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AQUATIC AND WETLAND VASCULAR PLANTS OF THE NORTHERN GREAT PLAINS

Gary E. Larson





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A taxonomic treatment of aquatic and wetland vascular plants has been developed as a tool for identifying over 500 plant species inhabiting wetlands of the northern Great Plains region. The treatment provides dichotomous keys and botanical descriptions to facilitate identification of all included taxa. Illustrations are also provided for selected species. Geographical ranges and habitat preferences are described for each species, and a map is provided for each plant showing its documented occurrences by counties within the region. Additional information provided with species descriptions includes common name(s), flowering/fruiting periods, and nomenclatural synonyms. A glossary of botanical terms is also provided.

Keywords: Wetlands, aquatic plants, hydrophytes, Great Plains, flora, plant identification

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Cover photos: Wild lily (top); Mare's-tail (bottom).

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Aquatic and Wetland Vascular Plants of the Northern Great Plains

Gary E. Larson
Professor of Biology and Herbarium Curator
South Dakota State University
Brookings, South Dakota

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Foreword and Acknowledgments

This manual is the product of about 15 years of field and herbarium research on the floristics of regional wetlands, and it represents an extension of a Ph.D. research project conducted at North Dakota State University on the wetland flora of North Dakota. Obviously, much is owed to the efforts and support of others in the gathering of information leading to this publication. Thanks to William T. Barker of NDSU for making possible the opportunity to pursue my interest in aquatic botany as a graduate student; and to the late Ardell Bjugstad, Director of the Rocky Mountain Forest and Range Experiment Station at Rapid City, for seeing the potential usefulness of this project and to Mark Rumble and Dan Uresk for seeing it to completion. My thanks also to Raymond Linder and Kenneth Higgins of the South Dakota Cooperative Fish and Wildlife Research Unit for their support and encouragement. I am grateful to fellow members of the Great Plains Flora Association and others for providing specimen loans from their respective herbaria, especially Ronald McGregor and Ralph Brooks of the University of Kansas, Theodore Van Bruggen of the University of South Dakota and Hal Kantrud of the Northern Prairie Wildlife Research Center. David Ode of the South Dakota Natural Heritage Program and his counterpart in North Dakota, Alexis Duxbury, deserve credit for alerting me to new discoveries of rare wetland plants in the region.

The line drawings are mostly the fine work of Linda Simmons Narem, a former plant taxonomy student whose artistic talent was manifest in drawings she produced in class. Illustrations of grasses come from A. S. Hitchcock's *Manual of the Grasses of the United States*, and those for *Carex* from F. J. Hermann's *Carices of the Rocky Mountains and Colorado Basin*, both U.S.D.A. publications. The color plates, unless otherwise indicated, are photographs taken by the author.

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AQUATIC AND WETLAND VASCULAR PLANTS OF THE NORTHERN GREAT PLAINS

Gary E. Larson

INTRODUCTION

Vegetation is usually the most conspicuous aspect of natural habitats and in the case of wetlands this is certainly true. The vascular plants growing in wetlands are crucial to the overall functioning of wetland and adjacent terrestrial ecosystems. Wetland vegetation provides food (directly or indirectly), cover, and shelter needed by wildlife and waterfowl populations. Some wetland plants are excellent forages for livestock while others are undesirable weeds. Marsh plants stabilize fine-textured, erodible substrates of basins and waterways with their extensive root and rhizome systems, while they also absorb and recycle some of the overly abundant nutrients contained in agricultural and municipal runoff. Wetland plants also add organic matter to the sediments that gradually accumulate in wetland basins. Some hydrophytes are reliable indicators of surface water quality and permanence, and for this reason, plant species are used as indicators in defining and classifying wetlands (Stewart and Kantrud 1971, 1972; Cowardin et al. 1979).

From whatever standpoint wetland ecosystems are studied or managed, the botanical component must be taken into account. Some wetland plants are more valuable than others in fulfilling various ecological roles. Management techniques such as mowing, prescribed burning, periodic flooding and drainage, or controlled grazing can be used to alter the composition of wetland vegetation. Species desirable for wildlife or livestock can thus be favored or diminished depending upon the influence of management practices. Before instituting management procedures, however, the habitat manager must know the identities of the plant species comprising the vegetation. Once a species is identified, information on the plant's reproductive ecology, habitat preferences, and relative value to wildlife and grazing animals is needed so that management procedures can be implemented to achieve desired results.

For many parts of North America, aquatic plant manuals have been produced to provide biologists and wetland managers with a means of identifying the plants encountered in wetland habitats. Noteworthy examples are the manuals by Muenscher (1944) and Fassett (1957) treating the aquatic plants for the predominantly wooded region of eastern North America, Correll and Correll (1975) covering the wetland flora of the southwestern U.S., and Godfrey and Wooten (1979, 1981) providing a treatment for the southeastern U.S. Manuals such as these are valuable tools for wetland managers and researchers, as well as botanists, for they acquaint these people with the botanical resources of regional wetlands.

Given the vastness and ecological importance of the wetland resource in the northern Great Plains (see the figure below outlining the region being described), there is much justification for a manual treating the regional wetland flora. Manuals produced for other parts of North America have limited application in the so-called Prairie Pothole Region and the Nebraska Sand Hills because the assemblages of plant species inhabiting these wetlands are a unique combination of eastern, western, and boreal North American elements, as well as some more cosmopolitan and introduced species. Since no existing manuals handle the combination of species encountered in northern prairie wetlands, their utility in this region is limited.



Another shortcoming of using existing manuals in the northern Great Plains is that important species found in marginal habitats (such as wet meadows and drawdown zones) are typically excluded. Outside of the northern Great Plains, many of these species characteristically occupy more upland habitats. Wet meadows, drawdown zones, and the plants that inhabit them are integral parts of prairie wetland ecosystems; so to be of greatest utility to wetland researchers and managers working in this region, a manual should include these wetland species as well as the strictly aquatic species.

The aim of this publication is to provide a complete manual of the vascular plants growing in wetland habitats of the northern plains and thereby to assist students and professionals in the identification of aquatic and wetland plants that occur here. The taxonomic keys, plant descriptions, distribution maps, and statements of range and habitat preferences are offered to fulfill this primary objective.

A few secondary objectives are also met in providing a treatment of the regional wetland flora at this time. Considerable new information on the vascular flora has been generated by recent investigations, and one purpose of this publication is to incorporate new discoveries derived from floristic exploration of regional wetlands. Another purpose is to provide updated nomenclature for groups affected by name changes. Most of the recent name changes have been adopted in the *Flora of the Great Plains* (The Great Plains Flora Association 1986), and for the sake of uniformity, the names used herein are those employed in the latter publication with only a few exceptions as noted within the appropriate treatments.

Some of the taxa covered by this treatment pose difficult taxonomic problems deserving of further study. Defining problematic groups and suggesting areas of taxonomic research is another objective of this study. The references cited in the body of this treatment were consulted for information pertaining to the taxonomy of specific groups, but they are also provided to acquaint the user of this manual with relevant taxonomic literature. These references may be studied to gain further insight into the groups treated.

Defining the Wetland Flora

Authors inevitably differ in their concept of which species should be included in a taxonomic treatment of aquatic plants. Each has his own definition for the term "aquatic." Virtually all authors recognize those plants with a submersed or floating growth habit as aquatic. Most also apply the term to the common emergent species. The definition is harder to apply consistently for (1) plants growing in marginal zones of wetlands, e.g., shores, wet meadows, streambanks, etc., and (2) plants displaying a wide-ranging ecological amplitude which enables them to grow in either wet or dry situations. Whether a plant is to be designated as aquatic or not is thus based upon the plant's growth habit and the types of habitats in which it is found. How much weight is assigned to either of these criteria is a subjective decision which largely accounts for differences in the taxa treated by various aquatic plant manuals.

Much confusion can be avoided at the outset by defining the terms used to delimit the group of plants included herein. The term "aquatic" is used to describe those plants growing in water or in soils that are saturated during most of the growing season. Four categories of aquatic plants may be recognized on the basis of growth form and zone of habitation:

1. **Free-floating** is the term used for plants which float at or beneath the water surface without attachment to the substrate. Free-floating aquatics are transported freely by wind and currents, so they are normally found in abundance only in calm, sheltered waters. Duckweed (*Lemna* spp.), bladderwort (*Utricularia vulgaris*), and coontail (*Ceratophyllum demersum*) are common examples of free-floating aquatics.

2. **Submergent** describes plants anchored to the bottom by roots or rhizomes. Their foliage is either entirely submersed or some floating leaves may also be present. Reproductive structures may be submersed, floating, or borne above the water surface. Submergent plants occur in very shallow to deep water, depending upon water clarity, substrate, and growth form. Some common examples include pondweed (*Potamogeton* spp.), water milfoil (*Myriophyllum* spp.), waterweed (*Elodea* spp.), and widgeongrass (*Ruppia maritima*).

3. **Emergent** refers to those species which occur on saturated soils or on soils covered with water for most of the growing season. The foliage of emergent aquatics is partly or entirely borne above the water surface. Examples of emergent aquatics are many, including arrowhead (*Sagittaria* spp.), cattail (*Typha* spp.), common reed (*Phragmites australis*), and bulrush (*Scirpus* spp.).

4. **Amphibious** applies to aquatic species which are capable of growing as either submergent or emergent aquatics. These species commonly assume a semi-terrestrial growth form when stranded by a receding water level. The semi-terrestrial growth form usually differs markedly in appearance from the submersed growth form. Amphibious aquatics include yellow water-crowfoot (*Ranunculus flabellaris, R. gmelinii*), pepperwort (*Marsilea vestita*), and water smartweed (*Polygonum amphibium*).

Many of the species included by this treatment fit none of the categories given above. These are plants that ordinarily inhabit wet meadows, shores, streambanks, exposed mud flats, and other marginal habitats where the soil is saturated for only part of the growing season. Since these habitats are inherent to prairie wetland ecosystems, the plants which inhabit them are logically part of the wetland flora. They are, therefore, admitted to this treatment as wetland plants.

Not all wetland plants are restricted to wetland habitats. A considerable number of them are also found in upland situations. Many are opportunistic weedy species that rapidly invade soil left bare by receding water. Plants like barnyardgrass (*Echinochloa muricata*), foxtail barley (*Hordeum jubatum*), and common plantain (*Plantago major*) are

as apt to be found on disturbed upland sites as on mud flats or shorelines. Some of the agronomic weeds, e.g., sowthistle (*Sonchus arvensis*), Canada thistle (*Cirsium arvense*), and cocklebur (*Xanthium strumarium*), are well suited to the disturbed conditions provided by shorelines and stream banks. Still other plants found in both wetland and upland habitats are not weedy at all, but are simply capable of growing in a variety of moisture regimes. The wild lily (*Lilium philadelphicum*) and blue-eyed grass (*Sisyrinchium montanum*) are nonweedy species encountered in wet meadows and boggy places, as well as in prairie habitats. Even though these plants are by no means restricted to wetlands, they are encountered in wetland habitats with considerable frequency and are included in this treatment to ensure adequate coverage of the wetland flora.

Using the Manual

This treatment is composed of taxonomic keys and plant descriptions to facilitate identification of about 500 vascular plants encountered in wetland habitats of the northern prairie region. Many taxa are also illustrated with a line drawing or photograph to help the user conceptualize what is being described. Most taxa are not illustrated; but for those which have illustrations, the figures are often not detailed enough to be diagnostic. Consequently, illustrations alone should not be relied upon to make species determinations. Rather, the keys and descriptions must be used carefully in conjunction with illustrations to ensure proper identifications. The terminology used in keys and descriptions is necessarily botanical, because to distinguish between the various kinds of plants requires observing traits that are technical by nature. Those unfamiliar with descriptive terminology of plants will find it helpful to consult the Glossary of Botanical Terms (p. 648), relevant illustrations, and the lead-in descriptions of genera and families. A hand lens or binocular microscope, a 15-cm ruler with mm scale, and dissecting implements will also help because discerning between closely related plant taxa almost always entails close inspection and careful measurement of plant structures.

Included with the species descriptions in the manual are (1) common name(s), if available; (2) flowering/fruiting periods (or periods when spore-producing structures are present in ferns and fern allies); (3) habitat descriptions; (4) accounts of regional and range-wide distributions; and (5) nomenclatural synonyms for those species treated under other names in recent works. Official U. S. Post Office abbreviations for states are used to describe distributions in the United States; standard abbreviations are used for Canadian provinces, foreign countries, and geographical regions. The nomenclature and taxonomic concepts are largely those of the *Flora of the Great Plains* (Great Plains Flora Association 1986) except where otherwise noted. The ordering of plant families also follows the *Flora*; genera and species are alphabetically ordered within family treatments. Notes on related taxa rarely encountered in regional wetlands, or other items of interest, are sometimes included in a paragraph following the appropriate species description.

The regional range distribution map for each species shows the plant's occurrence on a county by county basis as documented by voucher specimens in regional herbaria. Each dot on a map represents at least one herbarium specimen of the plant from the dotted county in the region. Besides the many specimens collected for this study, a major resource for development of distribution maps was the *Atlas of the Flora of the Great Plains* (Great Plains Flora Association 1977). Another source of distributional information was *Vascular Plants of Minnesota: A Checklist and Atlas* (Ownbey and Morley 1991). For a few species, maps in the Great Plains *Atlas* are incorrect because they are at least partly based on misidentified specimens. The distribution maps shown herein are thus updated.

The diagnostic keys to taxa in the manual are strictly dichotomous, meaning that the user must choose between two leads at each step in the key. The two leads (called a couplet) always share the same number and describe contrasting characteristics or conditions. The user must determine which one of the two leads applies to the plant being identified. Once this determination is made, the next couplet directly below the chosen lead is considered in the same manner, and a choice is made between the two leads of that couplet. The process continues until the taxon (the particular family, genus, and ultimately, the species) to which the plant belongs is determined.

The traits used as key characters are those considered most readily observable, yet least likely to cause errors in identification. The use of technical terms and reference to minute traits are unavoidable in many instances, especially in the treatments of the more complex and specialized taxa like the grasses (Poaceae), sedges (Cyperaceae), and composites (Asteraceae). Specialized structures are described and often illustrated in the treatments of families and genera where they are found.

The key in the following section is a key to the plant families represented in the regional wetland flora. This key will direct the user to the appropriate family treatment, and often (in parentheses) to a particular genus or species within the manual. Keys to genera and species are provided within each family treatment wherever there are two or more different possibilities. With practice and a gained familiarity with plant characters, the keying process becomes easier and faster. The family and genus keys can even be bypassed once one is able to recognize families and genera on sight.

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1 Plants small and flattened, less than 3 cm across, free-floating at or beneath the water surface, often not differentiated into stems and leaves; fine roots often produced on the underside of the plants.

2 Plants with tiny, overlapping, scalelike leaves in 2 rows on branched, filiform stems . . . . . 6. SALVINIACEAE (*Azolla mexicana*, p. 37)

2 Plants lacking differentiated leaves and stems . . . . 60. LEMNACEAE (p. 399)

1 Plants not greatly reduced in size, with stems and leaves, exhibiting various habits but usually anchored in the substrate; roots usually produced.

3 Plants nonflowering, reproducing by spores (ferns and fern allies).

4 Stems jointed, longitudinally ridged, simple or with whorled branches; leaves scalelike, fused to form a toothed sheath at each joint of the stem; sporangia borne in terminal cones . . . . . 1. EQUISETACEAE (*Equisetum*, p. 17)

4 Stems not jointed, often subterranean; leaves not scalelike, often with expanded, simple or compound blades; sporangia not borne in cones.

5 Leaves narrow and grasslike, lacking an expanded blade.

6 Leaves arising from a cormlike base; sporangia contained in swollen leaf bases . . . . . 2. ISOETACEAE (*Isoetes melanopoda*, p. 26)

6 Leaves arising from filiform rhizomes; sporangia contained in round, hardened sporocarps borne on branches from the rhizomes . . . . . 5. MARSILEACEAE (See *Pilularia americana* as described under *Marsilea vestita*, p. 36)

5 Leaves with an expanded, simple or compound blade.

7 Leaves 4-foliate, appearing like a 4-leaved clover . . . . . 5. MARSILEACEAE (*Marsilea vestita*, p. 36)

7 Leaves simple or pinnately lobed to compound.

8 Leaf blades simple, entire, subtending a spike of sporangia . . . . . 3. OPHIOGLOSSACEAE (*Ophioglossum vulgatum*, p. 27)

8 Leaf blades pinnatifid to pinnately compound; sporangia grouped in sori on modified or unmodified leaves . . . . . 4. POLYPODIACEAE (p. 28)

3 Plants producing flowers, although these not always conspicuous (flowering plants).

9 Trees and shrubs.

10 Shrub with pinnately compound leaves . . . . . 28. FABACEAE (*Amorpha fruticosa*, p. 191)

10 Trees or shrubs with simple leaves.

11 Leaves scalelike, 1-5 mm long . . . . . 20. TAMARICACEAE (*Tamarix ramosissima*, p. 119)

11 Leaves not scalelike, all or mostly longer than 5 mm.

12 Trees or shrubs with nonshowy, unisexual flowers in catkins.

13 Dioecious trees and shrubs with male and female catkins on separate plants; female catkins bearing capsules, these maturing to release cottony seeds . . . . . 21. SALICACEAE (p. 120)

13 Monoecious shrubs with male and female catkins on the same plant; female catkins bearing winged nutlets . . . . . 11. BETULACEAE (p. 66)

12 Shrubs with greenish, white or yellow flowers, these perfect and not in catkins.

14 Leaves opposite . . . . . 32. CORNACEAE (*Cornus stolonifera*, p. 218)

14 Leaves alternate.

15 Leaves palmately lobed and veined; fruit a berry . . . . . 24. GROSSULARIACEAE (*Ribes*, p. 170)

15 Leaves finely toothed, pinnately veined: fruit of 5 (or fewer) follicles . . . . . 26. ROSACEAE (*Spiraea alba*, p. 188)

9 Herbs, woody only at the base if at all.

16 Flowers much reduced in size, (2) several to many crowded into involucrate heads and sharing a disklike receptacle; each head resembling a single flower; flowers of the head usually of 2 types, with petaloid ray flowers around the outside and less conspicuous disk flowers in the central portion of the head, or the heads often comprised entirely of ray or disk flowers (see p. 298); involucral bracts herbaceous to membranous, green or sometimes colored, in 1 to many series surrounding the disk, sometimes spiny-tipped and united . . . . . 49. ASTERACEAE (p. 298)

16 Flowers sometimes small in size but not crowded into involucrate heads and not appearing as ray and/or disk flowers.

17 Submersed leaves present, finely divided into few to many, filamentous or flat, narrow segments.

18 Submersed plants with small bladders (1-4 mm in diameter) on filiform segments of finely dissected leaves; flowers irregular and spurred, yellow, in scapose racemes held above the water surface . . . . . 46. LENTIBULARIACEAE (*Utricularia*, p. 287)

18 Submersed or emergent plants lacking bladders; flowers regular, colored or greenish, not spurred; inflorescence other than a raceme.

19 Submersed leaves long-petioled, pinnately compound, with the leaflets variously divided into flat, narrow segments; stems and petioles mostly over 5 mm thick, conspicuously hollow and chambered. . . . 34. APIACEAE (submersed form of *Sium suave*, p. 227)

19 Submersed leaves sessile, or if petioled, then palmately divided; stems less than 5 mm thick.

20 Leaves whorled or mostly so; flowers greenish and nonshowy.

21 Leaves dichotomously branched, the segments spinulose . . . . . 8. CERATOPHYLLACEAE (*Ceratophyllum demersum*, p. 44)

21 Leaves pinnately branched, lacking spinulose projections . . . . . 29. HALORAGACEAE (*Myriophyllum*, p. 195)

20 Leaves alternate; flowers white or yellow . . . . . 9. RANUNCULACEAE (*Ranunculus*, p. 49)

17 Submersed leaves, if present, entire, toothed or incised but not finely divided into segments.

22 Leaves all submersed or some floating also, all basal or borne on stems which are limp when removed from water and usually prostrate when stranded.

23 Leaves all basal.

24 Submersed leaves with a median band containing many fine longitudinal veins, the median band bordered by narrow, nerveless or sparsely nerved margins; floating leaf blades none; plants dioecious, producing either oblong female flowers that float on the water surface attached to a long peduncle or producing many tiny male flowers that are released free-floating from a spathe at the plant base . . . . . 52. HYDROCHARITACEAE (*Vallisneria americana*, p. 364)

24 Submersed leaves lacking a prominent median band of veins, the few to several principal longitudinal veins evenly distributed on both sides of the midvein, often obscure; floating leaves sometimes produced; plants monoecious or hermaphroditic, although flowers often missing in sterile submersed forms.

