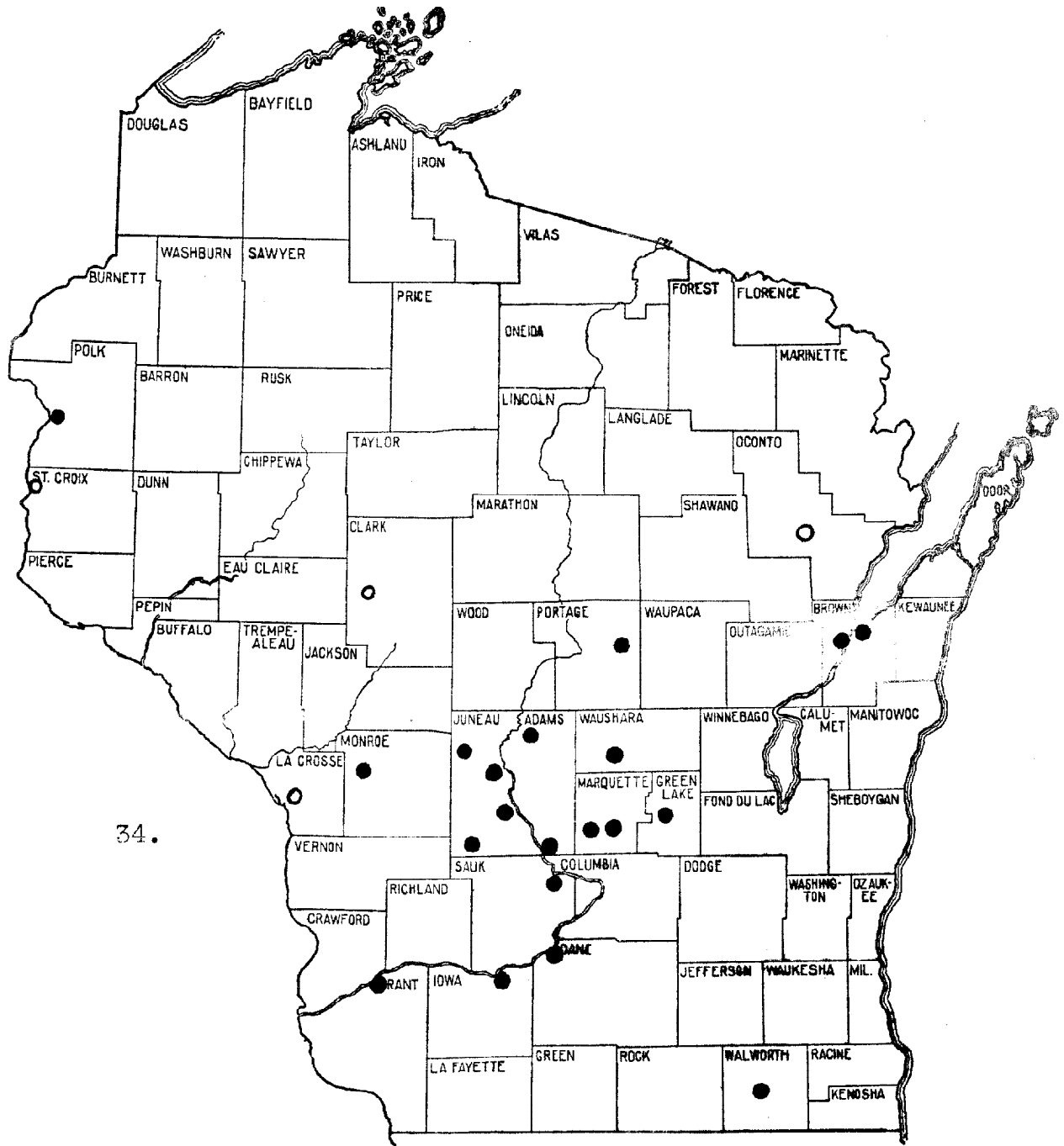
32.

Aureolaria grandiflora var. *pulchra*



33.

- ◇ *Aureolaria flava* var. *typica*
- *Aureolaria pedicularia* var. *typica*
- + *Aureolaria pedicularia* var. *intercedens*



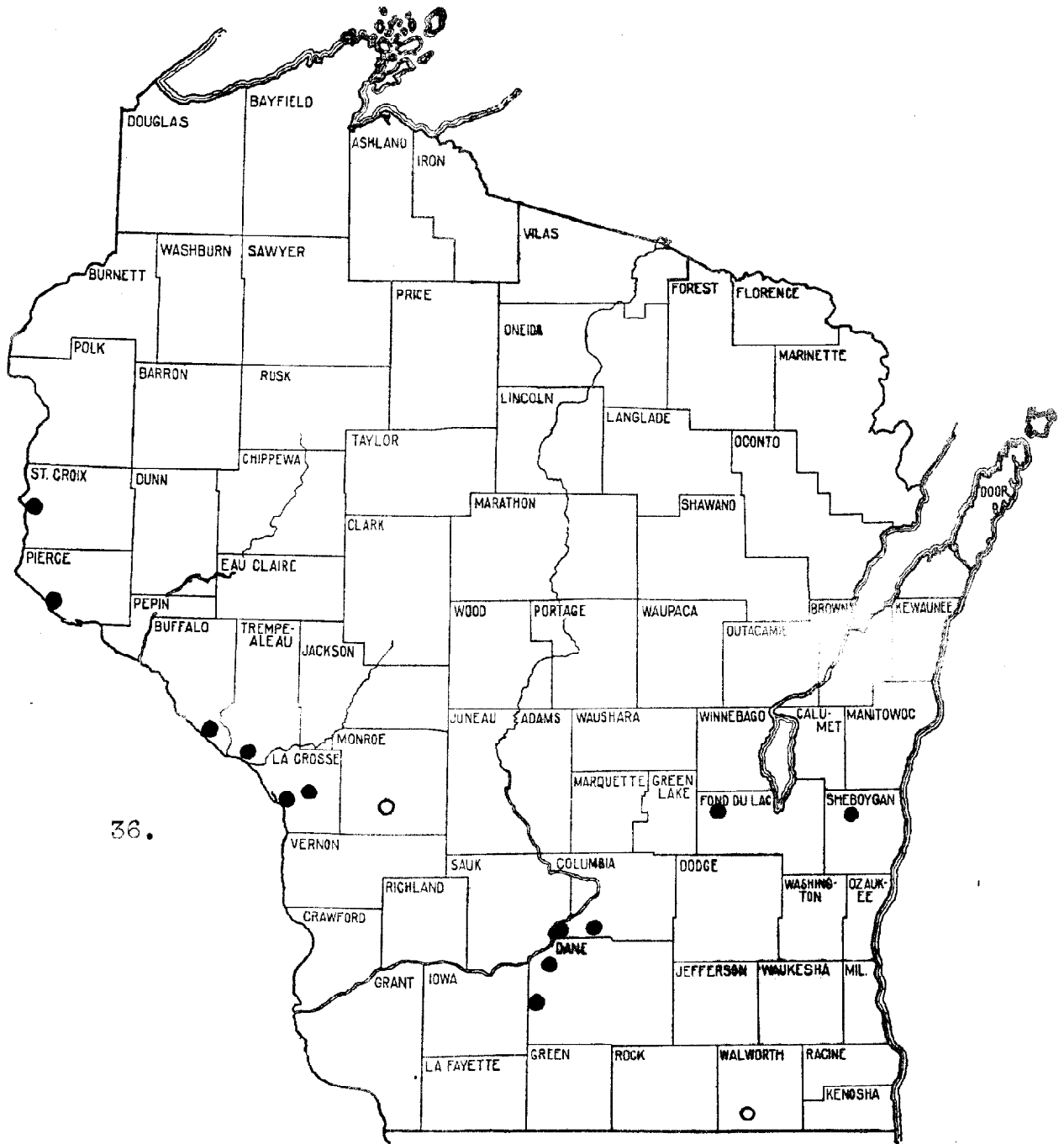
34.