25 Inflorescence a submersed panicle with whorled branches . . . . . 51. ALISMATACEAE (submersed form of *Alisma gramineum*, p. 350)

25 Inflorescence absent; plants apparently sterile . . . . Several taxa of monocots that are normally emergent will produce sterile submersed forms during juvenile stages when inundated. Some common examples include *Sagittaria* spp. and *Alisma plantago-aquatica*, both of which produce rosettes of brittle, dark green, sword-shaped leaves, often along with long-petioled floating leaves. The floating blades are generally sagittate (*Sagittaria*) or oblong-lanceolate (*Alisma*) in shape. (Of our Alismataceae only *Alisma gramineum* appears capable of flowering and fruiting underwater and it does so frequently.) *Typha* spp., *Sparganium* spp. and some grasses, e.g. *Zizania aquatica* and *Glyceria* spp., have sterile submersed forms featuring few to several flexuous, light green, tapelike leaves arising from the base. None of these sterile forms can be confidently identified to species unless one can relate them to more mature examples at the same site or can observe their development through the growing season.

23 Leaves borne on elongate stems.

26 Leaves all or mostly alternate, sometimes the uppermost opposite.

27 Leaves linear, 2-10(15) cm long, 2-5(7) mm wide, the midvein inconspicuous; flowers pale yellow, solitary in the upper axils; fruit a many-seeded capsule . . . . . 66. PONTEDERIACEAE (*Zosterella dubia*, p. 628)

27 Leaves of various shapes and sizes, but if fitting the above dimensions, then the midvein prominent; flowers in various types of inflorescences; fruit hard, one-seeded.

28 Flowers pink, in dense, terminal, spikelike racemes . . . . . 15. POLYGONACEAE (*Polygonum amphibium*, p. 89)

28 Flowers greenish, nonshowy, in terminal or axillary spikes.

29 Leaves all submersed, filiform, ca. 0.5 mm wide; flowers enclosed in leaf sheaths at anthesis, the peduncles elongating and often coiling as fruits develop; mature fruits borne in an umbel . . . . . 56. RUPPIACEAE (*Ruppia maritima*, p. 391)

29 Leaves all submersed or some floating, variously shaped; flowers and fruits borne in elongate to short spikes . . . . . 55. POTAMOGETONACEAE (*Potamogeton*, p. 369)

26 Leaves all opposite or whorled.

30 Leaves in whorls of 3 or mostly decussate; flowers axillary and extended to the water surface by a long, threadlike hypanthium . . . . . 52. HYDROCHARITACEAE (*Elodea*, p. 360)

30 Leaves opposite (most obviously the uncrowded lower leaves); flowers completely contained in the leaf axils.

31 Leaf blades abruptly broadened at the base and sheathing the stem; fruits fusiform, only 1 per node . . . . . 57. NAJADACEAE (*Najas*, p. 392)

31 Leaf blades of about equal width throughout, only weakly clasping the stem if at all; fruits crescent-shaped or round.

32 Fruits mostly 2-4 per node, crescent-shaped with a persistent style . . . . . 58. ZANNICHELLIACEAE (*Zannichellia palustris*, p. 395)

32 Fruits 1 or 2 per node, round; styles deciduous.

33 Small, densely branched plants usually sprawling on mud and rooting at the nodes; fruit a capsule containing numerous minute, ridged seeds . . . 16. ELATINACEAE (*Elatine triandra*, p. 113)

33 Irregularly branched plants, normally submersed, the upper leaves sometimes floating; fruit orbicular, cleft down the middle and eventually splitting into 4 nutlets . . . . . 43. CALLITRICHACEAE (*Callitriche*, p. 260)

22 Leaves mostly or all emersed (or mostly large and floating in Nymphaeaceae), borne on erect to procumbent, aerial or partly submersed stems, or the leaves basal; leaves sometimes apparently lacking.

34 Plants grasslike, rushlike or reedlike, emergent or terrestrial; leaves long, linear and parallel-veined, often sheathing at the base, or leaf-blades absent, the leaves reduced to sheathing around the base of the stem.

35 Individual flowers showy, yellow, pink or white to blue-violet.

36 Plants tall, rushlike, with large pink flowers in a terminal umbel . . . . . 50. BUTOMACEAE (*Butomus umbellatus*, p. 347)

36 Plants low, rather grasslike, with yellow or white to blue-violet flowers.

37 Flowers usually blue-violet (white), in clusters subtended by a 2-bracted spathe . . . . . 68. IRIDACEAE (*Sisyrinchium montanum*, p. 631)

37 Flowers yellow, not subtended by a spathe . . . . . 67. LILIACEAE (*Hypoxis hirsuta*, p. 629)

35 Individual flowers not showy, usually greenish to brownish.

38 Typically emergent marsh plants with broad (mostly 5 mm or more wide), long, linear leaves; flowers unisexual, arranged in a terminal spike or in globose heads, the male flowers borne above the female.

39 Flowers in a dense, terminal spike of 2 portions, the upper part male and the lower female; plants usually 1 m or more tall; cattails . . . . . 65. TYPHACEAE (*Typha*, p. 623)

39 Flowers in few to many dense, globose heads, the upper heads male and the lower female; plants 1 m or less tall; burreeds . . . . . 64. SPARGANIACEAE (*Sparganium*, p. 619)

38 Plants of various habits; flowers perfect or imperfect, when imperfect, the male and female flowers contained in small spikes of grasslike plants.

40 Inflorescence a dense, cylindric spadix 5-10 cm long, protruding laterally from the base of a leaflike extension of the scape; fresh foliage sweetly fragrant when crushed . . . . . 59. ARACEAE (*Acorus calamus*, p. 397)

40 Inflorescence of various types, but if spicate, then the flowers borne in 1 or more terminal spikes, or if single and lateral, then the spike much less than 5 cm long; foliage not sweetly fragrant.

41 Inflorescence a long, slender, spikelike raceme of many flowers; leaves all basal, terete; fruit splitting lengthwise into 3 or 6, one-seeded segments . . . . . 54. JUNCAGINACEAE (*Triglochin*, p. 366)

41 Inflorescence of various types; leaves seldom all basal, usually some cauline, or leaves apparently reduced to basal sheaths; leaf blades usually flat when present; fruit an achene, grain, capsule, or a group of follicles.

42 Perianth segments evident, consisting of 6 tepals; fruit a capsule or 3 (rarely to 6) follicles.

43 Flowers usually numerous in dense clusters or loosely flowered cymes; tepals stiff, chaffy; carpels united, the ovary maturing as a 3-valved, many-seeded capsule; widespread plants . . . . . 61. JUNCACEAE (*Juncus*, p. 413)

43 Flowers few to several in a bracteate raceme; tepals soft, not chaffy; carpels separate or nearly so to the base, each of the 3(to 6) maturing as a 1 or 2(several) seeded follicle; rare bog plant . . . . 53. SCHEUCHZERIACEAE (*Scheuchzeria palustris*, p. 365)

42 Perianth absent or reduced to scales or bristles, the flowers enclosed by 1 or 2 chaffy bracts; fruit an achene or grain.

44 Leaves in 3 vertical ranks on an often trigonous, solid or pithy stem, or leaves reduced to basal sheaths only; leaf sheaths closed around the stem, sometimes splitting with age; flowers each borne in the axil of a scalelike bract and often with several inner subtending scales or bristles; ovary sometimes contained in a saclike covering (perigynium); fruit a beaked achene; styles bifid or trifid; sedges . . . . . 62. CYPERACEAE (p. 434)

44 Leaves in 2 vertical ranks on a terete, usually hollow stem with swollen nodes; leaf sheaths commonly open longitudinally with overlapping margins; flowers each subtended by 2 bracts (lemma and palea) and also by 2 inner, obscure scales (lodicules); ovary never enclosed in a sac; fruit a grain; styles bifid; grasses . . . . . 63. POACEAE (p. 551)

34 Plants not grasslike, rushlike or reedlike; leaves of various shapes, net or parallel-veined, seldom sheathing at the base; all or most of the leaves with blades.

45 Broader-leaved monocots; leaves usually curved-parallel veined, sometimes net-veined; perianth parts in multiples of 3 (sometimes obscured by fusion and modification in the ORCHIDACEAE).

46 Leaves petiolate.

47 Leaf blades broadly heart-shaped, about as wide as long; inflorescence a short-cylindric spadix subtended by a broadly ovate spathe . . . . . 59. ARACEAE (*Calla palustris*, p. 398)

47 Leaf blades elliptic, lanceolate, ovate or sagittate; inflorescence other than a spadix.

48 Flowers in a panicle or branched raceme, perfect or imperfect; ovaries many per flower, superior, maturing as flattened achenes . . . . . 51. ALISMATACEAE (p. 348)

48 Flowers solitary from a narrow spathe, perfect; ovary 1, inferior, maturing as a many-seeded capsule . . . . . 66. PONTEDERIACEAE (*Heteranthera limosa*, p. 627)

46 Leaves sessile, sometimes sheathing the stem.

49 Leaves opposite or some whorled above; flowers regular, reddish-orange with dark spots (rarely solid yellow) . . . . . 67. LILIACEAE (*Lilium philadelphicum*, p. 630)

49 Leaves alternate or mainly basal; flowers irregular, variously colored . . . . . 69. ORCHIDACEAE (p. 633)

45 Dicots; leaves net-veined; perianth segments usually in multiples of 4 or 5.

50 Leaf blades large and leathery, floating or emergent, oblong to oval or round, with a narrow sinus behind the petiole attachment to the blade, (1)1.5-4 dm long or across; stem a thick, fleshy rhizome buried in the mud; flowers large, 4-15 cm across; water lilies . . . . . 7. NYMPHAEACEAE (p. 39)

50 Leaves smaller and variously shaped; flowers generally smaller.

51 Small insectivorous bog plant; leaves all basal, the blades rotund, mostly less than 1 cm across, the upper surface covered with reddish, sticky glandular hairs that serve to trap insects . . . . . 18. DROSERACEAE (*Drosera rotundifolia*, p. 117)

51 Plants not insectivorous; leaves not specialized to trap insects.

52 Leaves whorled, with 4-12 at each node, the members of each whorl of equal size.

53 Stems weak, ascending to reclining, branched; leaves in whorls of 4-6 . . . . . 48. RUBIACEAE (*Galium*, p. 295)

53 Stems erect, simple; leaves in whorls of 6-12 . . . . . 42. HIPPURIDACEAE (*Hippuris vulgaris*, p. 259)

52 Leaves opposite, alternate or basal, sometimes both opposite and alternate, or if appearing whorled, then the leaves at each node of differing sizes.

54 Plants low, succulent, the stems often brittle, green to often strongly red; leaves opposite, small and scalelike; flowers embedded in terminal portions of the fleshy stems . . . . . 12. CHENOPODIACEAE (*Salicornia rubra*, p. 74)

54 Plants without the above combination of characters.

55 Perianth consisting of a calyx only, the sepals green or often colored and petaloid, sometimes rudimentary; flowers hypogynous.

56 Leaves opposite or mostly so.

57 Flowers in terminal inflorescences . . . . . 14. CARYOPHYLLACEAE (*Cerastium*, p. 80)

57 Flowers solitary in the axils or in axillary clusters.

58 Flowers white to pinkish, solitary in the axils . . . . . 23. PRIMULACEAE (*Glaux maritima*, p. 163)

58 Flowers greenish, clustered in axillary inflorescences . . . . . 10. URTICACEAE (p. 62)

56 Leaves alternate or mostly basal (all basal except for leaflike involucres subtending the flowers in *Anemone canadensis*, RANUNCULACEAE).

59 Flowers large and showy, white or yellow, 2-5 cm across . . . . . 9. RANUNCULACEAE (p. 45)

59 Flowers individually small, white, pink or greenish.

60 Leaves all basal; sepals spurred at the base; pistils many on an elongate receptacle . . . . . 9. RANUNCULACEAE (*Myosurus minimus*, p. 48)

60 Leaves cauline or partly so; sepals not spurred; pistils 5, 6, 1 or none.

61 Leaves serrate; pistils 5, fused in a star-shaped ring . . . . . 25. SAXIFRAGACEAE (*Penthorum sedoides*, p. 179)

61 Leaves entire, undulate or lobed; pistil 1 or none.

62 Stems sheathed at the nodes by a membranous ocrea; perianth petaloid or green to brown and winged . . . . . 15. POLYGONACEAE (p. 87)

62 Stems without ocreae; perianth green, minute and inconspicuous.

63 Flowers perfect . . . . . 12. CHENOPODIACEAE (p. 69)

63 Flowers imperfect . . . . . 13. AMARANTHACEAE (*Amaranthus*, p. 76)

55 Perianth consisting of both a calyx and corolla, or if the perianth is of only one series, then the flowers epigynous; flowers hypogynous to epigynous.

64 Flowers pouchlike and spurred, yellow to orange-yellow, often reddish-brown spotted . . . . . 33. BALSAMINACEAE (*Impatiens*, p. 219)

64 Flowers not pouchlike, variously colored.

65 Inflorescence a simple or compound umbel.

66 Leaves simple; flowers deeply pink to red or lilac.

67 Leaves all basal, strongly whitened beneath . . . . . 23. PRIMULACEAE (*Primula incana*, p. 169)

67 Leaves opposite, not whitened beneath . . . . . 37. ASCLEPIADACEAE (*Asclepias incarnata*, p. 234)

66 Leaves compound; flowers white . . . . . 34. APIACEAE (p. 222)

65 Inflorescence other than an umbel.

68 Stamens more than 10, or if as few as 9, then the stamens united below into 3 fascicles.

69 Leaves opposite . . . . . 17. CLUSIACEAE (p. 114)

69 Leaves alternate or all basal.

70 Flowers hypogynous, the sepals, petals and stamens attached to the receptacle directly beneath the gynoecium . . . . . 9. RANUNCULACEAE (*Ranunculus*, p. 49)

70 Flowers perigynous, the sepals, petals and stamens attached around the rim of a saucerlike or disklike hypanthium . . . . . 26. ROSACEAE (p. 180)

68 Stamens 10 or fewer, sometimes united below but not in 3 fascicles.

71 Leaves pinnately compound, with 3 or more distinct leaflets.

72 Leaves once-pinnate; flowers (or fruits) in simple or branched racemes . . . . . 28. FABACEAE (p. 190)

72 Leaves twice-pinnate; flowers (or fruits) in dense globose clusters . . . . . 27. MIMOSACEAE (*Desmanthus*, p. 189)

71 Leaves simple or sometimes pinnately lobed, not divided into distinct leaflets.

73 Petals separate or lacking.

74 Petals present, mainly purple or blue-violet, sometimes white toward the base (actually pink but often drying purple in *Epilobium*, ONAGRACEAE)

75 Plants acaulescent, the leaves and flowers arising from the base . . . . . 19. VIOLACEAE (*Viola nephrophylla*, p. 118)

75 Plants caulescent, the leaves and flowers borne on a stem.

76 Ovary inferior, elongate to linear, appearing like a pedicel of the flower; seeds often with a coma ..... 31. ONAGRACEAE (p. 209)

76 Ovary superior, ovoid to globose, enclosed by the tubular calyx; seeds lacking a coma ..... 30. LYTHRACEAE (p. 200)

74 Petals present or lacking, white, pink or yellow when present.

77 Sepals 5; petals 5.

78 Leaves all basal, or one leaf sessile above on each flowering scape and the rest basal ..... 25. SAXIFRAGACEAE (p. 174)

78 Leaves opposite.

79 Leaves glandular-serrate ..... 16. ELATINACEAE (*Bergia texana*, p. 112)

79 Leaves entire ..... 14. CARYOPHYLLACEAE (p. 79)

77 Sepals 4; petals 4 or none.

80 Ovary superior, sometimes contained in a calyx cup but free of it.

81 Leaves alternate, usually shallowly to deeply lobed or compound ..... 22. BRASSICACEAE (p. 145)

81 Leaves opposite, entire..... 30. LYTHRACEAE (p. 200)

80 Ovary inferior ..... 31. ONAGRACEAE (p. 209)

73 Petals united, at least toward the base.

82 Leaves basal.

83 Leaves simple.

84 Flowers in a spike ..... 44. PLANTAGINACEAE (*Plantago*, p. 264)

84 Flowers solitary on peduncles arising from the plant base ....45. SCROPHULARIACEAE (*Limosella aquatica*, p. 272)

83 Leaves trifoliate ..... 38. MENYANTHACEAE (*Menyanthes trifoliata*, p. 235)

82 Leaves cauline.

85 Stamens numbering the same as the corolla lobes.

86 Leaves opposite (sometimes appearing whorled because of leaf fascicles in axils).

87 Flowers yellow ..... 23. PRIMULACEAE (*Lysimachia*, p. 164)

87 Flowers not yellow.

88 Flowers white or greenish-white, less than 5 mm long; fruit 1 or 2 slender follicles; plants with milky juice .... 36. APOCYNACEAE (*Apocynum cannabinum*, p. 233)

88 Flowers purple (drying dark blue), rarely white, 15 mm or more long; fruit a 2-valved capsule; plants with clear juice ..... 35. GENTIANACEAE (p. 228)

86 Leaves alternate or mostly so.

89 Ovary superior, 4-lobed, splitting into 4 nutlets at maturity; flowers in scorpioid spikes or racemes . . . . . 39. BORAGINACEAE (p. 236)

89 Ovary inferior, or partly so, not lobed, maturing as a capsule; flowers in bracteate racemes or solitary in the upper axils . . . . . 47. CAMPANULACEAE (p. 291)

85 Stamens numbering fewer than the corolla lobes.

90 Flowers blue-violet, slightly bilabiate, in dense terminal spikes . . . . . 40. VERBENACEAE (*Verbena hastata*, p. 241)

90 Flowers of various colors, but when in terminal spikes, the flowers usually pink or yellow, or if blue-violet, then strongly bilabiate.

91 Flowers in capitate or short-cylindric spikes that are peduncled from the axils . . . . . 40. VERBENACEAE (*Lippia lanceolata*, p. 240)

91 Flowers in racemes, spikes, axillary clusters or solitary in the axils.

92 Ovary 4-lobed, splitting into 4 nutlets at maturity; stems 4-angled . . . . . 41. LAMIACEAE (p. 242)

92 Ovary not lobed, maturing into a 2-valved capsule; stems usually terete . . . . . 45. SCROPHULARIACEAE (p. 266)

Perennial herbs with a life cycle featuring an alternation of two distinct generations — the sporophyte and the gametophyte. **Sporophyte** the dominant phase, diploid, typically differentiated into vascularized roots, stems and leaves, producing unicellular, haploid spores by meiosis, the spores produced in **sporangia** which may be grouped in sori on modified or unmodified leaves, or the sporangia borne in terminal cones (*Equisetum*), spikes (*Ophioglossum*) inside axillary sporocarps (*Marsilea* and *Azolla*), or inside the leaf bases (*Isoetes*). **Sporophyte plants** may produce spores of all one type (plants homosporous) or of 2 morphologically dissimilar types (plants heterosporous), small microspores and larger megaspores. **Spores** germinating in soil or water to produce the minute, inconspicuous sexual phase, the gametophyte. **Gametophyte** (termed a prothallium) photosynthetic or achlorophyllous; gametophytes of homosporous species similar, monoecious or dioecious, those of heterosporous species dissimilar, dioecious, each microspore producing a male gametophyte, each megaspore producing a female gametophyte. Sex organs developing on the gametophytes; antheridia producing numerous motile spermatozoids; archegonia each containing an egg cell. Fertilization achieved by impregnation of an egg by a spermatozoid, subsequent growth from the fertilized egg resulting in development of the dominant sporophyte plant.

References:

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Petrick-Ott, A. J. 1974. A county checklist of the ferns and fern allies of Kansas, Nebraska, South Dakota and North Dakota. Rhodora 77:478-511.

Tryon, R. M. 1954. The ferns and fern allies of Minnesota. Univ. of Minnesota Press, Minneapolis.

Division **EQUISETOPHYTA**

1. **Equisetaceae**, the Horsetail Family

1. ***Equisetum*** L. — Horsetail, scouring rush

Erect or decumbent perennial herbs; **stems** jointed and solid at the nodes, hollow through the internodes, longitudinally ridged, silicaceous, sometimes evergreen, some spp. dimorphic with colorless fertile stems which appear before the green sterile ones, the fertile stems eventually turning greenish in some; **branches**, if present, whorled in a regular or irregular fashion, arising from inside the sheath bases, sometimes rebranched; **ridges of the stem** sometimes roughened with spicules of silica deposit; **rhizomes** deeply buried, with adventitious roots. **Leaves** small and scalelike, often lacking chlorophyll, whorled and united at the base to form **sheaths** around the stem, the teeth of the sheaths (corresponding to the leaves) free or coherent by the margins in pairs or groups. **Sporangia** homosporous, borne in a terminal **cone** made up of whorled, peltate sporangiophores; spores spherical, with 4 spirally wound elaters. Gametophyte photosynthetic.

Perhaps only *Equisetum fluviatile* and *E. palustre* are truly wetland plants, since they are more or less restricted to permanently saturated substrates. The remaining 5 species occurring in our region are either tolerant of wide-ranging soil moisture conditions or require consistently damp substrates, and so all have been included to ensure the proper identification of any equiseta encountered in wet places.