Aureolaria pedicularia var. *ambigens*



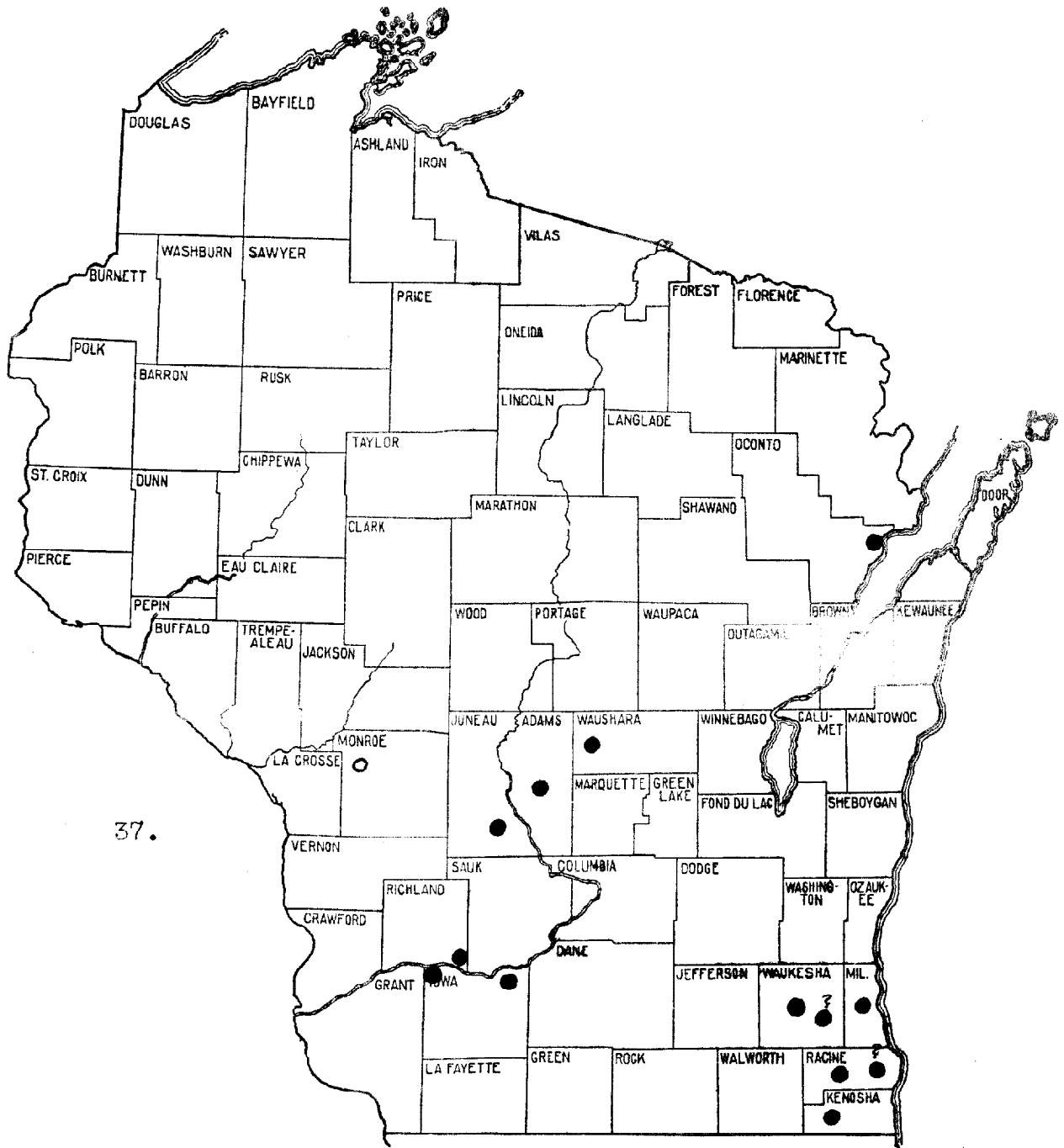
35.

Dasistoma macrophylla

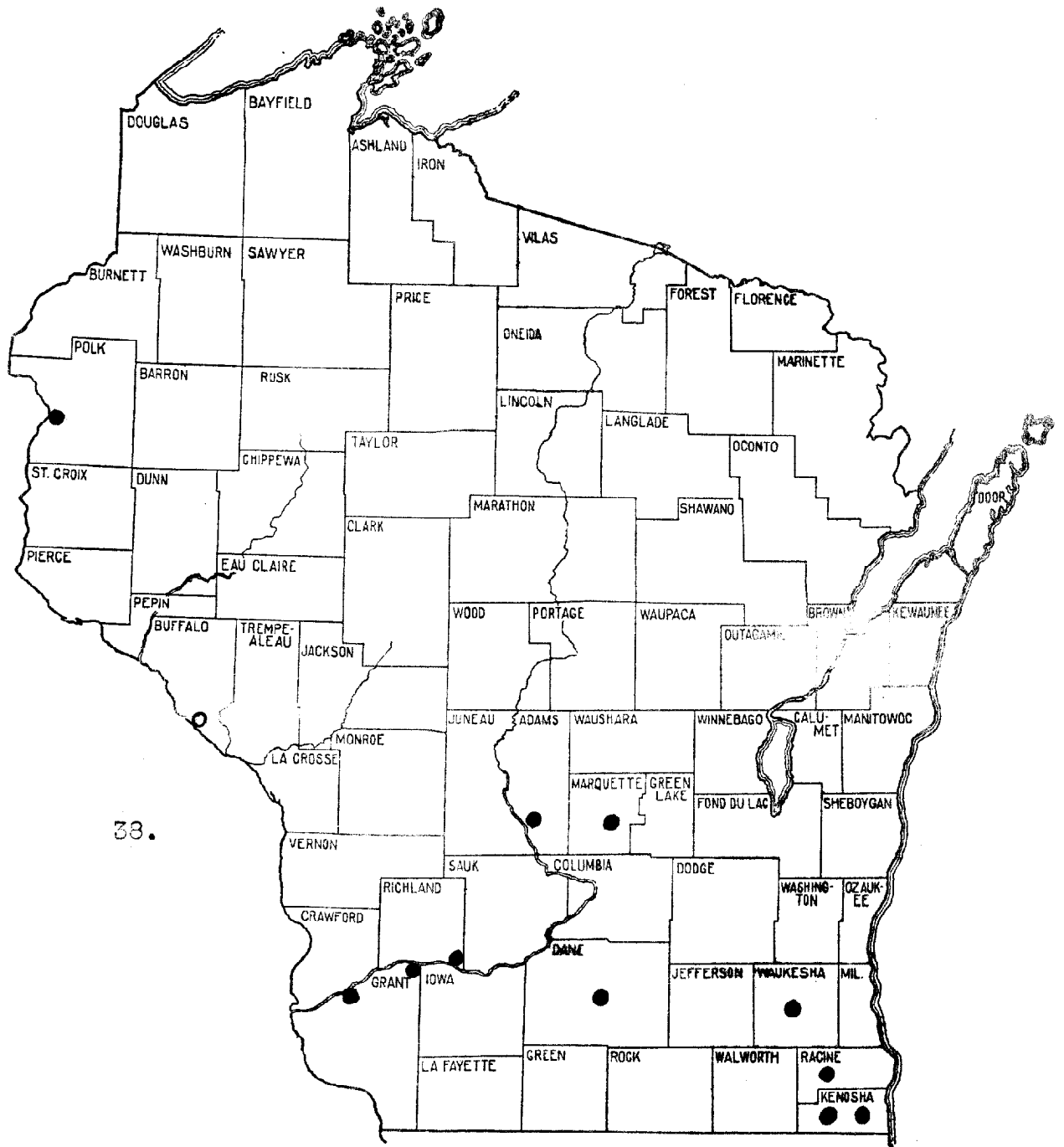


36.