Reference:

Hauke, R. L. 1965. Preliminary reports on the flora of Wisconsin. No. 54. Equisetaceae — horsetail family. Trans. Wisconsin Acad. Sci. 54:331-346.

1 Aerial stems fertile, brownish except that occasionally the sheaths may be green, or very small green branches may be present.

2 Teeth of the sheaths with a white margin; stem becoming branched with green branches ..... 6. *E. pratense*

2 Teeth of the sheaths brown to blackish; stem simple or branched.

3 Stem becoming branched with green branches; teeth of the sheaths coherent in a few groups, reddish-brown, the groups with rounded to broadly acute tips ..... 7. *E. sylvaticum*

3 Stem not branched, soon withering; teeth of the lower sheaths dark brown to blackish, mostly separate, with long-acuminate tips ..... 1. *E. arvense*

1 Aerial stems fertile or sterile, green.

4 Central cavity very large in relation to the diameter of the stem (ca. 4/5 the stem diameter), the stem wall thin; small outermost cavities opposite the ridges of the stem, i.e., on the same radius* ..... 2. *E. fluviatile*

4 Central cavity large or small, stem wall usually relatively thick; outermost cavities alternate with the stem ridges, i.e., on a different radius (a third set of smaller cavities often between the central one and the outermost).

5 Stem not branched above the base or only irregularly so; branches erect or strongly ascending.

6 Sheaths longer than broad, with a dark apical band ..... 4. *E. laevigatum*

6 Sheaths shorter or not much longer than broad, with both an apical and a basal dark band ..... 3. *E. hyemale*

5 Stem regularly branched above the base, the branches often spreading.

7 Teeth of the main stem sheaths reddish-brown, coherent in a few groups, especially toward the base of the stem; branches themselves branching ..... 7. *E. sylvaticum*

7 Teeth of the main stem sheaths whitish to black, sometimes brown but not reddish, separate or coherent in pairs; branches rarely branched.

8 Central cavity of the main stem about the same size as the outermost cavities; sheaths on the first internode of the branches with 5 or more teeth ..... 5. *E. palustre*

8 Central cavity of the main stem usually definitely larger than the outermost cavities; sheaths on the first internodes of the branches with 3 or 4 teeth.

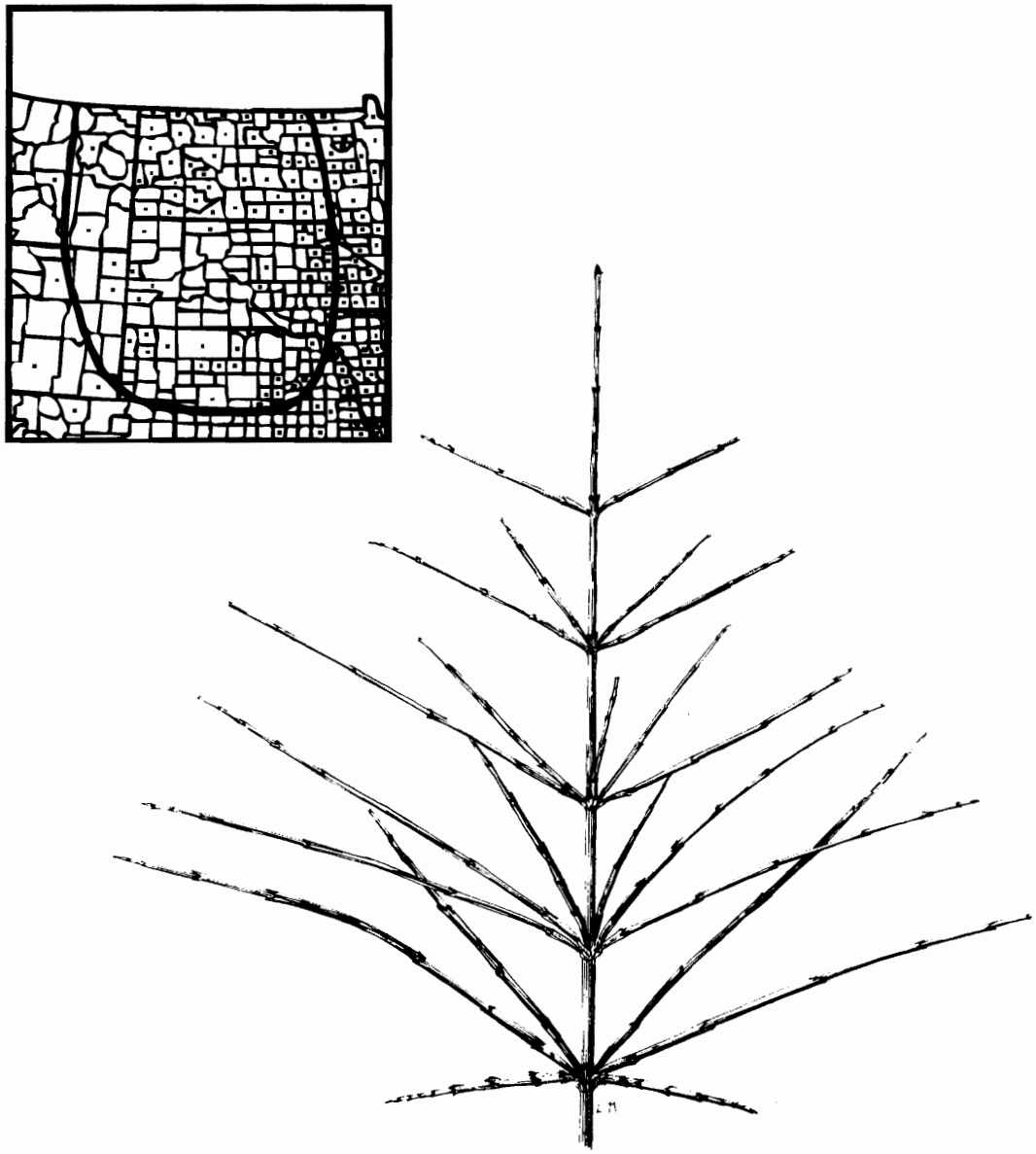
9 Ridges of the main stem with spicules of silica deposit, especially on the upper part of the upper internodes ..... 6. *E. pratense*

9 Ridges of the main stem usually roughened but lacking spicules of silica deposit ..... 1. *E. arvense*

*To observe internal stem structure a cross-section should be made near the middle of an internode of the main stem and examined with a lens. If the specimen is pressed and dried, the section should be soaked in a wetting solution (e.g., soap-water solution) before examination.

1. *Equisetum arvense* L. — Common horsetail

Stems dimorphic, annual, erect or decumbent. **Sterile stem** green, regularly branched, 1-6 dm tall, mostly 10- or 12-ridged, the **ridges** usually roughened but lacking spicules of silica deposit; **central cavity** ca. 1/4 the stem diameter; **main stem sheaths** 5-10 mm long, the teeth free or partly fused, with long-acuminate tips, brown to blackish, 1.5-2 mm long. **Branches** numerous, simple, ascending to occasionally recurved, 3- or 4-angled; **sheaths** on the first internodes of the branches with 3 or 4 teeth. **Fertile stem** unbranched, brownish, to 2 dm tall, appearing in early spring (late Apr—early May) and soon withering; **sheaths** 10-20 mm long, the teeth of the lower sheaths dark brown to blackish, mostly separate with long, acuminate tips, 4-9 mm long. **Cone** terminal, blunt, long-stalked. Stream banks, meadows, ditches and moist woods; common; (Cosmopolitan).



***Equisetum arvense*, vegetative stem. The green vegetative stems are conspicuous throughout summer after the nongreen cone-bearing stems have withered.**

2. *Equisetum fluviatile* L. — Water horsetail

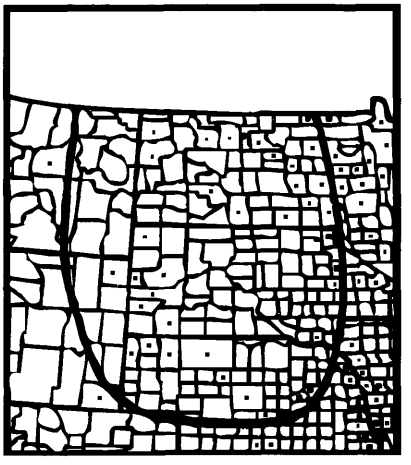
Stems alike, annual, erect, to 1 m tall, shallowly 9- to 25-ridged, the **ridges** smooth; **central cavity** ca. 4/5 the stem diameter, the stem wall thin; **small outermost cavities** opposite the ridges of the stem, i.e., on the same radius; **main stem sheaths** 6-10 mm long, the teeth free, dark brown to black, 2-2.5 mm long. **Branches** none to many, rather regular when present, simple, ascending, 4- to 6-angled. **Cones** terminal on the main stem or occasionally on upper branches, blunt, long-stalked, deciduous, appearing Jun—Aug. Marginal or emergent in swamps, bogs and spring-fed marshes where water is fresh; frequent in n ND, otherwise uncommon; (Circumboreal, in N.Amer. s to PA, MN, NE and OR).



3. *Equisetum hyemale* L. — Common scouring rush

Stems alike, erect, evergreen, viable for probably 2 or 3 years, simple or producing few, short, erect branches from the upper nodes, 2-12(15) dm tall, mostly 18- to 40-ridged, the **ridges** roughened with silica deposits; **central cavity** at least 3/4 the stem diameter; **main stem sheaths** shorter or not much longer than broad, 5-15 mm long, with both an apical and basal dark band, the teeth dark brown to black, connate by the scarious margins toward the base, 2-4 mm long, deciduous or persistent. **Cones** terminal on the main stem or produced on the short branches after the first year, sharp-pointed, sessile to short-stalked, eventually deciduous, appearing Jun—Sep. Often in dense colonies in seepage areas, wet meadows, ditches and along shores and stream banks, usually where sandy or gravelly; occasional; (Circumboreal, in N.Amer. s to FL, TX and CA). *E. praealtum* Raf.

North American representatives of *E. hyemale* belong to var. *affine* (Engelm.) A. A. Eat. (See also the discussion of *E.* X *ferrissii* Clute under *E. laevigatum*.)





***Equisetum hyemale*, cone-bearing stem.**

4. *Equisetum laevigatum* A. Br. — Smooth scouring rush

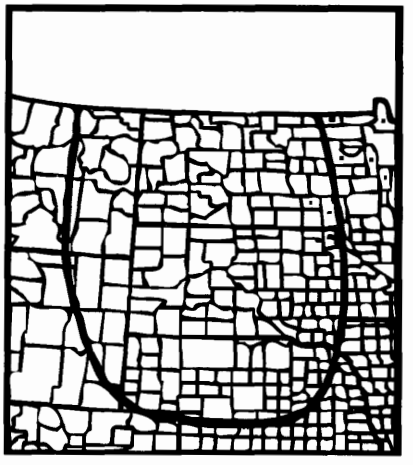
Stems alike, mostly annual in our range, simple or with few irregular, erect branches, commonly branching from the base if the main stem is cut, erect, 3-9 dm tall, mostly 16- to 30-ridged, **central cavity** usually 2/3 to 3/4 the stem diameter; **main stem sheaths** longer than broad, 6-15 mm long, with a single dark apical band or the lower ones sometimes with a dark basal band as well, the teeth dark brown with scarious margins, free or partly connate in pairs, 1-4 mm long, deciduous and usually missing from most of the sheaths. **Cones** terminal on the main stem or on the main branches if branched from the base, pointed or blunt, sessile to short-stalked, eventually deciduous, appearing Jun—Jul. Wet meadows, seepage areas, stream banks, floodplains and ditches, also common in prairie and on embankments, often where sandy or gravelly; common; (Que. to B.C., s to WV, IL, TX and Baja CA). *E. kansanum* J. H. Schaffner.

A hybrid between *E. hyemale* and *E. laevigatum* is referred to as *E.* X *ferrissii* Clute. The hybrid produces sterile cones with abortive spores. Reproduction is entirely vegetative by rhizomes and fragmentation of the stems. Sheaths and growth characteristics (e.g., semi-evergreen stems) are intermediate between the parental species, although the absence of spores is most diagnostic. The range of *E.* X *ferrissii* corresponds with that of *E. hyemale* in the northern plains.



5. *Equisetum palustre* L. — Marsh horsetail

Stems alike, annual, regularly branched, erect, 2-6 dm tall, deeply 7- to 10-ridged, the **ridges** smooth to rough but without spicules; **central cavity** ca. 1/6 the stem diameter, about the same size as the outermost cavities; **main stem sheaths** 7-17 mm long, the teeth free or partly connate, brown to dark brown, 3-4 mm long. **Branches** few to many, simple, ascending, 5- or 6-angled; **sheaths** on the first internode of the branches with 5 or more teeth. **Cone** terminal on the main stem, blunt, long-stalked, deciduous, appearing late Jun—early Aug. Emergent or marginal in oxbow swamps and fresh spring-fed streams; uncommon; se ND, ne SD; (Circumboreal, in N.Amer. s to PA, NE, MT, n ID and WA).



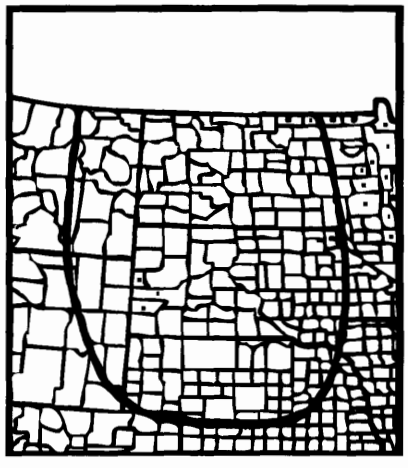
6. *Equisetum pratense* Ehrh. — Meadow horsetail

Stems dimorphic, annual, erect. **Sterile stem** green, branching regularly, 2-5 dm tall, 10- to 18-ridged, the **ridges** with spicules of silica deposit, especially on the upper portions of the upper internodes; **central cavity** 1/3 to 1/2 the stem diameter; **main stem sheaths** 2-6(8) mm long, the teeth free or partly connate in pairs, dark brown with white-hyaline margins, 1-3 mm long. **Branches** many, simple, spreading, mostly 3-angled; **sheaths** on the first internodes of the branches with 3 or 4 teeth. **Fertile stem** initially simple and brownish, eventually greening at the nodes and producing many small green branches, appearing in May before the sterile stems and persisting, mostly 1-3 dm tall; **sheaths and their teeth** like those of the sterile stems but somewhat longer. **Cone** terminal, blunt, long-stalked, deciduous. Moist woods and stream banks; uncommon; e ND, ne SD and the Black Hills; (Circumboreal, in N.Amer. s to NJ, PA, SD, ne ID, s Alta. and s B.C.).



7. *Equisetum sylvaticum* L. — Wood horsetail

Stems dimorphic, annual, erect. **Sterile stem** green, densely branched from the nodes, 3-7 dm tall, mostly 10- to 18-ridged, the **ridges** usually with silicaceous spicules; **central cavity** usually more than 1/2 the stem diameter; **main stem sheaths** 5-10 mm long, the teeth coherent in usually 3-5 broad lobes, reddish-brown, 3-5 mm long. **Branches** rebranched, spreading to recurved, 4- or 5-angled. **Fertile stems** as in *E. pratense*, except usually having rebranched rather than simple branches; **sheaths** 10-25 mm long, the teeth fused into reddish-brown lobes 4-15 mm long. **Cones** as in *E. pratense*. Wet or swampy woods; uncommon; ne ND, ne SD and the Black Hills; (Circumboreal, in N.Amer. s to MD, WV, KY, IA, SD, nw MT, n ID and s B.C.).

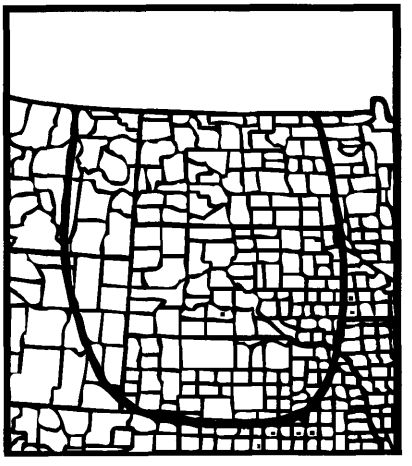


2. **Isoetaceae**, the Quillwort Family

1. ***Isoetes*** L.

1. *Isoetes melanopoda* Gay & Durieu — Blackfoot quillwort

Perennial herb with a rosette of long, terete **leaves** arising from a lobed, cormlike base; **roots** numerous and branched, arising from the groove between lobes of the corm. **Leaves** long, slender and terete, 10-50 cm long, 0.5-3.5 mm wide, mostly hollow with 4 longitudinal air chambers surrounding the central vascular bundle, broadened at the base where the sporangia are contained; the outer leaves producing megasporangia, the inner leaves microsporangia; **sporangia** oblong, 5-30 mm long, usually brown-spotted, the megasporangia containing many rather large (0.25-0.45 mm in diameter) megaspores, the microsporangia containing numerous, tiny microspores. Jun—Aug. Submerged or in wet soil of swales and temporary ponds; rare, with one old record from Mellette Co., SD, otherwise scattered from MN to s NE; (NJ to MN and SD, s to GA and TX).





Isoetes melanopoda. **The swollen bases of the quill-like leaves contain the sporangia.**

Division **POLYPODIOPHYTA**

3. **Ophioglossaceae**, the Adder's-tongue Family

1. ***Ophioglossum*** L. — Adder's tongue

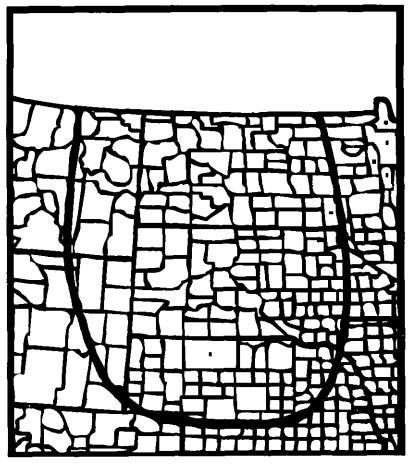
1. *Ophioglossum vulgatum* L.

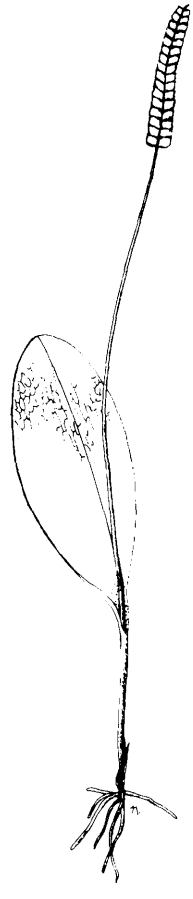
Small, erect, herbaceous perennial, (0.5)1-3 dm tall, from slender rhizomes. **Leaves** mostly solitary or paired, simple, entire, each blade borne on a **stipe** 3-15 cm long, the **blades** erect to ascending, elliptic to ovate, rounded to acute at the tip, 2.5-10 cm long, 1-4 cm wide, conspicuously net-veined. **Sporangia** homosporous, continuous in 2 rows in a terminal, unbranched spike, the **spike** 1-4 cm long, subtended by the leaf blade and borne above it on a **stalk** 3-15 cm long; spores single, with triradiate markings. Gametophyte small, subterranean, mycorhizal. Jun—Aug. Sandy wet meadows; rare; se ND, nc NE; (Circumboreal in temperate zones, in N.Amer. from N.S. to WA and irregularly scattered s to FL and Mex.).

Our plants belong to the northern var. *pseudopodum* (Blake) Farw.

Reference:

Barker, W. T. and J. Hanson. 1976. A record of *Ophioglossum vulgatum* L. for North Dakota. Amer. Fern J. 66:137.





Ophioglossum vulgatum.

4. **Polypodiaceae**, the Polypody Family

Perennial ferns from stout, often scaly subterranean stems (rhizomes) or stems with a short, upright, above-ground portion. **Leaves** commonly referred to as **fronds**, often large, variously pinnately lobed or dissected, the initial divisions called **pinnae**, the pinnae themselves sometimes pinnately divided into **pinnules**; fronds developing from a circinate coil ("fiddlehead"), the **petioles** well developed, often fairly stout. **Fronds** all alike, with the fertile fronds undifferentiated from the sterile fronds; or the fronds dimorphic, with the fertile fronds specialized and unlike the sterile fronds. **Sporangia** homosporous, grouped into **sori** on the undersides of fronds or on the specialized fertile fronds, the sori often covered by a membranous **indusium**; sporangia small, stalked, dehiscent perpendicular to a vertical annulus; spores released singly, with triradiate ridges. Gametophytes photosynthetic, dorsiventral, terrestrial, monoecious, with sex organs developed on the underside of the prothallium.

A large fern family of which several taxa grow in swampy or boggy places.