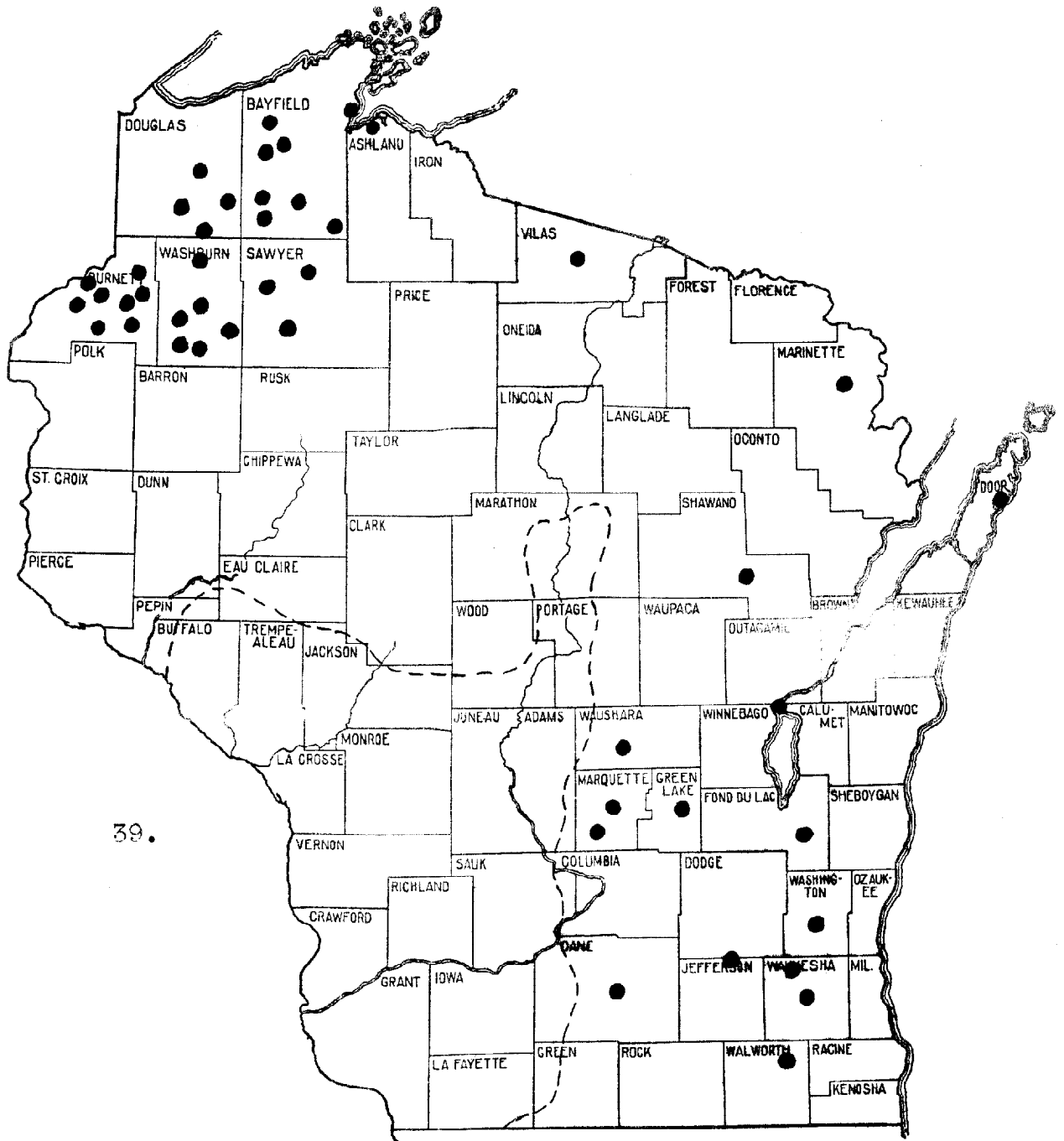
Gerardia aspera



Gerardia purpurea

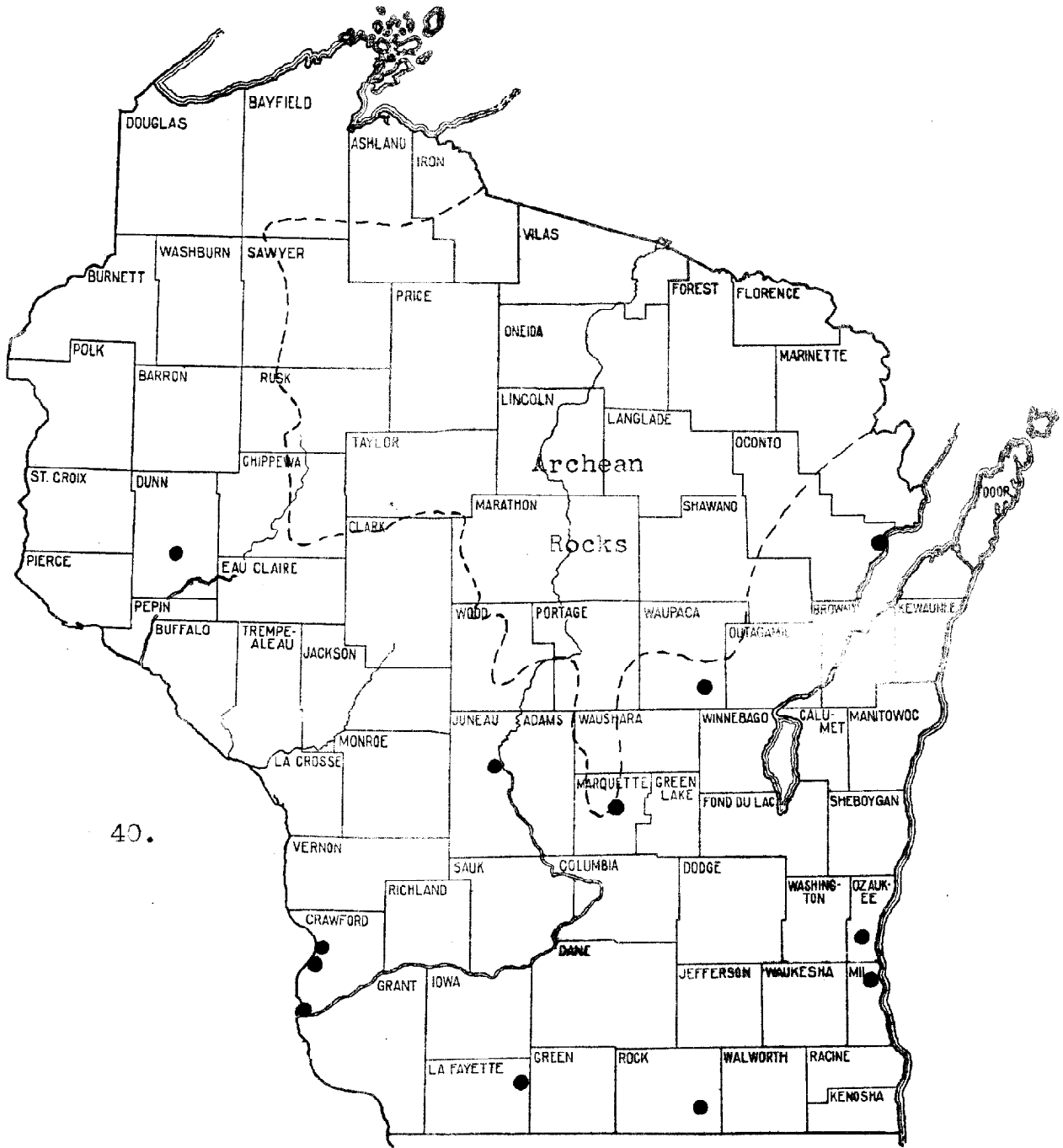


Gerardia paupercula var. *typica*



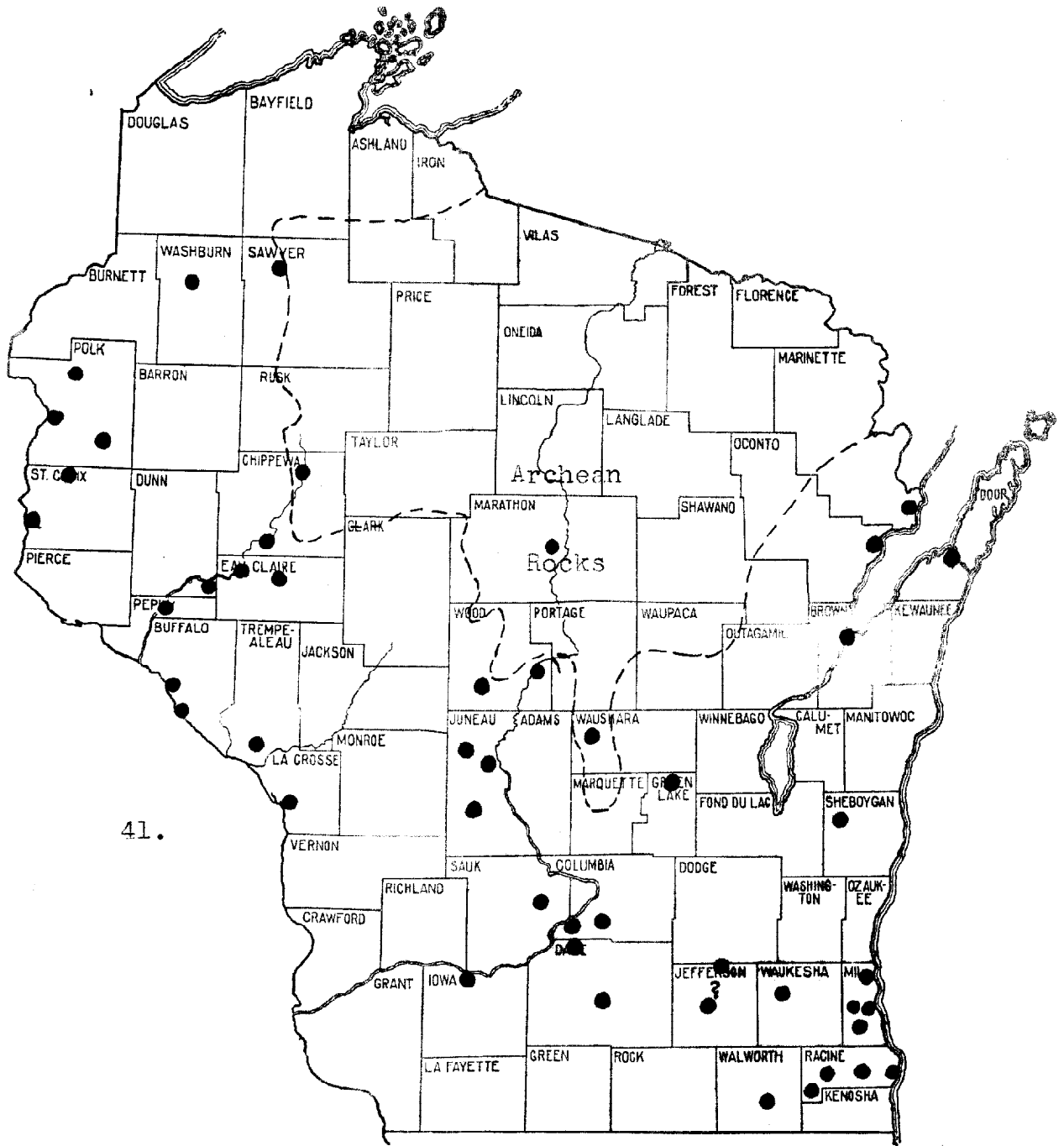
39.

Gerardia paupercula var. *borealis*

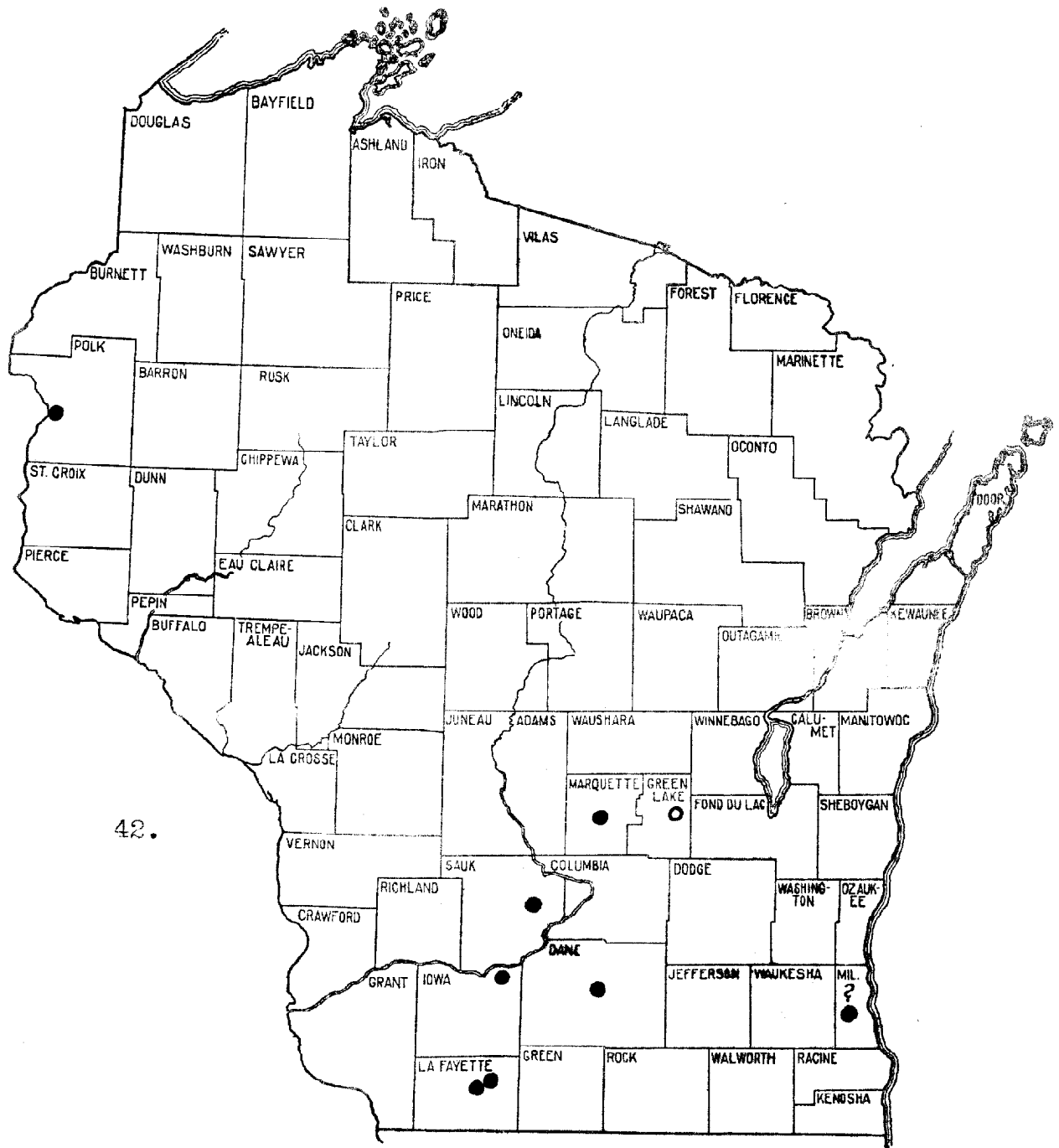


40.