1 Fertile fronds brown, structurally unlike the green sterile fronds.

  2 Sterile fronds pinnate at the base, pinnatifid upward; veins of the pinnae anastomosing . . . . . 5. *Onoclea*

  2 Sterile fronds pinnate-pinnatifid; veins of the pinnae free . . . . . 4. *Matteuccia*

1 Fertile and sterile fronds green, structurally similar.

  3 Ultimate leaf segments mostly flabellate; sori borne beneath reflexed margins of the lobes on the leaf segments . . . . . 1. *Adiantum*

  3 Ultimate leaf segments not flabellate; sori borne on the underside of the leaf segments.

    4 Indusium attached at its center in the middle of the sorus.

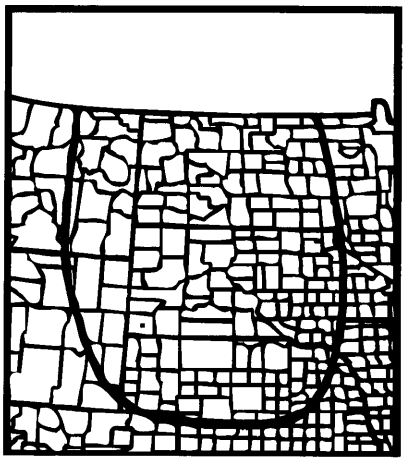
      5 Fronds pubescent, especially on the rachis and midnerves of the pinnae; petioles without scales . . . . . 6. *Thelypteris*

      5 Fronds glabrous; petioles with membranous scales . . . . . 3. *Dryopteris*

    4 Indusium attached along its margin to one side of the sorus . . 2. *Athyrium*

1. *Adiantum capillus-veneris* — Venus'-hair fern

Rhizomes short to long-creeping, heavily clothed with fine, tan to brown, subulate scales. **Fronds** alike, scattered along the rhizome, spreading to drooping, 1-5 dm long, the **blades** bipinnate to tripinnate, oblong-lanceolate in outline; **pinnae** alternate on the rachis, reduced upward, the ultimate divisions mostly flabellate or obliquely so, round-lobed and toothed toward the tips; veins dichotomous and free; **petioles** dark brown, smooth or scaly near the base, 3-20 cm long. **Sori** marginal, borne beneath reflexed margins of the lobes on the leaf segments, lacking indusia. Jun—Sep. Wet, calcareous stream banks, rock ledges and springy areas; locally common along Cascade Creek, Fall River Co., SD; (Widespread in tropical and temperate regions of the World, in N.Amer. s from VA to MO, CO and B.C., and with the disjunct population in sw SD.).



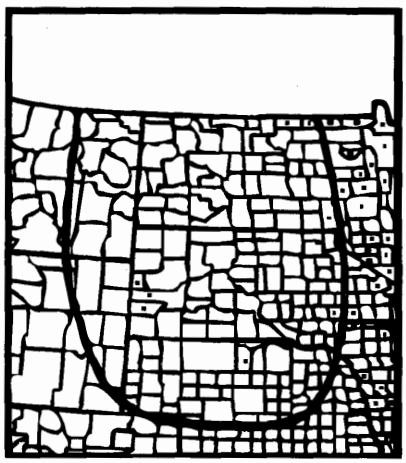


Adiantum capillus-veneris.

2. ***Athyrium*** Roth

1. *Athyrium filix-femina* (L.) Roth — Lady fern

Rhizome stout, short-creeping, scaly. **Fronds** annual, alike, clustered, 4-10 dm tall, the **blades** bipinnate to bipinnate-pinnatifid, with the **pinnules** toothed to deeply dissected, lanceolate, 2.5-6 dm long, 1-3 dm wide, glabrous, acuminate, narrowed at the base; **pinnae** numbering mostly 15-25(30) pairs, spreading, mostly alternate, linear-lanceolate, 1-4 cm wide; **veins** simple to dichotomizing a few times; **petioles** ca. 1/2 the length of the blade, with chaffy scales mostly near the base. **Sori** round to oblong, often hooked or horseshoe-shaped, in 2 regular rows on the backs of the pinnules; **indusium** attached along its margin to one side of the sorus. Jun—Sep. Swamp margins, wooded banks and alluvial woods; uncommon; e ND, e SD and the Black Hills, n NE; (Cosmopolitan). *A. angustum* (Willd.) Presl.



3. *Dryopteris* Adans. — Shield fern

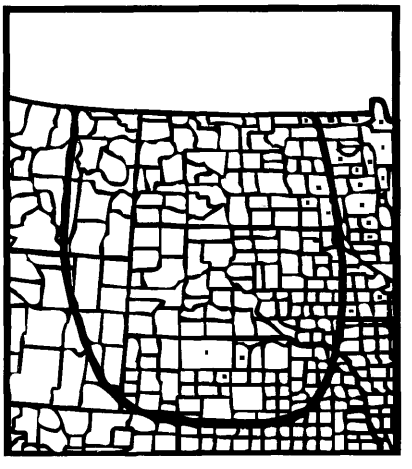
Rather large ferns of moist to wet, wooded habitats; **rhizomes** stout, scaly. **Fronds** alike or somewhat dimorphic, the sterile ones sometimes persisting over winter, glabrous, the **blades** pinnate-pinnatifid to tripinnate, ultimate segments commonly toothed or lobed; **veins** free, simple to once or twice dichotomous; **petioles** shorter than the blades, stramineous, bearing membranous scales. **Sori** round, occurring at regular intervals on the backs of the ultimate segments; **indusium** reniform, attached at its center in the middle of the sorus.

1 Blades bipinnate-pinnatifid to nearly tripinnate . . . . . 1. *D. carthusiana*

1 Blades pinnate-pinnatifid to nearly bipinnate . . . . . 2. *D. cristata*

1. *Dryopteris carthusiana* (Vill.) H. P. Fuchs — Spinulose woodfern

Fronds alike, clustered, to 10 dm tall, the **blades** bipinnate-pinnatifid to nearly tripinnate, lanceolate, 2-6 dm long, 6-30 cm wide, acuminate, slightly narrowed at the base; **pinnae** usually numbering 10-15 pairs, ascending to spreading, alternate to subopposite, lanceolate to linear-lanceolate; **pinnules** toothed to deeply pinnately lobed, mostly 5-40 mm long, 3-10 mm wide, the teeth or lobes spinulose-tipped. Jun—Sep. Wet alluvial woods or swamps; uncommon; e ND, n and se NE; (Labr. to Alta. s to VA, MO, NE and ID). *D. austriaca* (Jacq.) Woynar var. *spinulosa* (Mull.) Fiori; *D. spinulosa* (Mull.) Watt.



2. *Dryopteris cristata* (L.) A. Gray — Crested fern

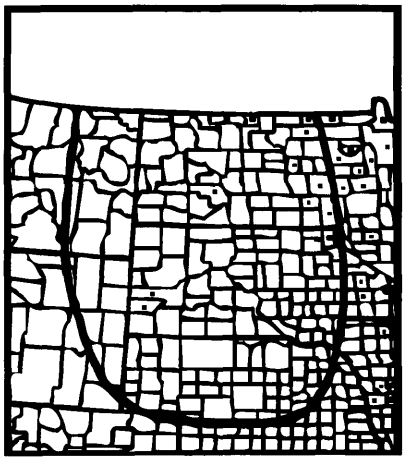
Fronds somewhat dimorphic, clumped, the outer sterile fronds smaller than the inner fertile ones and persisting longer during winter, the **fertile fronds** 3-8 dm tall; **blades** pinnate-pinnatifid to nearly bipinnate, narrowly lanceolate, 2-6 dm long, 7-15 cm wide, acuminate, narrowed at the base; **pinnae** as in the preceding, except ovate-lanceolate to lanceolate, only once-pinnately lobed; **pinnules** toothed, mostly 4-15 mm long, 4-7 mm wide, usually spinulose. Jun—Sep. Occurring in the same habitats as the preceding; uncommon; e ND, nc NE; (Circumboreal, in N.Amer. s to VA, AR, NE and ID).



1. *Matteuccia struthiopteris* (L.) Todaro

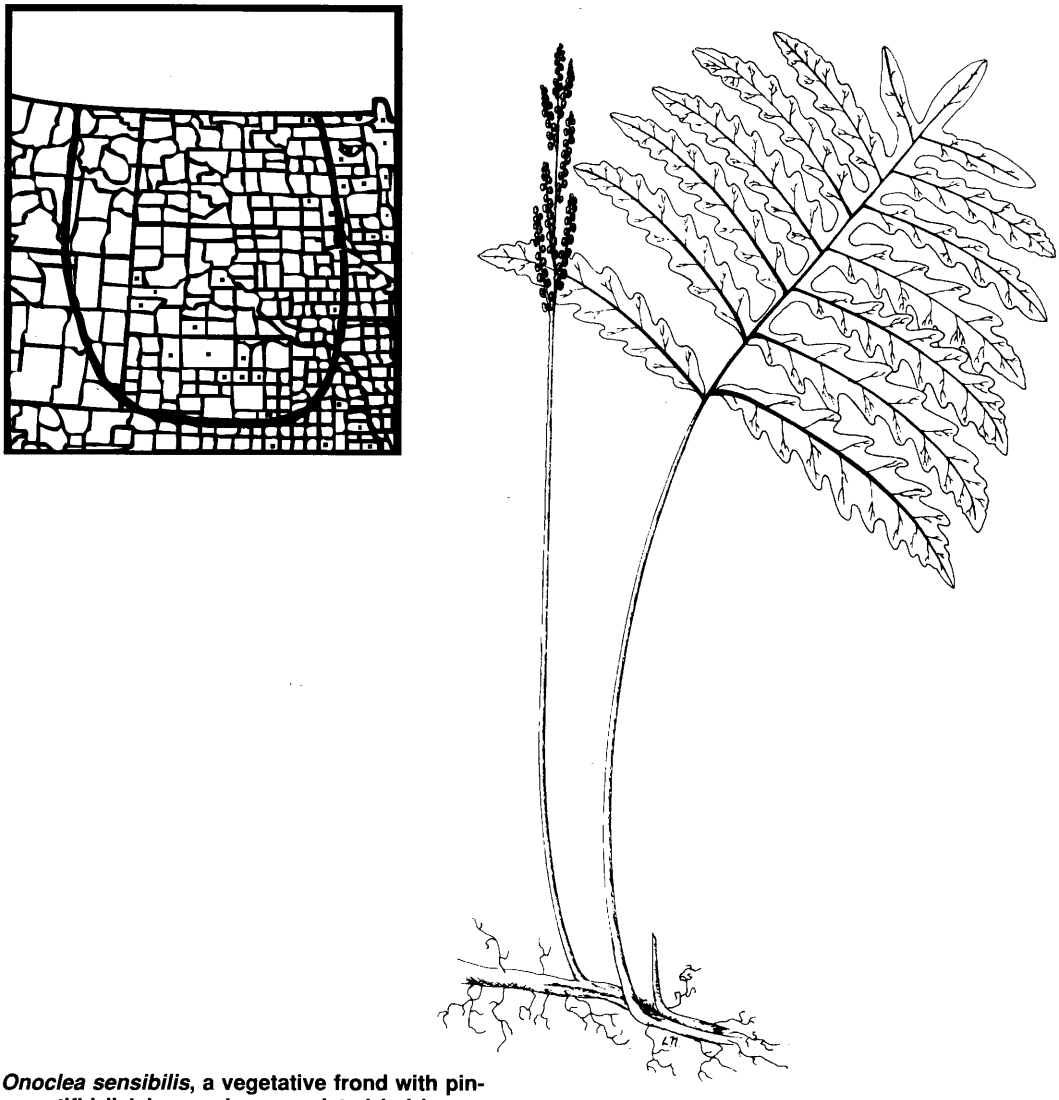
Rhizomes stout, branching and scaly, giving rise to short upright stems which bear the fronds. **Fronds** annual (in the northern plains), dimorphic, the **fertile frond** stiffly erect in the center of a circle of sterile fronds, blackish to brown, structurally unlike the green sterile fronds. **Sterile fronds** ascending, pinnate-pinnatifid, to 17 dm tall; **blades** much longer than the petioles, mostly 15-35 cm wide, sparsely to obviously pubescent on the rachis, abruptly narrowed to the tip, gradually tapered to the base; **pinnae** 20 to many pairs, ascending, mostly alternate, 7-22 cm wide, deeply divided into 20 or more pairs of **pinnules**, these 3-6 mm wide at the base; **veins** pinnate, free, not anastomosing. **Fertile frond** shorter than the sterile ones, to 5 dm tall; **blade** pinnate-pinnatifid, 12-25 cm long; **pinnae** ascending to appressed, 2-6 cm long, the margins revolute to enclose the sori, eventually spreading and the pinnules separating to expose the sporangia; **sori** several on each pinnule, the **pinnules** 1-2 mm wide; **indusium** hyaline, hoodlike, lacerate. Fertile fronds produced Jun—Jul, often persistent into the following year. Wet or swampy woods and stream margins; occasional; e and c ND, ne SD and the Black Hills; (Newf. to AK, s to VA, OH, MO, SD and B.C.; also in Europe). *Pteretis pensylvanica* (Willd.) Fern.

The ostrich fern is commonly planted as an ornamental in shaded places around homes. It spreads readily by rhizomes.



1. *Onoclea sensibilis* L.

Rhizomes spreading and branching, 4-7 mm thick, the scales caducous. **Fronds** annual, erect, dimorphic, the fertile fronds brown, structurally unlike the green sterile fronds. **Sterile fronds** pinnate at the base, pinnatifid upward, the rachis broader-winged toward the tip; **blades** mostly 10-30 cm long, 10-35 cm wide, with 8-12 pairs of opposite pinnae, these sinuate to pinnatifid, 1-3 cm wide, sparsely white-hairy on the veins beneath, the veins anastomosing; **petioles** shorter to about as long as the blade. **Fertile frond** surpassed by the sterile ones; **blade** pinnate-pinnatifid, mostly 5-15 cm long; **pinnae** strongly ascending, 2-5 cm long, divided into bead-like pinnules with inrolled margins enclosing the sori, the **pinnules** 3-4 mm wide, becoming dry, hard, eventually separating to release the spores; **sori** globose, covered by a delicate, hoodlike indusium. Fertile fronds produced Aug—Sep, often persistent into the following year. Swampy woods, wet meadows and marshes, where water is fresh; scattered from e ND to NE, especially common in the Sand Hills; (Newf. to Man., s to FL and TX).



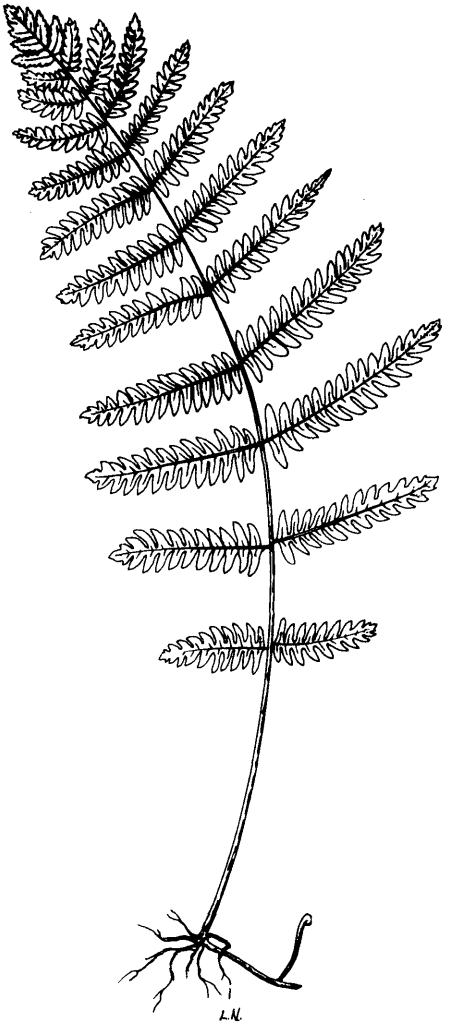
***Onoclea sensibilis*, a vegetative frond with pinnatifid divisions and an associated dark brown fertile frond, both arising from a rhizome.**

1. *Thelypteris palustris* Schott — Marsh fern

Rhizomes spreading and branching, slender, with a few appressed scales. **Fronds** annual, only slightly dimorphic, mostly erect, the **blades** pinnate-pinnatifid, lanceolate or oblong-lanceolate, 15-30(40) cm long, 8-15(20) cm wide, puberulent on the rachis and midveins, acuminate, only slightly narrowed at the base; **pinnae** usually 10-25 pairs, spreading, mostly alternate, 8-15(20) mm wide; **petioles** scaleless. **Sterile fronds** thin, delicate, **pinnules** broadly oval, obtuse, 3-5 mm wide, veins once-dichotomous; petioles shorter to longer than the blade. **Fertile fronds** surpassing the sterile ones, more firm than the sterile fronds, the petiole longer than the blade; **pinnules** oblong, 2-4 mm wide, the margins revolute; veins simple or once-dichotomous; **sori** round, usually confluent on the back of the pinnules; **indusium** attached at its center in the middle of the sorus, irregular in shape, usually ciliate. Jun—Sep. Boggy or marshy places, where water is fresh; scattered from ND to NE, especially common in the Sand Hills; (Nearly cosmopolitan; in N.Amer., Newf. to Man., s to GA and OK).

North American plants are var. *pubescens* (Lawson) Fern.





A frond of *Thelypteris palustris*.

5. **Marsileaceae**, the Pepperwort Family

1. ***Marsilea*** L. — Pepperwort, water clover

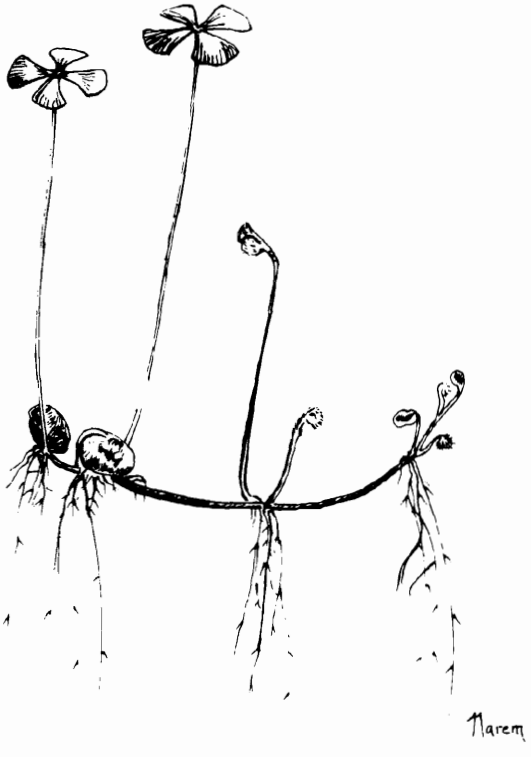
1. *Marsilea vestita* Hook. & Grev.

Creeping perennial (or acting as an annual when the habitat dries) in mud or shallow water. **Stem** a superficial, sprawling rhizome, rooting at the nodes. **Leaves** 4-foliate, with 4 wedge-shaped leaflets, giving the appearance of a 4-leaved clover, often floating, the **leaflets** obdeltate, 2-15 mm long and about as wide; **petioles** slender, lax when submersed, 2-20(30) cm long, greatly lengthened to accommodate the blade when submersed. Sporangia heterosporous, enclosed in solitary oval sporocarps borne near the base at the nodes; **sporocarps** brown, 4-7 mm long, strigose; sori in 2 rows inside the sporocarp, with apical megasporangia and lateral microsporangia; spores tetrahedral, the microspores numerous, the megaspores solitary in the sporangia; gametophyte aquatic, nonphotosynthetic. Jul—Sep. Mud or shallow water of temporary ponds, streams or ditches; occasional; (MN to B.C., s to AR, TX, Mex. and CA; intro. in FL). *M. mucronata* A. Br.

Pilularia americana R. Br., American pillwort, is another member of the Marsileaceae that has been found in Cherry Co., NE. It is an inconspicuous, low, mat-forming plant with tufts of filiform **leaves** 2-11 cm long arising from creeping, filiform rhizomes. The **sporocarps**, which are borne on short stalks from the rhizomes, are smaller (2-3 mm in diameter) and more round than those of *Marsilea vestita*. American pillwort occurs in shallow water or on exposed substrates of lakes and temporary pools in sandhill regions mainly south of this region.

Reference:
Stason, M. 1926. The marsileas of the western United States. Bull. Torrey Bot. Club 53:473-478.





Marsilea vestita. **When stranded by receding water, the 4-lobed leaves are borne on erect petioles and the plant produces the bean-shaped sporocarps near the petiole bases as shown in the drawing.**

6. **Salviniaceae**, the Water Fern Family

1. ***Azolla*** Lam. — Mosquito fern

1. *Azolla mexicana* Presl

Small, annual, free-floating plants up to 3 cm across, often forming mats, sometimes stranded on mud; **plant body** comprised of dichotomously branched stems clothed with tiny, alternate, overlapping leaves in 2 rows, green or often strongly red; **roots** few, unbranched. **Leaves** 2-lobed, the upper lobe emersed, rhombic-ovate to obovate, 0.7-1.3 mm long, the lower lobe submersed and larger than the upper, mostly achlorophyllous. Sporangia heterosporous, the micro- and megasporangia contained in separate **sporocarps** which are usually paired on the submersed lobes of some of the leaves. Jul—Oct. Quiet water of marshes, ponds, streams and ditches; scattered in NE; (WI to NE and B.C., s to TX, CA and into Mex. and S.Amer.).