Gerardia tenuifolia var. *macrophylla*

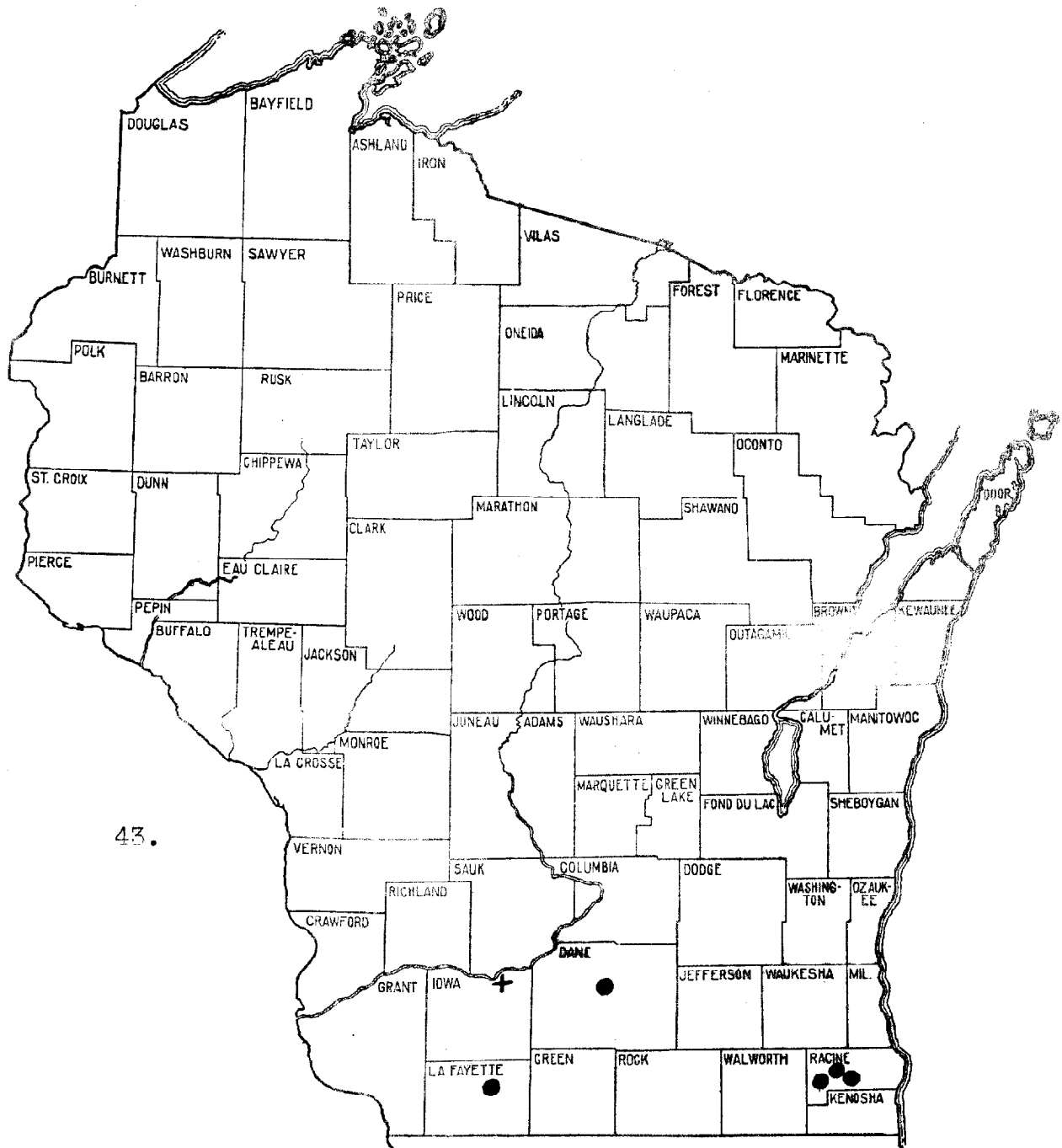


Gerardia tenuifolia var. *parviflora*



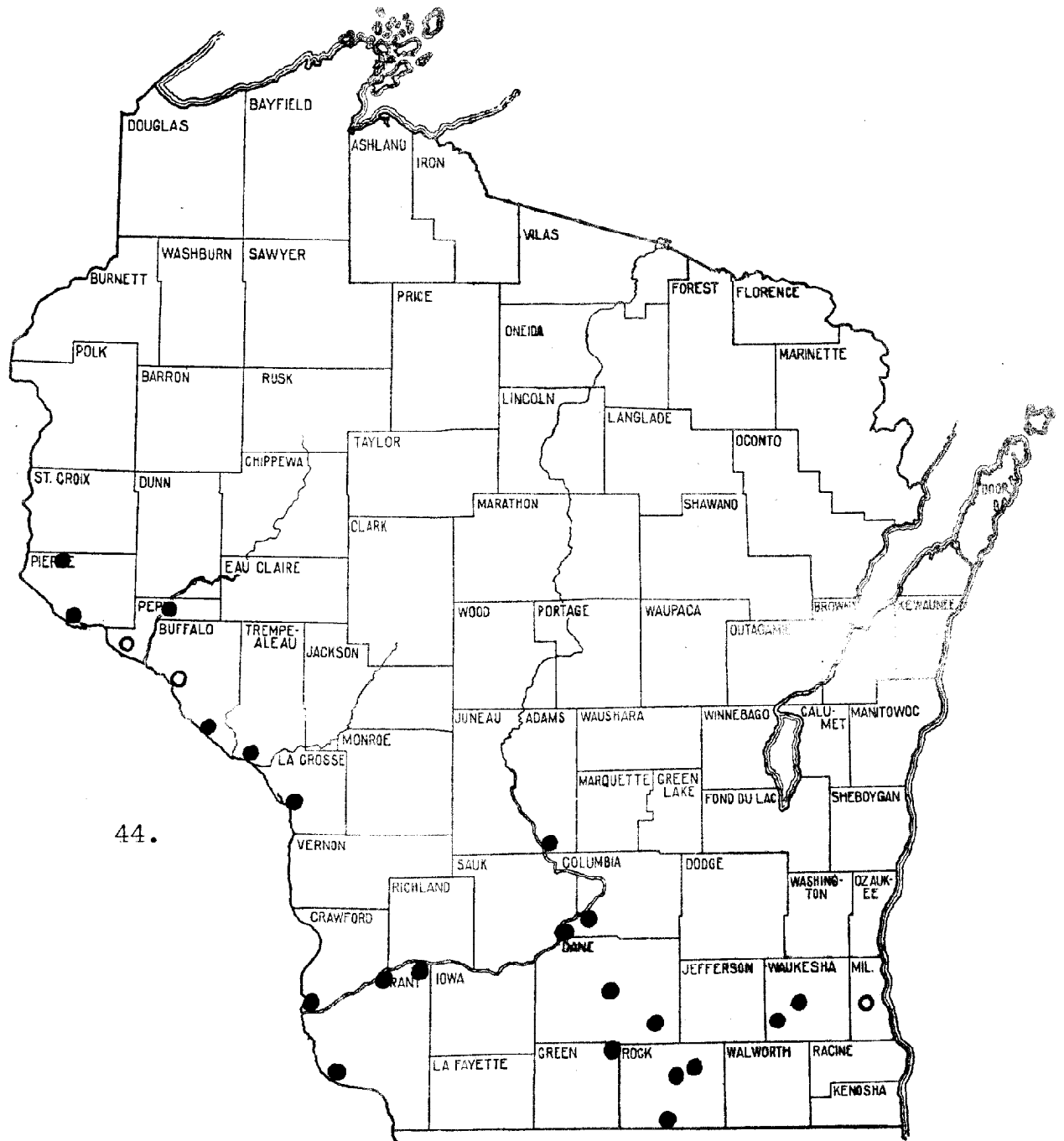
42.