***Azolla mexicana*, greatly enlarged.**

Division **MAGNOLIOPHYTA**

Herbs, shrubs, trees and vines, exhibiting a great diversity of growth forms and habits, featuring a life cycle in which the unisexual gametophytes are much reduced, very shortlived and nutritionally dependent upon the sporophyte. **Sporophyte** typically differentiated into vascularized roots, stems and leaves, or rarely thalloid (Lemnaceae). **Leaves** simple to compound, opposite, alternate, whorled or basal, sometimes much reduced. Sexual structures grouped into specialized short shoots termed **flowers**, the major parts of a flower typically comprised of highly modified sterile and fertile leaves in a cyclic or spiral arrangement on a receptacle, the sterile leaves (collectively termed the **perianth**) surrounding or enveloping the inner fertile ones; members of the perianth usually of 2 types, the outermost members (the **sepals**) commonly herbaceous, collectively making up the **calyx**, the innermost members (the **petals**) typically thin-textured, often brightly colored, collectively termed the **corolla**, the sepals and petals sometimes similar in appearance and referred to as **tepals**, either the calyx or the corolla or both occasionally lacking; fertile leaves (sporophylls) making up the central portion of the flower, usually 2 kinds present, the outermost of these the **stamens** (microsporophylls), collectively termed the androecium, each stamen comprised of a slender stalk (the **filament**) with a distally attached pair of connected sacs (the **anther**), the anther sacs containing numerous pollen grains (male gametophytes), eventually rupturing to release the **pollen**; the innermost of the fertile leaves termed **carpels** (megasporophylls), collectively termed the gynoecium, each carpel representing an ovule-bearing leaf with the margins inrolled and fused to enclose the ovules; **carpels** 1-many, separate so that each carpel comprises a simple pistil, or the carpels fused together to form one compound pistil; **pistil** typically composed of 3 parts, the swollen lower portion containing the ovules referred to as the **ovary**, the slender upper portion called the **style**, terminated by the sticky or hairy **stigma** which serves as the pollen-receptive surface of the pistil, the style sometimes obsolete so that the stigma is sessile on the ovary. Maturation of the ovary after fertilization results in the development of the **fruit**. The **ovules** contained within the ovary mature as **seeds**. Fruits are of many different types, of which the most common are the capsule, achene, caryopsis (or grain), follicle, drupe and berry.

Many terms are used to describe various conditions encountered in flowers. **Perfect** (or bisexual) **flowers** are those possessing both fertile stamens and carpels. Flowers with either stamens (staminate or male flowers) or carpels (pistillate or female flowers), but not both, are termed **imperfect** (or unisexual) **flowers**. The terms **regular** (or **actinomorphic**) and **irregular** (or **zygomorphic**) are used to describe flower symmetry. **Regular flowers** are radially symmetric, i.e., they may be bisected in many planes to give equal halves, whereas **irregular flowers** are bilaterally symmetric, i.e., they can be bisected in only one plane to give equal halves. The terms **hypogynous**, **perigynous** and **epigynous** pertain to the position of the perianth relative to the gynoecium of the flower. Flowers with the perianth lobes attached to the receptacle below the gynoecium (**ovary superior**) are described as **hypogynous**; those with the perianth lobes coming off above the ovary and with the ovary apparently embedded in the receptacle (**ovary inferior**) are termed **epigynous**; and those with the perianth lobes and stamens all attached around the margin of a disk, cup or tube, with the ovary (or ovaries) sitting free inside the base of the disk, cup or tube are considered **perigynous**. In the latter case the ovary position is considered superior because the one or more ovaries are not embedded in other tissues. In the case of perigynous and epigynous flowers, the portion of the flower surrounding (perigynous) or enclosing (epigynous) the ovary (or ovaries) is termed the **hypanthium** or **floral tube**.

Class **MAGNOLIOPSIDA**, Dicotyledons

Plants with vascular bundles of stems typically arranged in a ring in herbaceous forms, forming a cylinder which encloses a central pith, usually with a fascicular cambium; woody forms with secondary growth added on in layers by a vascular cambium; leaves mostly pinnately or palmately net-veined; flower parts (mainly the sepals, petals and stamens) usually in multiples of 4 or 5, seldom 3; plant embryo usually with 2 cotyledons.

7. **Nymphaeaceae**, the Water Lily Family

Aquatic perennials with large floating and often some emersed leaves; **stem** a thick, fleshy, submerged rhizome anchored in the substrate, the older portions decaying behind the growing apex. **Leaves** arranged in a close spiral on the rhizome, subpeltate, the **blades** large and leathery, oblong to oval or rotund in outline but with a sinus behind the petiole attachment to the blade; smaller, thin textured submersed leaves sometimes present, especially early in the growing season; **petioles** elongate, stout and tough. **Flowers** solitary on long peduncles, borne at or above the water surface, white or yellow, 4-20 cm across, perfect, regular, hypogynous to nearly epigynous; **sepals** 4-6, quite petaloid, green or greenish on the outside, white or yellow on the inside, when yellow usually reddish toward the base; **petals** numerous, either white, large and showy, or yellow, small and inconspicuous, spirally arranged, gradually passing into the stamens; **stamens** numerous, with flattened and often broadened filaments; **carpels** several to many, fused into a compound ovary, stigmas radiating from the center of the disklike summit of the ovary. **Fruit** fleshy and leathery, many-seeded, eventually breaking open under water.

1 Flowers yellow; leaf blades oblong to oval or subsagittate . . . . . 1. *Nuphar*

1 Flowers white; leaf blades rotund or nearly so . . . . . 2. *Nymphaea*

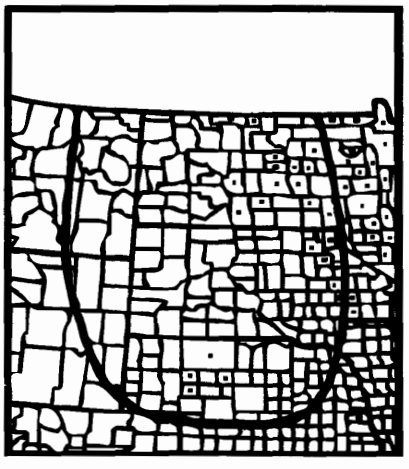
1. *Nuphar luteum* (L.) Sibth. & Small — Yellow water lily, spatterdock

Stout plants from thick, yellowish, branched rhizomes. **Leaf blades** floating or some often emersed, oblong to oval or subsagittate, (1)1.5-4 dm long, the basal lobes divergent to slightly overlapping; earliest leaves submersed, thin and reddish; **petioles** flattened and winged on the upper side. **Flowers** yellow, 4-6 cm across; **sepals** usually 6(5), spirally arranged and overlapping, greenish to yellow, usually reddish toward the base on the inside, oblong; **petals** oblong to spatulate, much smaller than the sepals, usually shorter than the stamens; **anthers** 4-7 mm long, **filaments** flat; **stigmatic rays** usually 7-16. **Fruit** somewhat ovoid, mostly 2-4 cm long; **seeds** ovoid, to 5 mm long. Jun—Aug. Shallow to deep water of quiet streams, lakes and ponds; occasional in e and c ND, e SD and the NE Sand Hills. *N. variegatum* Engelm., *N. advenum* Ait.

Northern Great Plains plants belong to subsp. *variegatum* (Engelm.) Beal, which ranges from Newf. to the Yukon, s to DE, n OH, n IL, IA, NE and MT.

Reference:

Beal, E. O. 1956. Taxonomic revision of the genus *Nuphar* of North America and Europe. J. Elisha Mitch. Sci. Soc. 72:317-346.





***Nuphar luteum* subsp. *variegatum*.**

2. *Nymphaea* L. — Water lily

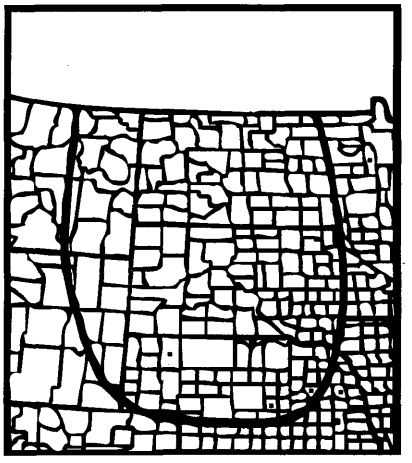
Large-flowered plants from stout rhizomes, these sometimes with lateral tubers. **Leaf blades** nearly always floating, seldom some emersed, rotund or nearly so, with a narrow V-shaped sinus behind the petiole attachment to the blade; **petioles** not flattened or winged. **Flowers** white and showy, 7-25 cm across, usually opening in morning and closing in afternoon, remaining open on cool days; **sepals** 4, greenish; **petals** numerous and overlapping, white, gradually passing into the stamens; **stamens** numerous, the outer ones with broadened, petaloid filaments, anthers yellow, the spiral of petals and stamens encroaching up the sides of the ovary so that the flower is nearly epigynous; **ovary** concave at its summit with a rounded protuberance projecting from the center, **stigmas** usually 10-25, radiating from the center, overarched by finger-like projections around the margin of the stigmatic disk. **Fruit** subglobose, covered with the persistent petal and stamen bases, maturing under water; **seeds** numerous, each enveloped by a saclike aril.

1 Petals elliptic, broadest near the middle, tapered to a subacute tip; flowers usually fragrant; rhizome lacking tubers . . . . . 1. *N. odorata*

1 Petals oblanceolate to spatulate, broadest above the middle, obtuse to rounded at the tip; flowers scarcely if at all fragrant; rhizome with lateral tubers . . 2. *N. tuberosa*

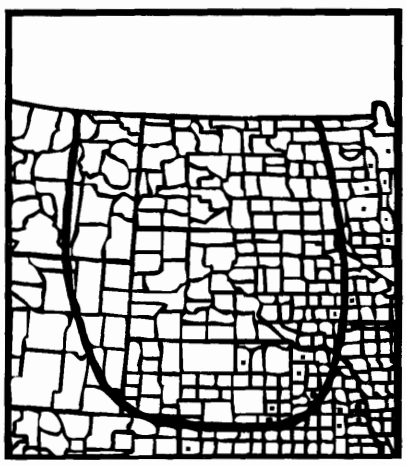
1. *Nymphaea odorata* Ait. — Fragrant white water lily

Rhizome elongate, without lateral tubers. **Leafblades** to 25 cm across, green above, usually purple or red-tinged beneath; **petioles** not striped. **Flowers** pleasantly fragrant while open, 7-12 cm across; **sepals** often purplish on the back; **petals** elliptic, tapered to a subacute tip. **Seeds** ellipsoid, ca. 2 mm long. Jun—Sep. Quiet waters of ponds, lakes, and streams; rare in the Sand Hills and e NE; (Newf. to Man. and MN, s to FL and e TX, also AZ).



2. *Nymphaea tuberosa* Paine — White water lily

Rhizome producing knotty, lateral tubers. **Leaf blades** 10-30 cm across, green above and beneath or rarely dull purple beneath; **petioles** usually striped. **Flowers** odorless or scarcely fragrant, 8-25 cm across; **sepals** green on the back; **petals** oblanceolate to spatulate, obtuse to rounded at the tip. **Seeds** 2.8-4.4 mm long. Jun—Sep. Same habitats as the preceding; rare or extirpated in e SD, uncommon in the Sand Hills and e NE; (Que. to n Ont. and MN, s to MD, IN and OK).

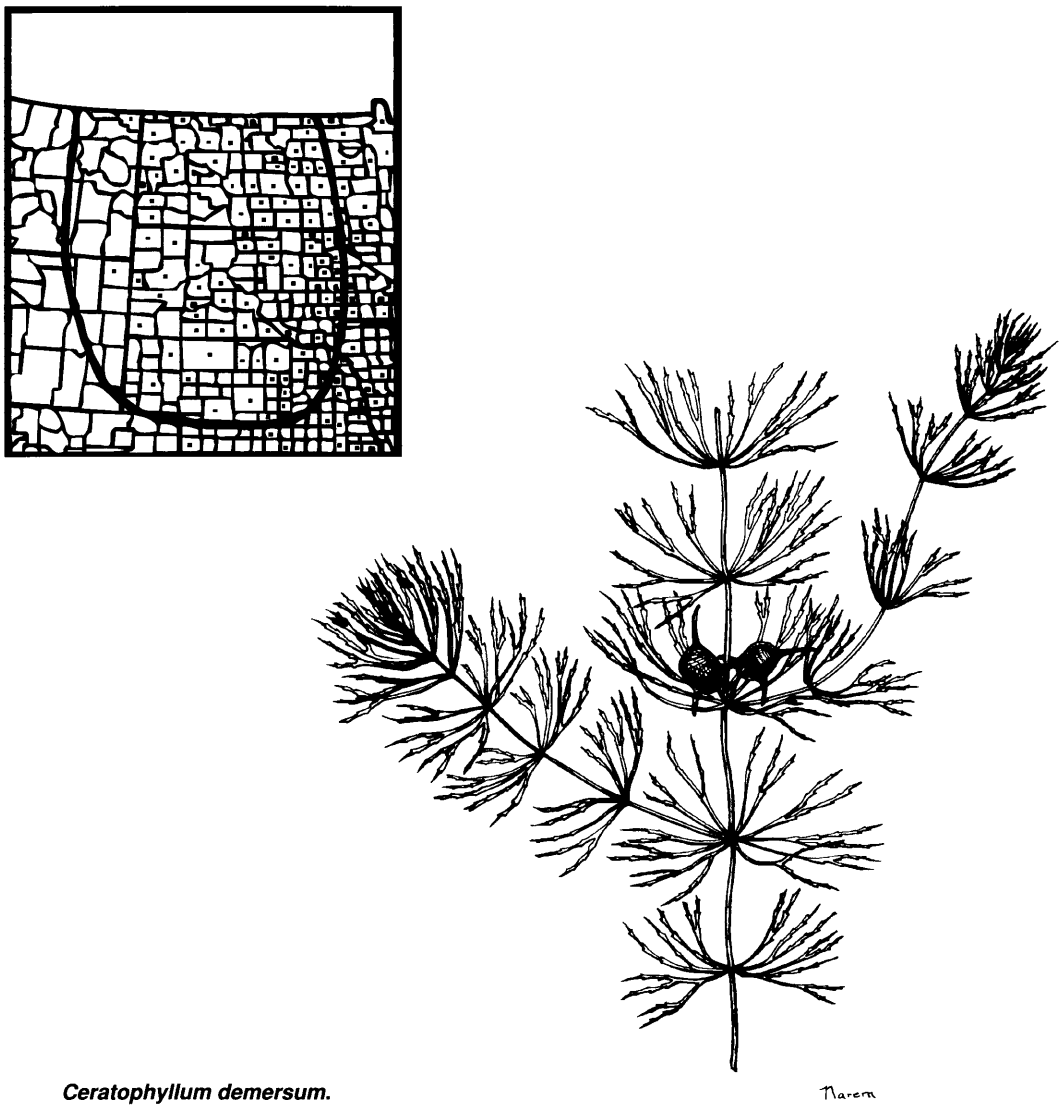


8. **Ceratophyllaceae**, the Hornwort Family

1. ***Ceratophyllum*** L. — Hornwort, coontail

1. *Ceratophyllum demersum* L.

Rootless perennial aquatic, entirely submersed, free-floating or more often anchored by the older decaying portion of the stem. **Stems** delicate, freely branching, the living portion usually no more than a few dm long, often fragmenting as water warms during summer. **Leaves** sessile, whorled, 5-12 at each node, once or twice dichotomously branched into filiform segments, 5-30 mm long, sparsely to conspicuously spinulose, spreading to curving upward, more crowded toward the branch tips to give the coontail appearance. **Flowers** minute, imperfect, solitary and sessile in the leaf axils, both male and female flowers subtended by an involucre or perianth of 8-15 greenish segments; **male flowers** containing 10-16 stamens; **female flowers** each consisting of a single unicarpellary pistil. **Fruit** a dark olive, ellipsoid achene, usually with 1 terminal and 2 basal spinelike projections, the achene body 4-5 mm long. Jun—Sep. Quiet water of lakes, ponds, marshes and streams; common, often abundant; (Cosmopolitan).



Ceratophyllum demersum.

9. **Ranunculaceae**, the Buttercup Family

Aquatic to terrestrial herbs (in those included here). **Leaves** simple to palmately lobed or compound, alternate or mostly to entirely basal, usually petioled, exstipulate or stipulate. **Flowers** perfect, regular, hypogynous; **sepals** usually 5, occasionally more, herbaceous and greenish or petaloid and colored, often deciduous; **petals** 5 or none, seldom more than 5, usually yellow or white; **stamens** usually numerous; **pistils** several to many, simple, ripening into beaked achenes or follicles.

1 Pistils containing several ovules, maturing into follicles; leaves shallowly toothed, not divided into filaments or lobes . . . . . 2. *Caltha*

1 Pistils containing 1 ovule, maturing into achenes; leaves all or mostly divided into lobes or filaments (except in *Ranunculus cymbalaria*, *R. flammula* and *Myosurus*, which have undivided leaves).

2 Sepals spurred at the base; achenes borne in a spikelike cluster on an elongate receptacle . . . . . 3. *Myosurus*

2 Sepals not spurred; achenes borne in a globose to short-cylindric cluster.

3 Flowers white, 2-5 cm across; leaves all basal except for the leaflike involucres subtending the flowers, deeply lobed . . . . . 1. *Anemone*

3 Flowers yellow or white, but if white, then the flowers less than 2 cm across and the leaves finely dissected into filamentous segments; leaves cauline or basal . . . . . 4. *Ranunculus*

1. *Anemone canadensis* L. — Meadow anemone

Erect perennial 1-6 dm tall, from slender rhizomes, often forming dense patches; **stems** simple below the inflorescence, setose. **Leaves** all basal and long-petioled except for the 2-3 sessile, leaflike involucres subtending the inflorescence; **blades** deeply 3- to 5-lobed and sharply toothed as well, rotund to reniform in outline, 4-15 cm across, sericeous, especially beneath; **petioles** 5-35 cm long. **Flowers** 1-3, white and showy, 2-5 cm across, lateral flowers, when present, subtended by smaller involucres than the central one; **peduncles** 3-12 cm long; **sepals** (4)5(6), petaloid, white, obovate, often unequal, 10-25 mm long; **petals** none; **stamens** numerous; **pistils** many, maturing into achenes, styles pubescent. **Achenes** in a globose head, obovate to suborbicular, 2.5-4.5 mm long, about as wide; style beak 2-4 mm long, pubescent. Jun—Jul, fruiting into Aug. Wet meadows, low prairie, ditches, floodplains, moist woods and thickets; common in ND, e SD and e NE, much less so in w SD and w NE; (e Que. to Alta., s to MD, WV, MO, KS and NM).

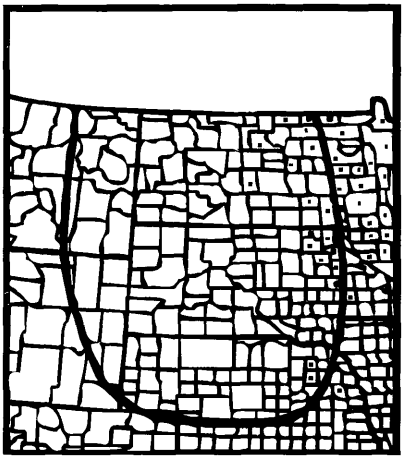




Anemone canadensis.

1. *Caltha palustris* L.

Loosely clumped, coarsely rooted perennial 2-6 dm tall; **stems** hollow, rather succulent, glabrous throughout. **Leaves** simple, the blades rotund-cordate, with the basal lobes separate or overlapping, 4-10(15) cm across, the margin shallowly dentate; membranous stipulelike appendages present at the nodes. **Flowers** few to several terminating each stem, showy, 2-4 cm across; **sepals** 4-9, bright yellow, petaloid, 12-20 mm long; **petals** none; **stamens** many; **pistils** 4-12, with very short styles. **Follicles** somewhat recurved and splitting lengthwise along the inside wall, 1-1.5 cm long. Flowering May—early Jun, fruiting Jun—early Jul. Swamps, springs, boggy areas and along fresh streams; occasional in e and c ND, e SD and e NE; (Circumboreal, in N.Amer. s to VA, WV, NC, TN, IN, IL, IA and NE).