Gerardia Gattingeri

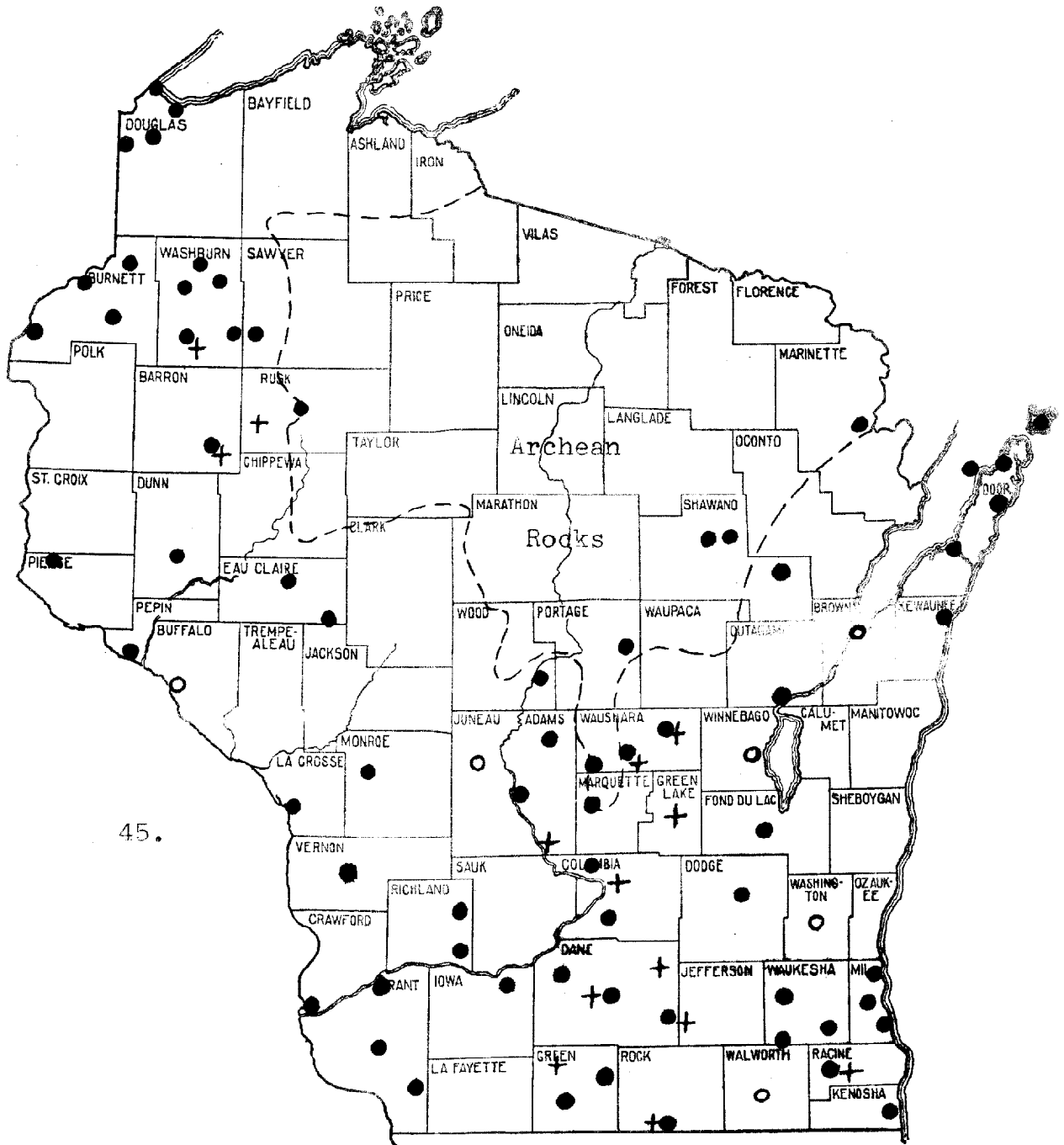


43.

- *Tomanthera auriculata*
- + *Gerardia Skinneriana*



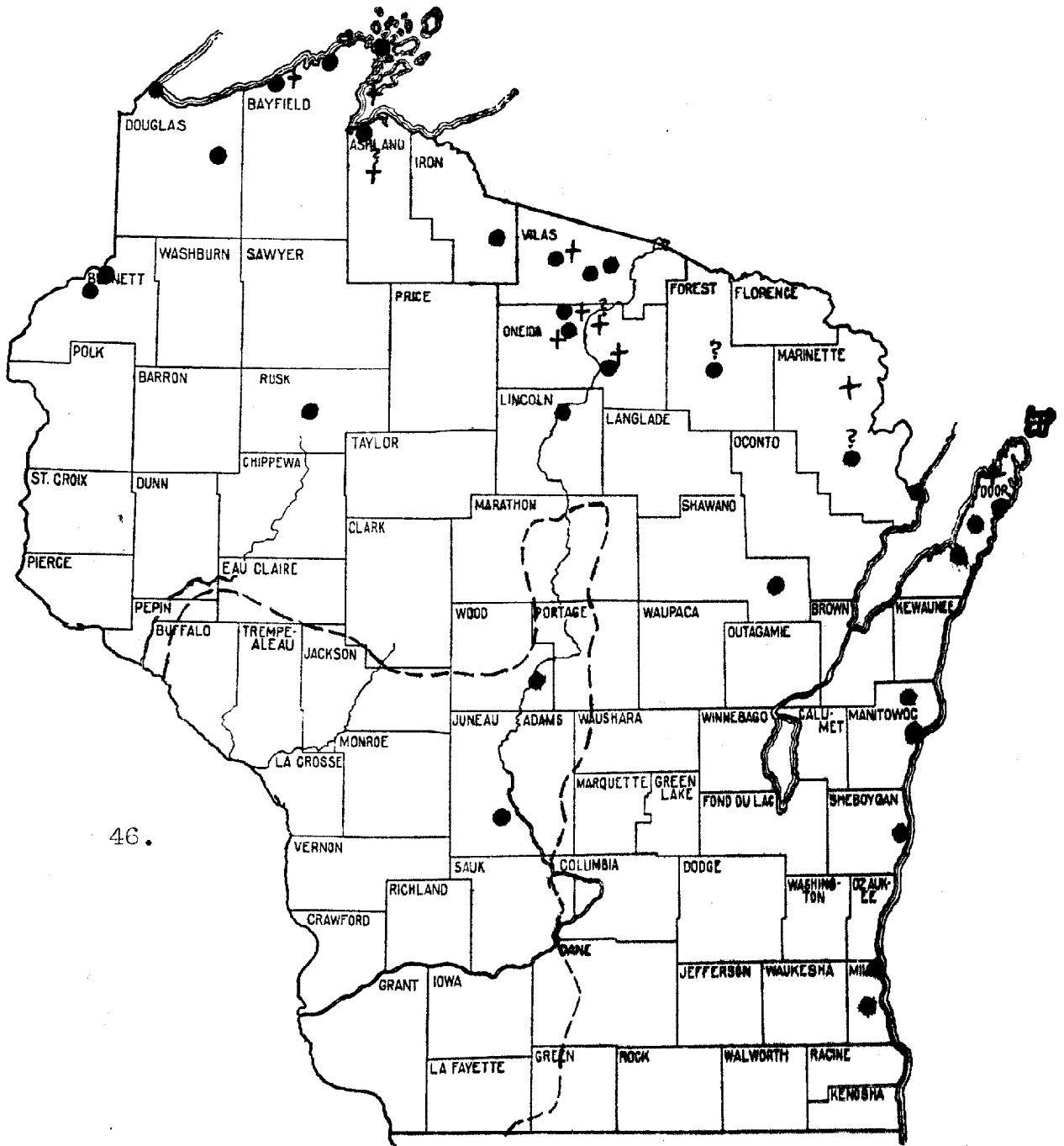
Castilleja sessiliflora



45.