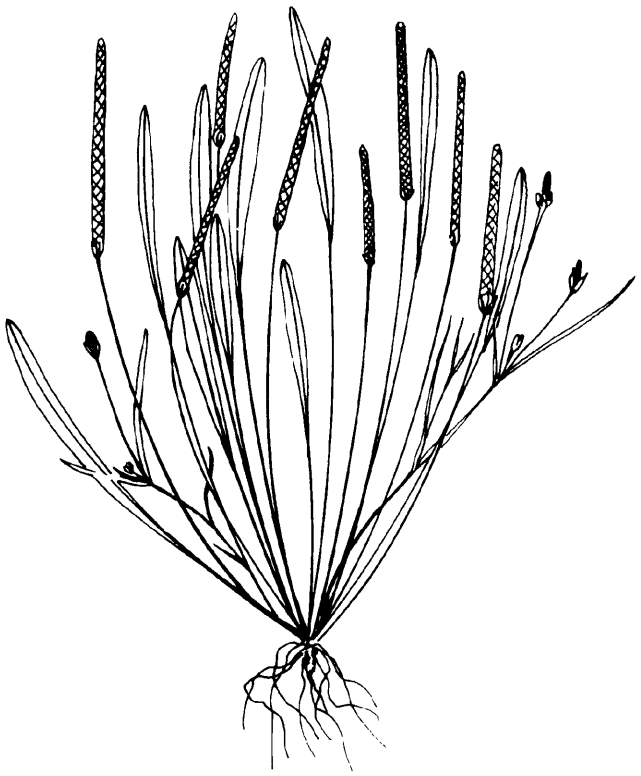
Caltha palustris.

1. *Myosurus minimus* L.

Small, glabrous, acaulescent annual 4-15 cm tall, with fibrous roots and a basal tuft of narrow, linear **leaves** mostly less than 1 mm wide. **Flowers** small, inconspicuous, usually few to many, borne singly above the leaves on slender peduncles, becoming more conspicuous in fruit; **sepals** greenish, usually 5, erect, spurred downward at the base, deciduous, 1.5-3.5(5.5) mm long, the blade lightly 3(5)-nerved on the back, usually longer than the spur; **petals** usually 5, sometimes none, inconspicuous, whitish or pinkish, about equaling the sepals; **stamens** 5-10; **pistils** many, borne on an elongate receptacle, ripening as a slender spike of usually more than 100, closely adherent, angular achenes; the **achene bodies** 1-2 mm long, with a sharp dorsal keel that extends beyond the body as an inconspicuous beak to 0.5 mm long, the beaks appressed in the spike; **mature spike** of achenes 1-6 cm long. Late Apr—Jun. Wet to moist places, sometimes in shallow water, usually where water stands only temporarily; scattered and probably more common than records indicate, as the plant is early and easily overlooked; (Ont. to B.C., s to FL, TX and CA; also s Europe, Asia and Australia).

A similar species, *Myosurus aristatus* Benth. ex Hook., has been recorded for Slope, Ward and Williams Cos., ND, and Daniels Co., MT. This plant also occurs in temporarily wet places, apparently in prairie. It differs from *M. minimus* mainly in the following ways: **Sepals** 1-nerved or rarely with 2 faint lateral nerves; **achenes** 20-50(90), rather loose in the spike, the **achene bodies** with a broad low keel and usually 2 marginal ridges on the back, the beaks conspicuous, 0.5-1.5 mm long, divergent from the spike; **mature spike** of achenes 0.5-2.5 cm long.





Myosurus minimus. **Note the very elongate heads of achenes that develop from each flower.**

4. ***Ranunculus*** L. — Buttercup, crowfoot

Aquatic, semiaquatic and terrestrial perennials and annuals, some amphibious. **Stems** erect to procumbent, sometimes floating in water, often rooting at the nodes in some spp., branching or simple. **Leaves** simple or more often ternately compound to finely dissected, often variable on the same individual in this regard, alternate or mostly basal or entirely basal; nearly sessile to long-petioled, the **petioles** often dilated at the base (probably representing stipules), especially in submersed spp. **Flowers** from terminal buds, sometimes appearing axillary, often showy, borne above the water surface in aquatic spp.; **sepals** usually 5, greenish, deciduous; **petals** 5, seldom more, yellow or white, often fading to whitish with age, usually bearing a minute nectary pit covered by a scale toward the base; **stamens** usually 10-many; **pistils** usually numerous; **receptacle** conic to cylindric, glabrous or pubescent. **Achenes** usually many in a hemispheric, globose or cylindric head; achene body thick or flattened, the coat smooth, ridged, papillate or striate, glabrous or pubescent, tipped with a terminal or lateral style beak.

References:

Benson, L. 1948. A treatise on the North American ranunculi. Amer. Midl. Naturalist 40:1-261.

Cook, C. D. K. 1963. Studies in *Ranunculus* subgenus *Batrachium* (DC.) A. Gray II. General morphological considerations in the taxonomy of the subgenus. Watsonia 5:294-303.

Cook, C. D. K. 1966. A monographic study of *Ranunculus* subgenus *Batrachium* (DC.) A. Gray. Mitt. Bot. Staatssamml. Munchen 6:47-237.

Drew, W. B. 1936. The North American representatives of *Ranunculus* sect. *Batrachium*. Rhodora 38:1-47.

Duncan, T. 1980. A taxonomic study of the *Ranunculus hispidus* complex in the Western Hemisphere. Univ. of Calif. Bot. Publ. 77:1-125.

1 Flowers white; leaves finely divided into filiform segments; plants normally submersed.

2 Achenes (7)15-25; achene body averaging 1.5 mm long; achene beak prominent, 0.7-1.1 mm long (often shorter when dried) . . . . . 7. *R. longirostris*

2 Achenes 30-45(80); achene body averaging 1.25 mm or less long; achene beak 0.2-0.5 mm long (often nearly beakless when dried) . . . . . 11. *R. subrigidus*

1 Flowers yellow; leaves simple to deeply lobed or finely divided into narrow, flat segments; plants submersed or emergent.

3 Leaves all simple and entire or crenate to crenate-lobed.

4 Leaves ovate to round or reniform, crenate to crenate-lobed; achenes striate with longitudinal ribs . . . . . 2. *R. cymbalaria*

4 Leaves elliptic to lanceolate or linear, entire to denticulate; achenes not striate . . . . . 4. *R. flammula*

3 All, or at least the cauline leaves deeply lobed, divided or compound.

5 Basal and cauline leaves distinctly different in shape, the basal leaves mostly entire or crenate, not lobed or divided, the cauline leaves deeply divided . . . . . 1. *R. cardiophyllus*

5 Basal and cauline leaves essentially similar in shape and form, all variously lobed, deeply divided or compound, none merely crenate.

6 Achenes turgid, without a sharp border.

7 Petals 4-14 mm long; achenes 1.2-2.5 mm long, beaked; plants aquatic or amphibious perennials.

8 Achene margin thickened and corky below the middle; petals mostly 6-14 mm long . . . . . 3. *R. flabellaris*

8 Achene margin rounded but not thickened, petals mostly 4-8 mm long . . . . . 5. *R. gmelinii*

7 Petals 3-5 mm long; achenes 0.8-1.2 mm long, nearly beakless; plants weedy annuals, usually emersed . . . . . 10. *R. sceleratus*

6 Achenes flattened, with a sharp or winglike border.

9 Petals 2-5 mm long; anthers less than 1 mm long; stems not rooting at the nodes.

10 Petals distinctly shorter than the sepals; heads of achenes ovoid-cylindric to cylindric . . . . . 9. *R. pensylvanicus*

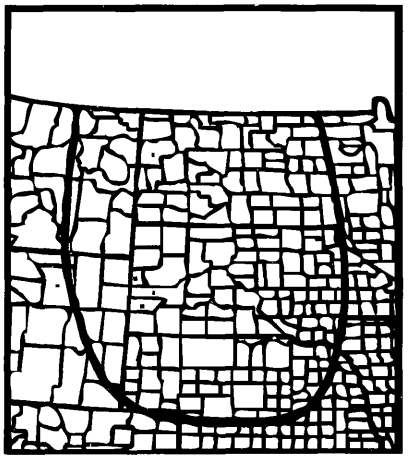
10 Petals equaling or longer than the sepals; heads of achenes ovoid to globose . . . . . 8. *R. macounii*

9 Petals 7-16 mm long; anthers longer than 1 mm; stems often recurved and rooting at the nodes . . . . . 6. *R. hispidus*

1. *Ranunculus cardiophyllus* Hook.

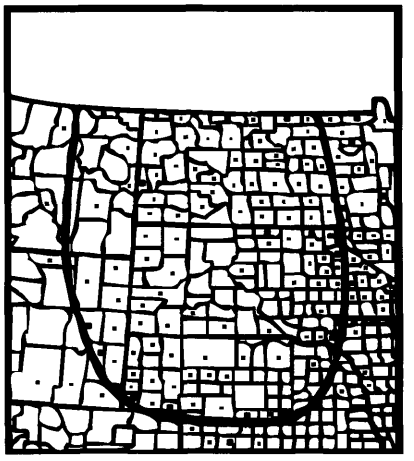
Erect, pilose to glabrate perennial with fibrous roots, 1.5-4 dm tall; **stem** single, simple or branched above, 1- to several-flowered. **Leaves** basal and cauline, the basal leaves with petioles 2-12 cm long, the previous year's petioles often persistent at the base of the stem; blades of the basal leaves simple, reniform to mostly ovate-cordate, 2-6 cm long, about as wide, crenate, one or two sometimes shallowly to deeply cleft; cauline leaves few, subsessile to sessile, deeply parted into several linear lobes. **Sepals** 5, yellowish, often tinged with purple, spreading, 6-10 mm long, pilose dorsally, petaloid on the margins; **petals** 5 or sometimes a few more, yellow, 8-15 mm long; **stamens** 35-80; **receptacle** oblong-ovoid, 4-14 mm long in fruit, hairy. **Achenes** 20-100 in an oblong-cylindric head 8-15 mm long, 7-9 mm thick; achene body obovate, turgid with an inconspicuous margin, 1.5-2.5 mm long, puberulent; beak straight or recurved at the tip, 0.5-1 mm long. Jun—Jul. Seepage areas and in alpine meadows; uncommon in the Black Hills and with one record from McKenzie Co., ND; (Sask. to N.W. Terr. and B.C., s to SD, NM, AZ and WA).

This plant is vegetatively similar to the early wood buttercup, *Ranunculus abortivus* L., which is common in moist woods throughout the region, but the flowers of *R. cardiophyllus* are much larger and showier.



2. *Ranunculus cymbalaria* Pursh — Seaside buttercup

Low, extensively stoloniferous perennial, often forming dense mats, 3-15(25) cm tall, glabrous or sparsely pubescent mainly on the scapes and petioles. **Leaves** all basal, the blades ovate to round or reniform, cordate or truncate at the base, 5-22(40) mm long, 4-20(35) mm wide, crenate to shallowly lobed, often with 3 prominent lobes at the tip. **Scapes** surpassing the leaves, simple or sparingly branched with 1-several small yellow flowers. **Sepals** 5, greenish-yellow, spreading, 3-5 mm long, deciduous; **petals** usually 5(-12), yellow, turning whitish with age, 3-8 mm long; **stamens** usually 10-30; **receptacle** 2-4 mm long in flower, 4-10 mm long in fruit, pubescent. **Achenes** usually 40-150 in a cylindric head 3-10(15) mm long, 3-4(6) mm thick; achene body turgid, cuneate-oblong, longitudinally nerved, ca. 1.5 mm long; beak triangular, straight, 0.3 mm long. Jun—Oct. Wet meadows, stream banks, shores, ditches and seepage areas, often where brackish; very common; (Throughout most of N.Amer. and S.Amer.; also Eurasia).





A matlike colony of *Ranunculus cymbalaria*. Plants reproduce freely by stolons.

3. *Ranunculus flabellaris* Raf. — Yellow water-crowfoot

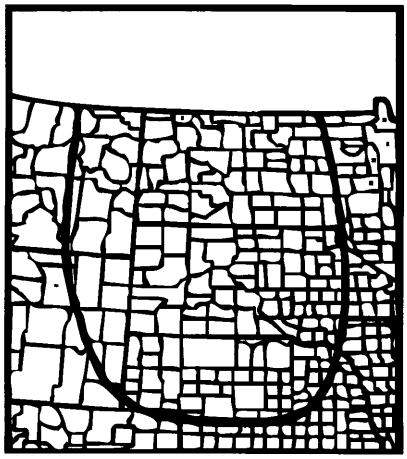
Amphibious perennial, usually submersed but occasionally stranded on mud, glabrous or rarely pubescent (when emersed). **Stems** floating or, when stranded, erect from a decumbent base, rooting at the lower nodes, branching, 3-7 dm long. **Leaves** all cauline; blades finely triternately dissected, the divisions narrow and flat, 1-2 mm or less wide, not as finely dissected on emersed plants, semicircular to reniform in outline, 1.5-10 cm long, 2-12 cm wide; petioles composed of the stipular leaf bases on upper leaves, 3-8 mm long, often extending beyond the stipular base and much longer on lower leaves. **Flowers** 1-several terminating each stem, bright yellow; **sepals** 5, greenish-yellow, spreading, 5-8 mm long, early deciduous; **petals** 5-8, yellow, 7-15 mm long; **stamens** 50-80; **receptacle** 2-3 mm long in flower, 5-7 mm long in fruit, pubescent. **Achenes** 50-75 in a globose to ovoid head 7-10 mm long, 5-8 mm thick; achene body obovate, 1.5-2 mm long, the margin thickened and corky below the middle; beak broad and flat, 1-1.5 mm long. Late May—Jul, occasionally in Aug and Sep. Fresh water or mud of ditches, slow streams, marshes and ponds; frequent in e ND, SD and NE, less common c and w parts; (ME to B.C., s to NJ, VA, OH, IN, IL, LA, UT, NV and CA).



4. *Ranunculus flammula* L. — Spearwort

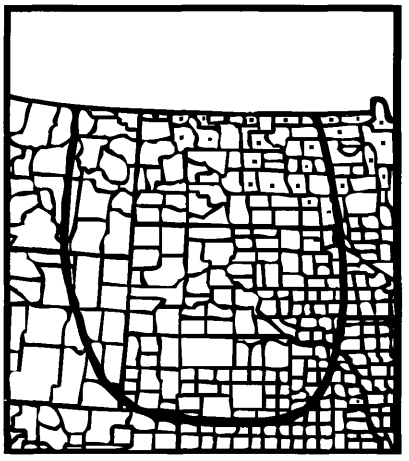
Low, stoloniferous perennial, often appressed-hairy. **Stems** decumbent to prostrate, rooting at the nodes, simple to sparingly branched, the upright tips 4-15 cm tall, 1- to several-flowered. **Leaves** clustered at rooting nodes, reduced and shorter-petioled on upper portions of the stem; blades simple, elliptic to lanceolate or linear, 1-5 cm long, 1.5-7(20) mm wide, entire or very slightly toothed, tapered to slender petioles mostly 5-15 mm long. **Sepals** 5, yellowish-green, ovate, 1.5-3(5) mm long, strigose; **petals** 5, yellow, obovate, 3-5 mm long; **stamens** 25-50; **receptacle** obovoid, ca. 1 mm long in fruit, glabrous. **Achenes** 10-25 in a subglobose head 2.5-3.5 mm long, 3-4.5 mm thick; achene body turgid, obovate, 1.3-1.7 mm long, inconspicuously margined, smooth, the beak 0.2-0.6 mm long. Jun—Aug. Marshes and muddy shores; rare, with records from Burke Co., ND, Sheridan Co., MT, and Johnson Co., WY; (Circumboreal, in N.Amer. s to MA, PA, MI, MN, ND, NM, AZ and CA).

Plants of the northern Great Plains are *R. flammula* var. *ovalis* (Bigel.) Torr. & Gray.



5. *Ranunculus gmelinii* DC. — Yellow water-crowfoot

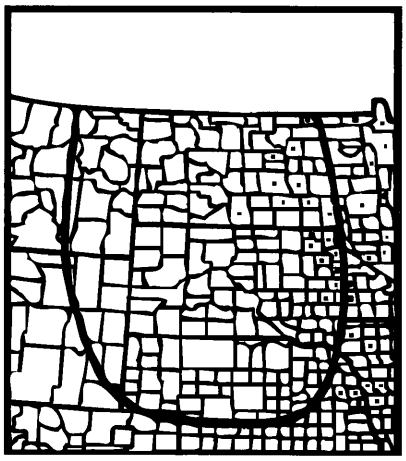
Similar in habit to *R. flabellaris* but usually emersed, glabrous to hirsute. **Stems** usually procumbent and rooting at the nodes, floating when submersed, sparsely branched, 1-5 dm long. **Leaves** all cauline or a few long-petioled basal leaves present, the upper leaves commonly floating on submersed plants; blades deeply 3-lobed or dissected, the divisions forked 2-3 times or sometimes dissected into flat segments when submersed, but not triternately dissected, pentagonal in outline, usually 0.8-2 cm long, 1.5-2.5 cm wide, or submersed leaves often larger, to 6-9 cm across; petioles mostly 1-4 cm long, the stipular bases 3-6 mm long. **Flowers** usually 1-several terminating each stem, seldom more, yellow; **sepals** 5, greenish-yellow, spreading, 2.5-6 mm long, deciduous with or before the petals; **petals** 5-8, rarely more, entire or sometimes lobed, 4-8 mm long; **stamens** 20-40; **receptacle** 1-2 mm long in flower, 3-6 mm long in fruit, short-pubescent. **Achenes** 50-70 in a globose to ovoid head 7-10 mm long, 5-8 mm thick; achene body obovate, 1-1.5 mm long, the margin rounded or inconspicuously keeled, not corky-thickened although the basal and ventral portions of the pericarp callous-thickened, the beak broad and thin, (0.4)0.6-0.8 mm long, slightly recurved. Late May—Jul, occasionally in Aug and Sep. Occurring in the same habitats as *R. flabellaris*, but more often where water is temporary; occasional in n, c and e ND, also Douglas Co., NE; (Boreal in N.Amer. and Asia, in N.Amer. s to ME, MI, IA, ND, CO, NV and OR).



6. *Ranunculus hispidus* Michx. — Marsh buttercup

Nearly glabrous to strongly hirsute perennial 2-7 dm tall. **Stems** erect to ascending, some eventually reflexed and rooting at an upper node, acting as stolons, to 10 dm long, with spreading or somewhat deflexed hairs. **Leaves** basal and cauline, the basal leaves larger and longer-petioled than the cauline ones; blades simple and 3-lobed on earliest leaves, otherwise ternately compound, broadly ovate-cordate in outline, 3-14 cm long, 4-20 cm wide, the lobes or leaflets themselves 2- or 3-lobed or cleft and irregularly toothed, appressed-hairy mainly on the veins; petioles 3-30 cm long, with pubescence like that of the stems; stipular bases 10-40 mm long. **Flowers** 1-several per flowering stem, the pedicels appressed-hairy; **sepals** 5, yellowish-green, spreading, 5-11 mm long, appressed-hairy, deciduous before the petals; **petals** 5 (rarely to 10), yellow, fading white, 7-16 mm long; **stamens** mostly 40-70, the anthers more than 1 mm long; **receptacle** 2-3 mm long in flower, 4-8.5 mm long in fruit, hispidulous. **Achenes** usually 15-30 or more in an ovoid to globose head 6-12 mm long, 7-12 mm thick; achene body obovate, 2-4.5 mm long, glabrous, narrowly to broadly winged around the margin, the beak straight, 1.5-3 mm long. Late May—early Jul. Wet meadows and woods, springs, boggy areas, swamps, shores and stream banks, where water is fresh; occasional mainly in the e part; (Labr. to s Man. s to FL and TX). *R. septentrionalis* Poir.

R. hispidus is represented by two varieties in our range. *R. hispidus* var. *caricetorum* (Greene) T. Duncan has the **achenes** narrowly winged with a margin to 0.3 mm wide. This is our most common variety, occurring in e and c ND, e SD and e NE. Less common is *R. hispidus* var. *nitidus* (Ell.) T. Duncan, which has the **achenes** broadly winged with a sharply demarcated margin 0.4-1 mm wide. This variety occurs sparingly in e SD and e NE.

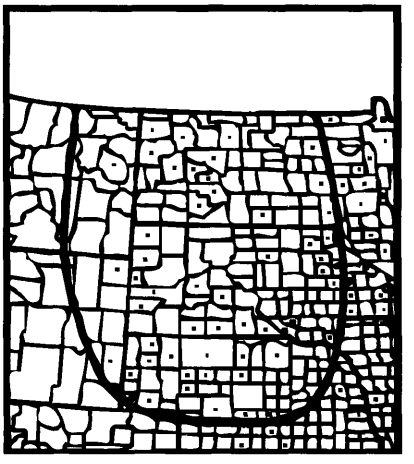




Ranunculus hispidus.