● *Castilleja coccinea*

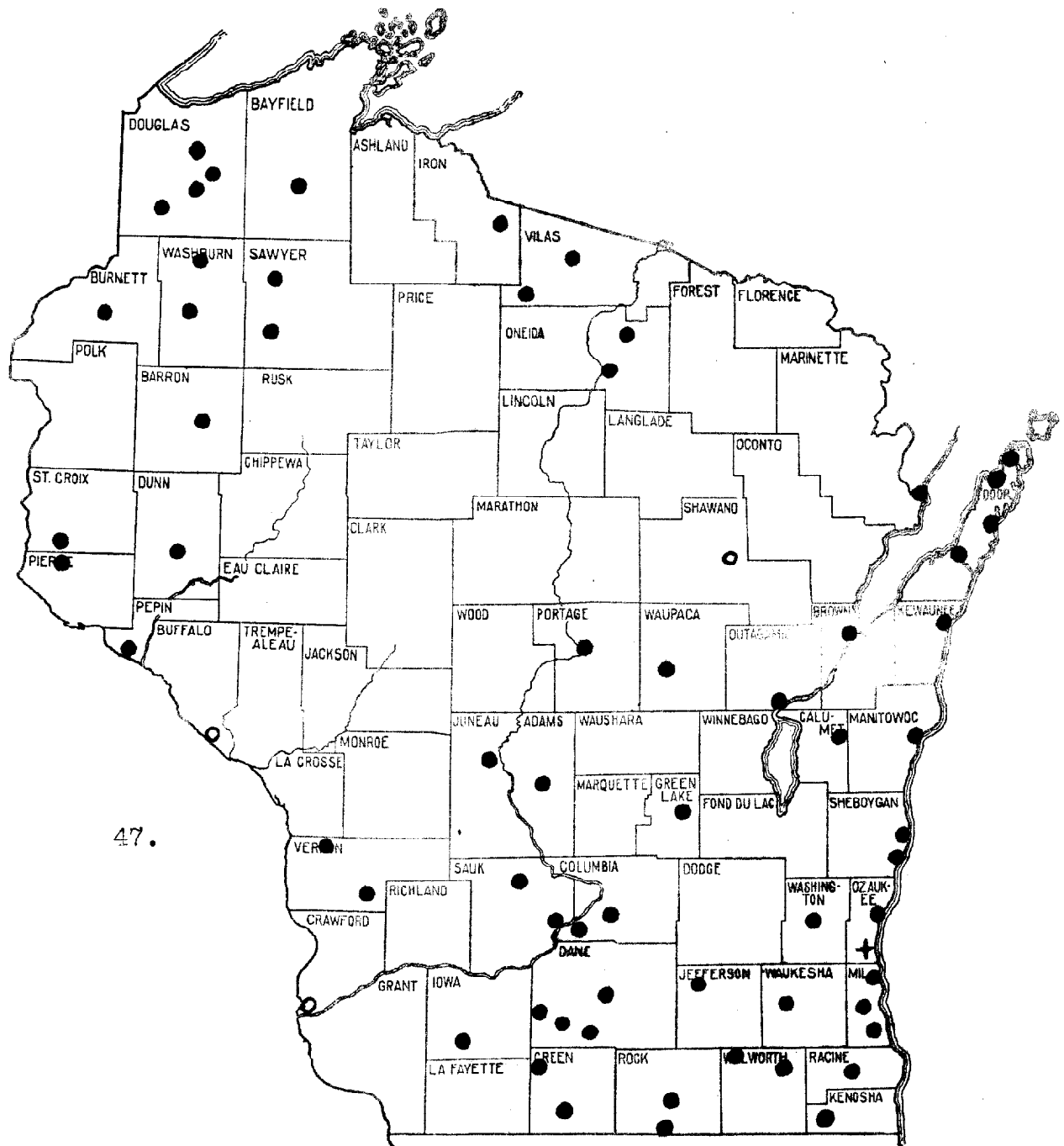
+ *f. pallens*



46.

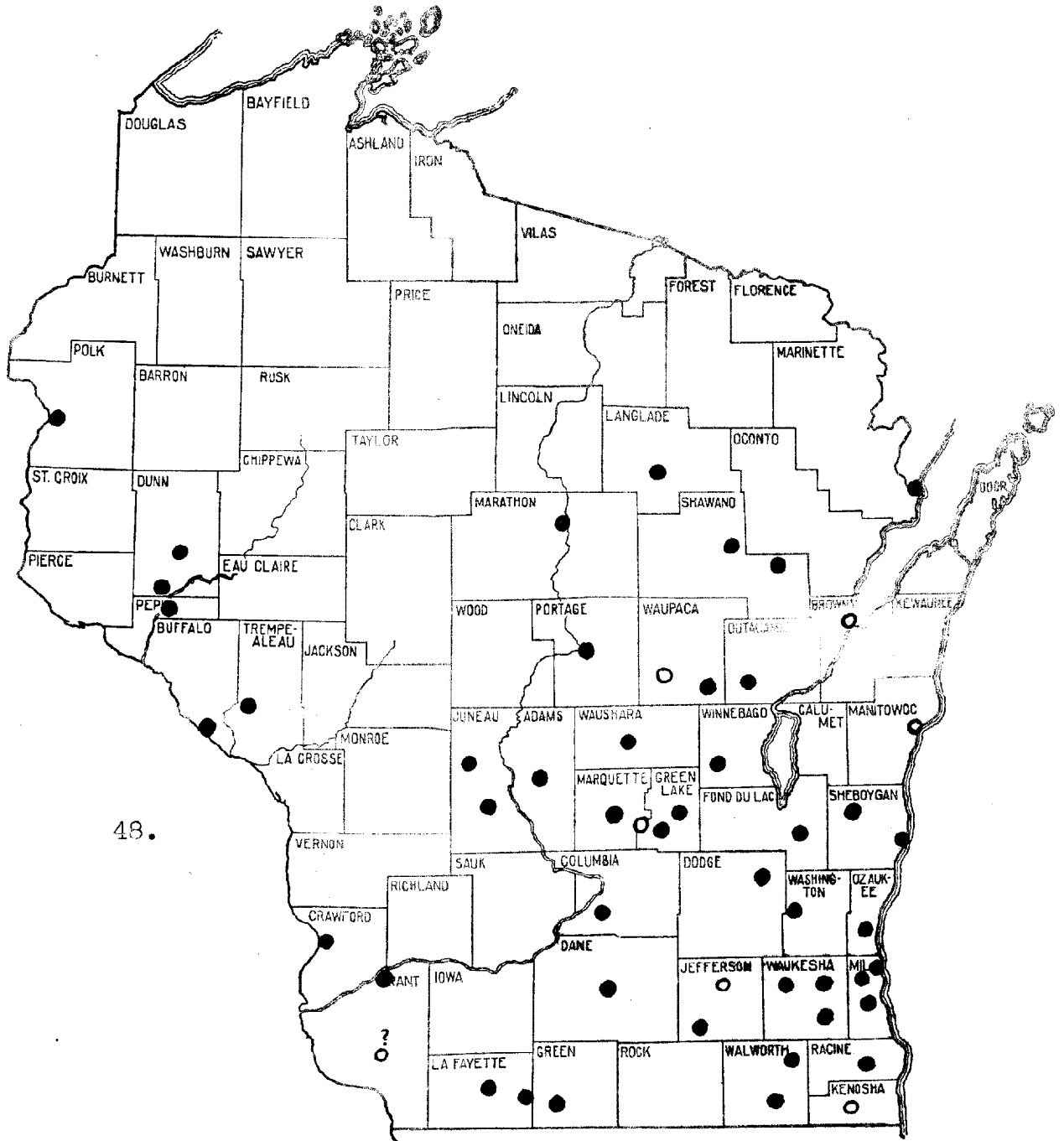
● *Melampyrum linearis* var. *americanum*

+ *Melampyrum linearis* var. *lineare*



47.

● *Pedicularis canadensis*
 + *f. praeclara*



48.

Pedicularis lanceolata