7. *Ranunculus longirostris* Godr. — White water-crowfoot

Submersed, mostly glabrous perennial. **Stems** floating, elongate, flexuous, mostly 3-8 dm long, simple or sparingly branched, rooting from the lower nodes. **Leaves** all cauline, the blades finely divided into filiform segments, once or twice trichotomous, then dichotomous, globular in outline, reniform when flattened, 1-2 cm long, 1.5-3 cm wide; petioles consisting of the inflated stipular leaf bases, 2-4 mm long, glabrous or pubescent. **Flowers** solitary from the axils in the upper portion of the stem, white; **sepals** 5(6), purplish-green, spreading, 2-3.5 mm long, deciduous shortly before the petals; **petals** 5, white, suffused with yellow at the base, 4-9 mm long; **stamens** 10-20. **Achenes** (7)15-25, in a hemispheric to globose head 3-5 mm long, 3-6 mm thick; achene body obovoid, transversely ridged, glabrous or slightly hispid, averaging 1.5 mm long, the beak prominent, slender and straight, 0.7-1.1 mm long (often shorter when dried); **receptacle** 1-2 mm long, pubescent; **peduncles** recurved in fruit, 1-5 cm long. Jun—Jul, occasionally in Aug—Sep. Slow streams, ponds, marshes and water-filled ditches, usually in calcareous water; occasional in the n part, common s; (Que. to Sask., s to DE, TN, AL, AR, TX, NM, ID and NV). *R. aquatilis* L., misapplied.





Ranunculus longirostris. ***R. subrigidus*** **is very similar but has more achenes with shorter beaks.**

8. *Ranunculus macounii* Britt. — Macoun's buttercup

Sparsely to densely hirsute annual or shortlived perennial 2-7 dm tall. **Stems** hollow, erect or decumbent, dichotomously branched 1-few times, the branches re-branching and terminating in few to several flowers. **Leaves** basal and cauline, the basal leaves usually larger and longer-petioled than the cauline ones; blades deltoid in outline, simple and 3-lobed or more often compound and divided into 3 segments which themselves may be 3-lobed, 4-14 cm long, 6-16 cm wide, glabrous to hirsute on both surfaces, the ultimate segments coarsely and irregularly toothed; stipular bases 5-25 mm long, mostly 2-3 cm long on basal leaves. **Sepals** 5, yellowish, reflexed, 3-5(7) mm long, deciduous, glabrous or pilose; **petals** 5, yellow, equaling or longer than the sepals, 3-6(8) mm long; **stamens** 15-35, anthers less than 1 mm long; **receptacle** 1-2 mm long in flower, 4-6 mm long in fruit. **Achenes** 30-50 in an ovoid to globose head 7-12 mm long, 8-12 mm thick; achene body flattened, obovate, 2-3(3.5) mm long, smooth or shallowly pitted, glabrous, narrowly keeled on the margin; beak stout, slightly curved or straight, 1 mm long. Jun—Jul. Wet meadows, shores, stream banks, ditches and other wet places; common in the n and w parts, less so in the c and e; (Labr. to AK, s to Que., n MI, IA, NE, NM, AZ and CA).

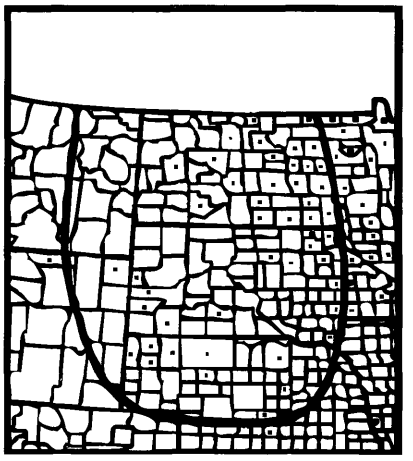




Ranunculus macounii. **Photo by James R. Johnson.**

9. *Ranunculus pensylvanicus* L. f. — Bristly crowfoot

Hirsute annual or shortlived perennial 4-10 dm tall, resembling the preceding. **Stems** hollow, erect, branching and flowering like *R. macounii*. **Basal leaves** often withering early, larger and longer-petioled than the cauline leaves; blades of basal and cauline leaves pinnately compound, 4-12 cm long, 4-15 cm wide, appressed-hairy to rarely glabrous, the leaflets lobed and coarsely toothed, tapered to the slender bases, the terminal one 3-parted, the lateral ones 2- or 3-parted; stipular bases 1-4 cm long. **Sepals** 5, yellowish, reflexed, (3)4-5 mm long, deciduous, sparsely hirsute; **petals** 5, pale yellow, fading whitish, distinctly shorter than the sepals, (1.5)2-3 mm long; **stamens** 15-20, anthers less than 1 mm long; **receptacle** 2 mm long in flower, 5-13 mm long in fruit, short-pubescent. **Achenes** 60-80 in an ovoid-cylindric to cylindric head 10-15 mm long, 6-9 mm thick; achene body flattened, obovate, (1.5)2-2.5 mm long, smooth and glabrous, keeled on the margin; beak stout, deltoid, 0.6-0.9 mm long. Jun—Aug. Occurring in the same habitats as *R. macounii* but intolerant of brackish conditions; common in the e part, less frequent w; (Newf. to AK, s to NJ, PA, OH, n IN, n IL, n IA, NE, CO, AZ and OR; also e Asia).



10. *Ranunculus sceleratus* L. — Cursed crowfoot

Weedy annual, glabrous or rarely hirsute, 1-5 dm tall or the stem to 10 dm long when submersed. **Stems** erect, inflated and hollow, sparsely to profusely branched, especially above. **Leaves** basal and cauline, the basal leaves often longer-petioled and less deeply dissected than the cauline ones, often floating when submersed; blades deeply 3-parted or divided, broadly truncate or cordate at the base, distally rounded, 1-6 cm long, 3-8 cm wide, the primary lobes or divisions lobed or divided, the ultimate lobes obtuse to rounded; petioles 2-15 cm long or much longer when submersed; stipular bases dilated, membranous, 5-12 mm long. **Flowers** numerous; **sepals** 5, yellowish-green, reflexed, 2-3 mm long, deciduous with the petals, glabrous; **petals** 5, light yellow, fading white, 3-5 mm long; **stamens** usually 10-25; **receptacle** 1.5-3 mm long in flower, 3-10 mm long in fruit. **Achenes** 40-300 in a cylindric-ovoid or rarely globose head 4-11 mm long, 3.5-7 mm thick; achene body obovoid, 0.8-1.2 mm long, glabrous, obscurely keeled on the margins, somewhat corky-thickened around the edges; beak minute and blunt. Jun—Sep. Shores, stream banks, mud flats, wet meadows, ditches, marshes and other wet places; very common; (Circumboreal, in N.Amer. s to FL, AR, LA, TX, NM and CA).

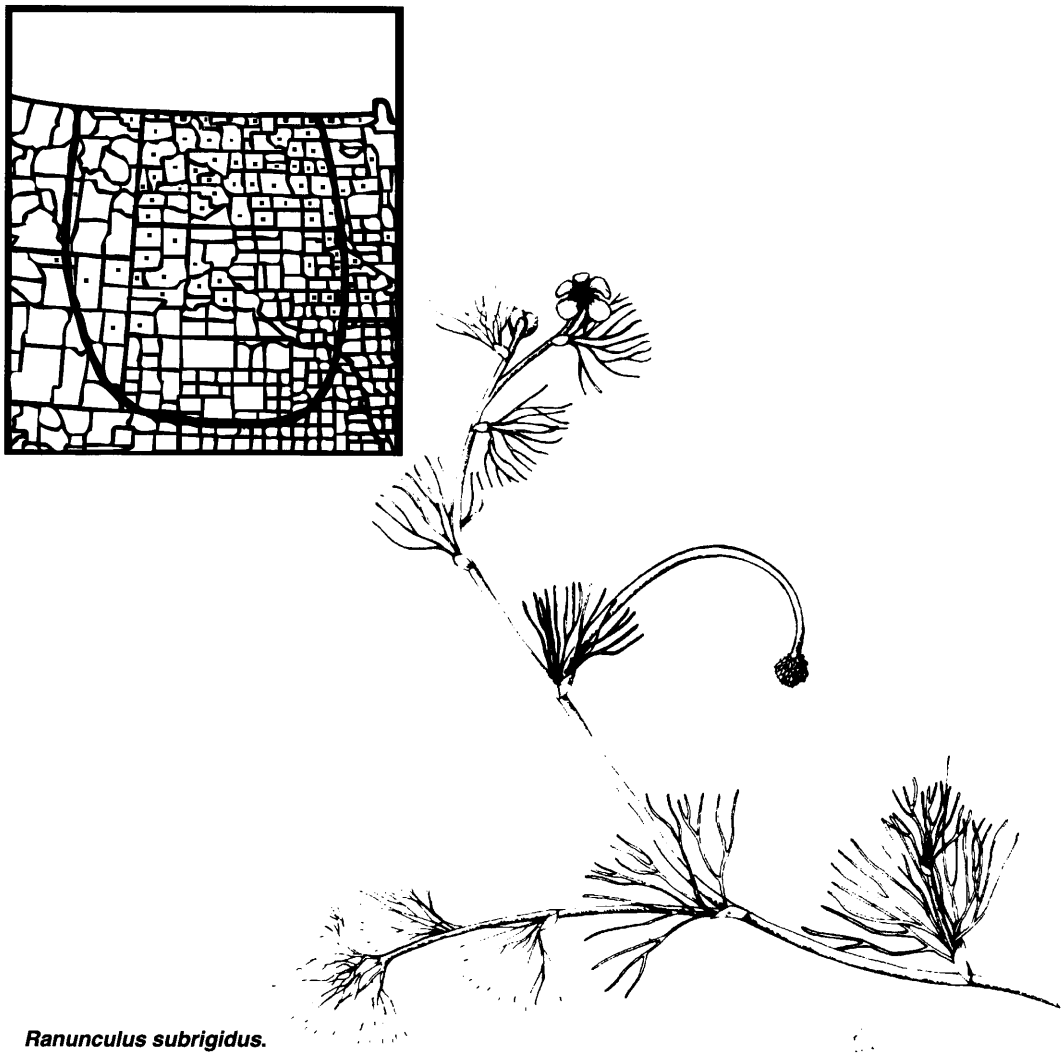
Two varieties of *R. sceleratus* are found in the northern Great Plains. *R. sceleratus* var. *multifidus* Nutt. is prevalent throughout. It has the **achenes** smooth in the central area of each face except for pinprick depressions surrounding the smooth area. The var. *sceleratus* has **achenes** cross-corrugated or reticulate in the central area of each face. The latter is more common in the e part.



11. *Ranunculus subrigidus* W. B. Drew — White water-crowfoot

Very similar to *R. longirostris*, occasionally stranded on mud in late summer and assuming a semiterrestrial growth form. **Stems** usually 2-6 dm long, sometimes over 10 dm long in clear deep water, or only to 1 dm long when stranded, simple or sparingly branched, rooting at the lower nodes. **Leaves** all cauline or some basal on semiterrestrial forms, the blades finely divided as in *R. longirostris*, roughly globular in outline, usually 1-3 cm across, often smaller, the filamentous leaf segments flattened on stranded plants; petioles consisting of the stipular leaf bases or extending slightly beyond the dilated base, 2-5 mm long, glabrous or pubescent. **Flowers** as in *R. longirostris*. **Achenes** 30-45(80) in a globose head 3-5 mm long, 3-5 mm thick; achene body obovoid, transversely wrinkled, hispidulous on the back, 1-1.5 mm long, averaging 1.25 mm or less long, the beak 0.2-0.5 mm long (often nearly beakless when dried); **receptacle** 1-2 mm long, pubescent; **peduncles** strongly recurved in fruit, (1)3-10 cm long. Jun—Aug. Marshes, lakes, ponds, water-filled ditches and slow-moving streams; common in ND, SD, e MT, WY and perhaps w NE; (Que. to N.W. Terr. and B.C., s to MA, MI, IA, TX, n Mex. and CA). *R. circinatus* Sibth. var. *subrigidus* (W. B. Drew) Benson; *R. aquatilis* L.

The white water-crowfoots, *R. longirostris* and *R. subrigidus*, are especially conspicuous in June when the white blossoms may literally cover the water surface of some marshes.



Ranunculus subrigidus.

10. **Urticaceae**, the Nettle Family

Monoecious or dioecious, annual or perennial herbs with watery juice, sometimes beset with stinging hairs, the **leaves** opposite (in those included here), simple, petiolate, usually stipulate. **Flowers** small, greenish and inconspicuous, borne in simple or branched axillary clusters, usually imperfect; **perianth** consisting of a 3- to 4-parted or toothed calyx, that of the male flowers usually more deeply parted; **stamens** equal in number to the calyx lobes and opposite them, a vestigial pistil sometimes present; **female flowers** containing a unicarpellary pistil and sometimes with scalelike rudiments of stamens, **style** 1, ovary superior, 1-celled, ovule 1. **Fruit** an achene, often enclosed by an accrescent calyx.

1 Plants 1-5 dm tall, glabrous or nearly so, not armed with stinging hairs . . 1. *Pilea*

1 Plants 8-20 dm tall, armed with stiff stinging hairs . . . . . 2. *Urtica*

1. ***Pilea*** Lindl. — Clearweed

Monoecious or dioecious, glabrous annuals; **stems** erect to decumbent, simple or branched, rather brittle and watery, translucent; cystoliths appearing as numerous minute, whitish or dark lines on the foliage of dried specimens. **Leaves** simple, opposite; blades thin and translucent, ovate, with 3 major veins arising from the base, broadly cuneate to rounded at the base, serrate, the teeth prominent, obtuse to rounded, the terminal tooth short to elongate; petioles subtending the inconspicuous, connate, membranous stipules. **Flowers** greenish, clustered in axillary cymes; **male flowers** with 4 sepals and 4 stamens; **female flowers** with 3 sepals, these often unequal; staminodes minute and scalelike; **ovary** superior, stigma sessile. **Fruit** a flattened, ovate achene, subtended by the persistent calyx.

Reference:
Fernald, M. L. 1938. *Pilea* in eastern North America. Rhodora 38:169-170.

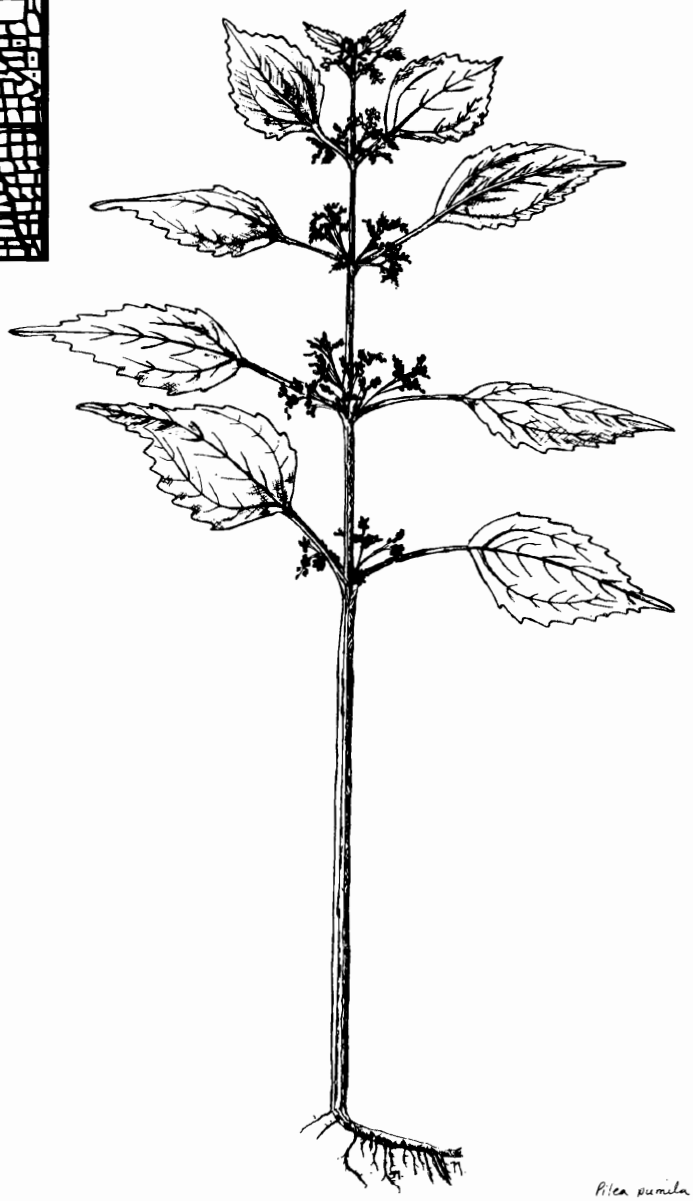
1 Achenes dark olivaceous to nearly black with a narrow pale margin . . . . . 1. *P. fontana*

1 Achenes green, often marked with purple . . . . . 2. *P. pumila*

1. *Pilea fontana* (Lunell) Rydb.

Plants 1-4 dm tall, often decumbent. **Leaf blades** mostly 1.5-6 cm long, 1-4 cm wide; **petioles** mostly 0.5-5 cm long. **Flower clusters** spreading 0.5-5 cm from the stem, the male flowers usually innermost in the clusters when mixed with female flowers. **Achenes** dark olivaceous to nearly black with a narrow pale margin, 1.3-2 mm long, the persistent sepals shorter than to slightly exceeding the achene. Late Jul—Sep. Cold springs, seeps and boggy places; uncommon and scattered, mainly in ND and SD; (P.E.I. to ND, s to VA and FL, IN and NE).

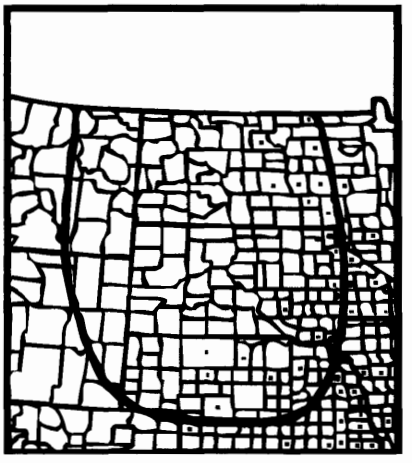




Pilea fontana.

2. *Pilea pumila* (L.) A. Gray

Very similar to *P. fontana* and differing mainly as follows: Plants sometimes larger, to 5 dm tall. **Leaf blades** to 12 cm long, 8 cm wide, thinner and more translucent than in *P. fontana*; **petioles** to 8 cm long. **Achenes** green, often marked with purple, 1.3-2 mm long. Late Jul—Sep. Swampy woods and wooded stream banks; occasional from e ND to c and e NE; (Que. to e ND, s to FL, LA and OK).



1. *Urtica dioica* L. — Stinging nettle

Monoecious or dioecious, stout perennial 8-20 dm tall, often forming dense patches by rhizomes, sparsely to moderately clothed with stinging hairs, otherwise glabrous or sparsely to densely puberulent, the **stems** usually simple. **Leaf blades** ovate to lanceolate, often conduplicate, mostly 5-15 cm long, 2-8 cm wide, puncticulate with cystoliths when dried, acute to acuminate, coarsely serrate, cordate to truncate or rounded at the base; petioles mostly 1-6 cm long; stipules linear-lanceolate, 5-15 mm long. **Flower clusters** branched and spreading, usually surpassing the subtending petioles, the clusters all of one sex or some male and some female, the female clusters usually above the male when both are present. **Achenes** tan, ovate, 1-1.2(1.5) mm long, ca. 1/2 as wide, enclosed by the inner pair of **sepals** which are 1-1.5 mm long, the outer pair ca. 1/2 as long. Jun—Sep. Moist woods, thickets, ditches, shores, stream banks and disturbed areas; common; (Labr. to AK, s through most of the U.S. and Mex.; also S.Amer. and Eurasia). *U. procera* Muhl.

American *U. dioica* is designated subsp. *gracilis* (Ait.) Seland. The European *U. dioica* subsp. *dioica* differs in chromosome number and is typically dioecious, whereas subsp. *gracilis* is predominantly monoecious. Although subsp. *dioica* has been naturalized in e U.S., it has not been detected in our range.

The wood nettle, *Laportea canadensis* (L.) Wedd., is often abundant in moist woods in the eastern and central parts of our area. This plant also has stinging hairs but differs from stinging nettle in its shorter stature; broader, alternately arranged leaves; and terminal inflorescence.





Urtica dioica. **A small colony at base of a peachleaf willow.**

11. **Betulaceae**, the Birch Family

Monoecious trees or shrubs. **Leaves** alternate, stipulate, serrate, pinnately veined. **Flowers** much reduced and imperfect; the male and female flowers produced in separate **catkins** on the same individual. **Flowers** 3 per scale in the catkin; **perianth** none; **stamens** 2-10; **carpels** 2, each with a stigma and style, ovary 2-celled, 4-ovuled. **Fruit** a winged nutlet, 1-seeded by abortion.

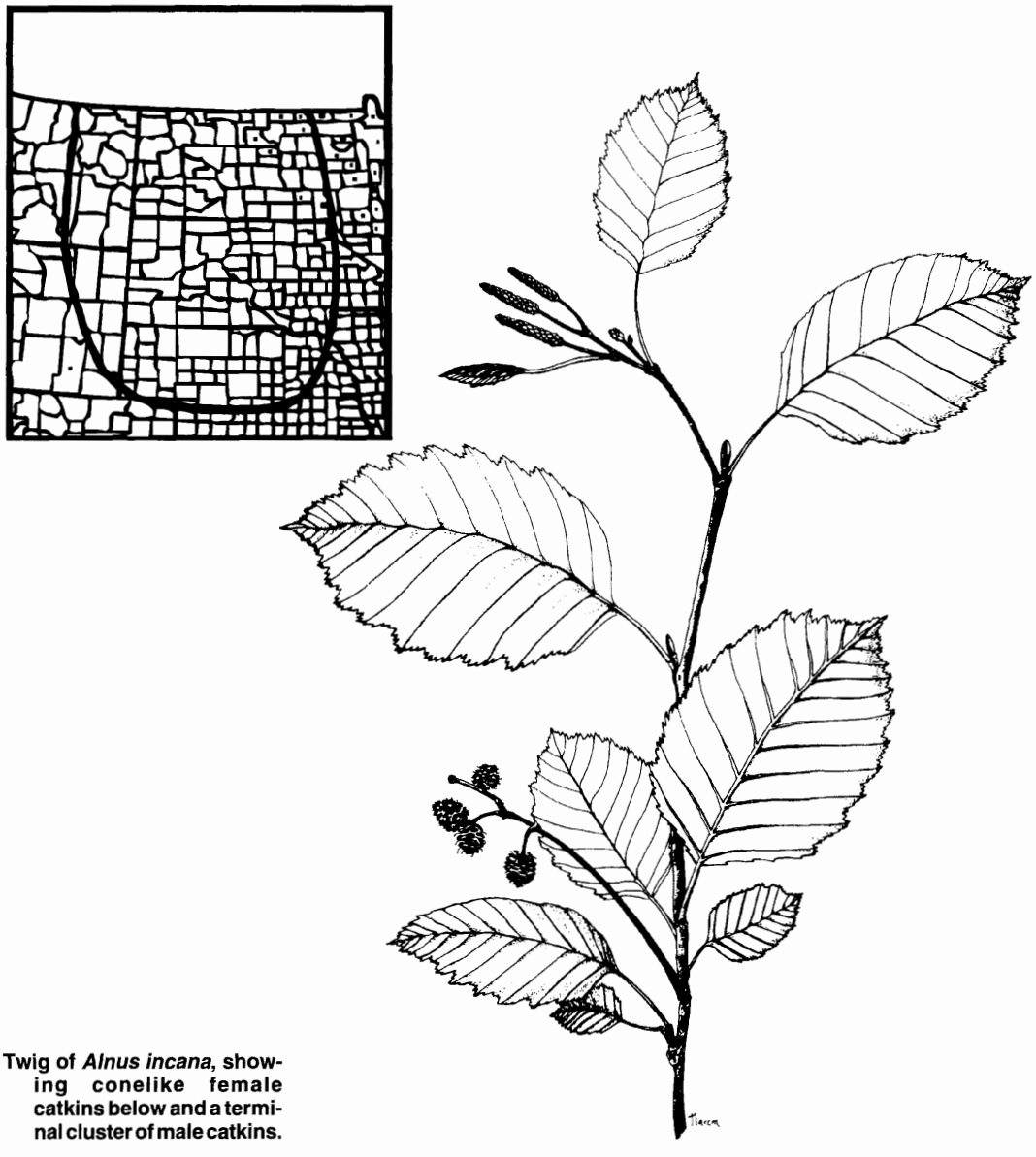
1 Catkins in terminal clusters of 3-several; pistillate scales unlobed ..... 1. *Alnus*

1 Catkins borne singly; pistillate scales 3-lobed ..... 2. *Betula*

1. *Alnus incana* (L.) Moench — Speckled alder

Shrub to 5 m tall; **twigs** reddish-brown, pruinose, mostly with conspicuous, light-colored lenticels. **Leaves** dark green and glabrous above, paler and pubescent on the veins beneath, ovate to elliptic, 5-14 cm long, 3-7 cm wide, serrate and shallowly lobed; petioles 1-2.5 cm long; stipules caducous, irregularly lanceolate, 6-15 mm long, 1.5-5 mm wide, variably pubescent. **Catkins** in terminal clusters of 3-several; male catkins short-peduncled, elongate, 4-9 cm long, 7-9 mm thick; female catkins sessile, cylindric, in flower 5-6 mm long, 2-2.5 mm thick, the scales unlobed, in fruit becoming conelike, 13-18 mm long, 8-13 mm thick. **Nutlets** flat, slightly winged, obovate, 3 mm long, about as wide. Flowering May, fruiting Aug—Sep. Swampy areas and stream banks; occasional in e ND; (Newf. to AK, s to MD, OH, n IN, MN, e ND, NM, AZ and CA; also Eurasia). *A. rugosa* (Du Roi) Spreng.

North American *A. incana* is designated subsp. *rugosa* (Du Roi) R. T. Clausen.



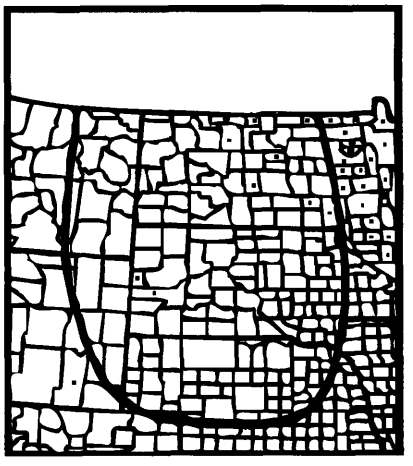
Twig of *Alnus incana*, showing conelike female catkins below and a terminal cluster of male catkins.

1. *Betula glandulosa* Michx. — Dwarf birch, swamp birch

Erect, colonial shrub to 2 m tall; **bark** dull gray; **twigs** grayish-puberulent and dotted with resin glands, becoming reddish-brown and pruinose with age. **Leaves** dark green above, paler below, suborbicular to obovate, 20-35(70) mm long, 10-25(50) mm wide, glabrous with age, coarsely serrate, the teeth blunt or sharp; petioles 3-6 mm long; stipules caducous, ovate, 2-2.5 mm long, ciliate. **Catkins** produced singly from the buds; male catkins sessile, cylindric, 15-18 mm long, 1-2.5 mm thick; female catkins on peduncles 3-10 mm long, the peduncle often bearing a single petioled, toothed bract, the catkin cylindric, 7-18 mm long, ca. 5 mm thick; scales 3-lobed. **Nutlets** flat, winged, suborbicular to obovate, 1.5 mm long, 1.2-2 mm wide. Flowering late May—mid Jun, fruiting late Jul—Aug. Swamps, cold springs, bogs, seepage areas and stream banks; occasional in e and c ND, uncommon in the Black Hills; (Newf. to AK, s to ME, n NY, IN, Ont., MN, SD, WY, ID and CA). *B. glandulifera* (Regel) Butler, *B. pumila* L. var. *glandulifera* Regel.

The phase of *B. glandulosa* in our area is var. *glandulifera* (Regel) Gl., characterized by resinous young leaves and twigs and catkins with scales averaging larger (3-4.5 mm long) than in the typical variety.

In the Black Hills, *Betula papyrifera* Marsh., paper birch, and *B. occidentalis* Hook., mountain or water birch, are often closely associated with streams. *B. occidentalis* in particular is common on low banks of Black Hills streams. Both of these birches are easily distinguished from bog birch. The peeling white bark and arborescent habit of paper birch are distinctive. Mountain birch is a large shrub or small tree with ovate leaves and lustrous, bronzy, nonpeeling bark. Although both paper and mountain birch are found in other parts of our range, only in the Black Hills are they so consistently found next to water.



12. **Chenopodiaceae**, the Goosefoot Family

Weedy, prostrate to erect annuals (in those included here), commonly growing in alkaline or saline soil. **Stems** stout (succulent and jointed in *Salicornia*), usually freely branched. **Leaves** simple, alternate or only the lower ones opposite (all opposite and scalelike in *Salicornia*), often rather leathery or succulent, sometimes farinose, especially on the lower surface. **Flowers** minute and usually abundant, perfect or imperfect, green or reddish-tinged, crowded in clusters or in terminal and/or axillary inflorescences, or (in *Salicornia*) embedded in terminal fleshy spikes; **perianth** consisting of a calyx only (perianth lacking in female flowers of *Atriplex*), usually (3-4)5-lobed, unlobed in *Salicornia*; **stamens** (1)2-5; **pistil** 2-3(5)-carpellary, styles usually 2-3(5), ovary superior, 1-celled. **Fruit** a utricle, the **seed** oriented horizontally or vertically to the calyx.

Some of the common dryland weeds of this family will invade dry wetland basins during periods of drought. Notable among these are kochia, *Kochia scoparia* (L.) Schrad. and Russian thistle, both *Salsola iberica* Sennen & Pau and *S. collina* Pall. These plants are especially opportunistic around brackish or saline wetlands where high salt concentrations discourage other plants from pioneering exposed substrates. Since kochia and Russian thistle are well known as upland weeds and because they are uncharacteristic of wetlands except during periods of drought, they are excluded here.

1 Leaves opposite, scalelike; stems succulent, jointed at the nodes . . . . 3. *Salicornia*

1 Leaves alternate or mostly so; stems not especially succulent and not jointed.

2 Leaves sessile, linear, semiterete . . . . . 4. *Suaeda*

2 Leaves mostly petiolate, the blades lanceolate to ovate-deltate or ovate-oblong, entire to sinuate-dentate, often hastate.

3 Flowers imperfect, the male and female flowers mixed in glomerules borne in axillary and terminal spikes, the spikes ebracteate or only sparsely bracteate in the lower portion; pistillate flowers lacking a perianth, the fruit enclosed by a pair of sepaloid bracteoles . . . . . 1. *Atriplex*

3 Flowers perfect, in glomerules borne in axillary and terminal spikes which are bracteate throughout, the bracts reducing in size upward; fruit surrounded by the persistent perianth . . . . . 2. *Chenopodium*

1. *Atriplex subspicata* (Nutt.) Rydb. — Spearscale

Monoecious to semidioecious, taprooted annual (1)2-10 dm tall; **stems** erect to decumbent, simple to freely branched. **Leaves** alternate, or the lowest ones often opposite, petioled or becoming sessile upward in the inflorescence; **blades** lanceolate to trullate or deltate, often hastate, mostly 2-8 cm long, 0.5-6 cm wide, entire to sinuate-dentate, somewhat grayish-farinose when young, becoming dull green and glabrate with age; petioles mostly 5-30 mm long. **Flowers** imperfect, minute, greenish, the male and female flowers usually mixed in glomerules which are borne in terminal and axillary spikes, the **spikes** simple or branched, ebracteate or only sparsely bracteate in the lower portion; **male flowers** with a deeply 5-lobed perianth, ca. 1 mm wide, stamens 5; **female flowers** lacking a perianth, subtended by 2 sepaloid **bracteoles**, these expanding as the fruit matures and enclosing it, ovate-deltate, 2-5 mm long and about as wide, sometimes hastate, connate toward the base, smooth or tuberculate on the back. **Fruit** with a transparent membranous pericarp adherent to the seed, the **seed** oriented vertically between the bracteoles, dark brown to black, lenticular, 1.5-2.5 mm in diameter. Aug—early Oct. Shores, stream banks and flats, usually where alkaline or saline; also disturbed places; common; (Newf. to B.C. s to NC, OH, IN, MO, TX, AZ and CA). *A. patula* L., *A. hastata* L.

A. subspicata is a highly variable species throughout its range, and many species and varieties have been described on the basis of variations in growth habit and leaf shape.



2. ***Chenopodium*** L. — Goosefoot

Erect to spreading, taprooted annuals with simple to freely branched **stems** and alternate, petiolate leaves, the **blades** somewhat fleshy, lanceolate to ovate-oblong or trullate to deltate, sinuate-dentate to sinuate-lobed, seldom entire, occasionally hastate, sometimes farinose, especially on the lower surface. **Flowers** perfect, very minute and numerous, ca. 0.5 mm across at anthesis, greenish or sometimes reddish-tinged, densely clustered in glomerules which are borne in short terminal and axillary spikes, the **spikes** bracteate throughout with the bracts reducing in size upward; **perianth** 2- to 5-lobed, the segments rather fleshy, obtuse, often incurved over the fruit; **stamens** 1-5; **styles** 2(3), short. **Fruit** oriented horizontally or vertically to the persistent perianth, sometimes both horizontal and vertical, the thin membranous perianth loosely adherent to the lenticular seed.

The two chenopods treated here are consistently encountered on alkaline to saline shores and mudflats. Other weedy species such as *Chenopodium berlandieri* Moq. and *C. strictum* Roth are occasional on dry shores but are more typical of disturbed upland habitats.

References:

Aellen, P. and T. Just. 1943. Key and synopsis of the American species of the genus *Chenopodium* L. Amer. Midl. Naturalist 30:47-76.

Wahl, H. A. 1952-1953 (1954). A preliminary study of the genus *Chenopodium* in North America. Bartonia 27:1-46.

1 Leaves persistently whitish-farinose on the lower surface, dull green above, mostly 0.7-3 cm long, 0.2-1.2 cm wide . . . . . 1. *C. glaucum*

1 Leaves not whitish-farinose at maturity, green on both surfaces, often reddish-tinged, drying dark, mostly 2-8 cm long, 0.7-5 cm wide . . . . . 2. *C. rubrum*

1. *Chenopodium glaucum* L. — Oak-leaved goosefoot

Plants erect to low and spreading, usually widely branching from the base; **stems** sometimes reddish toward the base, 1-7 dm long. **Leaf blades** dull green above, persistently whitish-farinose beneath, lanceolate to ovate-oblong or ovate-deltate, 0.7-3(4) cm long, 0.2-1.2(2) cm wide, sinuate-dentate; petioles about as long as or much shorter than the blades. **Perianth** 3- to 5-lobed; **fruit** varying from horizontal to vertical, the pericarp greenish; **seed** dark brown, shiny, orbicular, 0.8-1.2 mm in diameter. Aug—Oct. Shores, stream banks, flats and disturbed areas, usually where alkaline or saline; common; (Naturalized from Eurasia; N.B. to Alta., s to VA, MO, TX, NM, AZ and OR; also Africa and Australia).



2. *Chenopodium rubrum* L. — Red goosefoot

Plants erect to decumbent, sometimes low and spreading, 1-10 dm tall; **stems** simple to freely branched. **Leaf blades** green on both surfaces, often reddish-tinged, drying dark, only weakly farinose when young, soon glabrate, lanceolate to trullate or deltate, sometimes weakly hastate, 2-8(10) cm long, 0.7-5(8) cm wide, irregularly sinuate-dentate to sinuate-lobed, seldom entire; petioles mostly 0.5-3(5) cm long. **Perianth** 2- to 4-lobed; **fruit** vertical, the pericarp brown; **seed** dark brown, shiny, orbicular to oval, 0.5-0.8 mm in diameter. Aug—Oct. Same habitats as the preceding; common, often locally abundant; (Newf. to B.C., s to NJ, MO, NE, n NM and CA; also Eurasia).

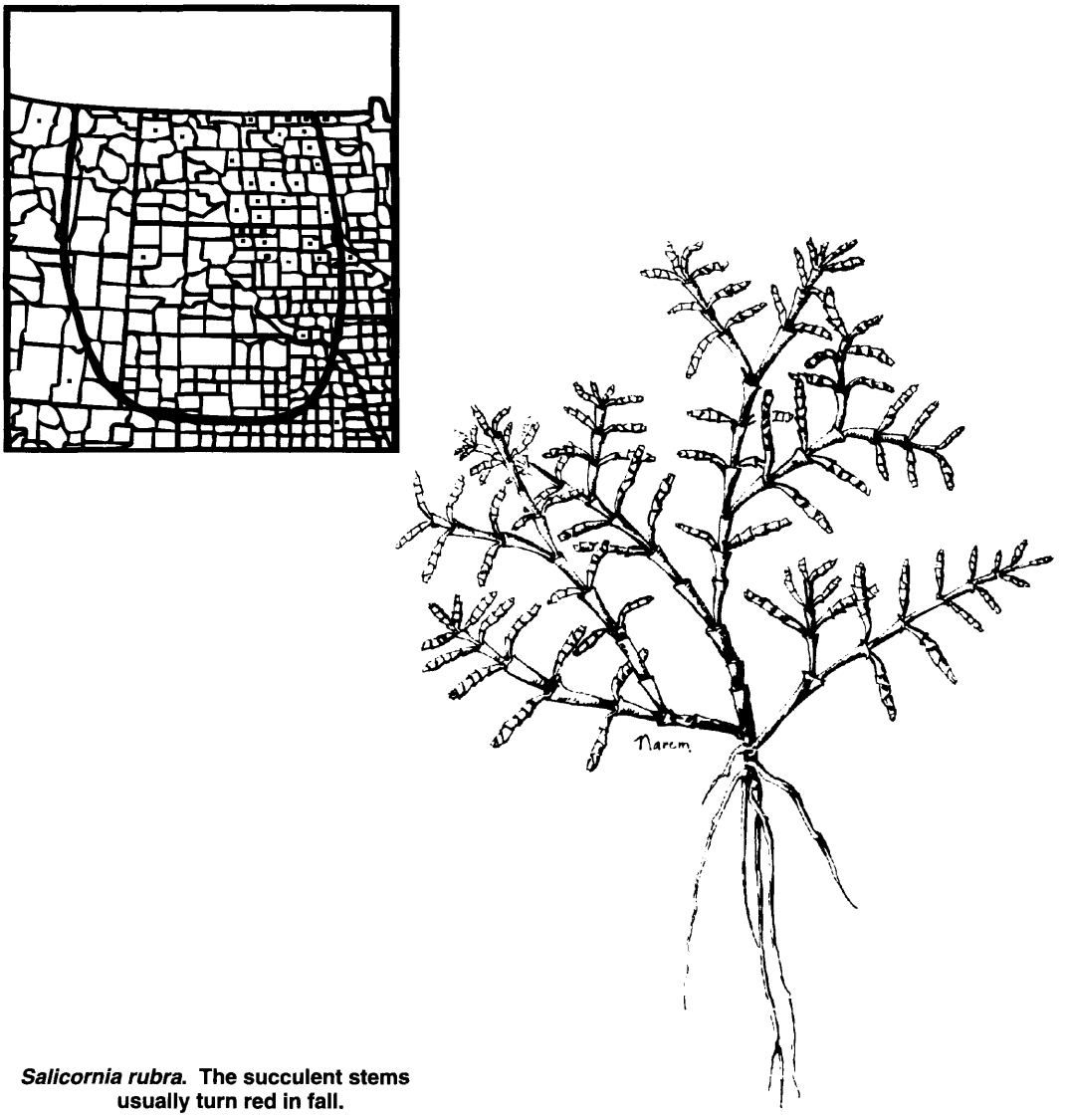




Chenopodium rubrum **in midsummer prior to flowering.**

1. *Salicornia rubra* A. Nels.

Low, erect to ascending, taprooted annual, succulent, green to strongly red throughout, 0.5-2 dm tall; **stems** oppositely branched, fleshy, jointed at the nodes, often brittle and breaking with a crackling noise when the plants are walked upon. **Leaves** opposite, small and scalelike, mostly 1-2 mm long, obtuse to acute, connate at the base to form a short sheath at each node, scarious on the margins, the internodes shortened in the spikes, with the leaves serving as scalelike bracts. **Flowers** perfect or partly female, embedded in the fleshy, terminal spikes, arranged in groups of 3 above each bract, the central flower above the lateral 2, about reaching the next node upward, the joints of the spike ca. 2 mm long and about as wide in dried condition; **calyx** essentially unlobed, fleshy, completely enclosing the flower except for the slitlike opening through which the stamens and style branches barely protrude at anthesis; **stamens** 2(1); **style branches** 2. **Fruit** olive, ellipsoid, 1-1.2 mm long. Aug—early Oct. Saline or alkaline soil of flats, shores, seepage areas and ditches; frequent in n, c and e ND, n and ne SD, otherwise uncommon; (w MN to s B.C. and e WA, s to KS, NM, and NV).

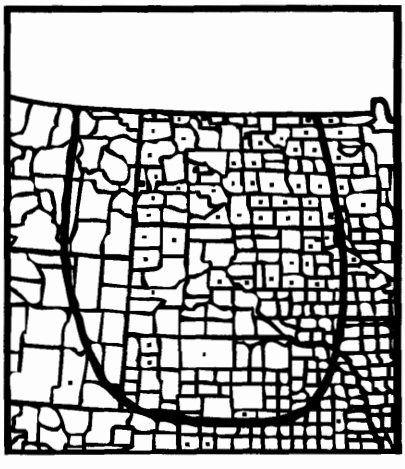


Salicornia rubra. **The succulent stems usually turn red in fall.**

4. ***Suaeda*** Forsk. — Sea blite

1. *Suaeda depressa* (Pursh) S. Wats.

Erect to low and spreading, taprooted annual, sometimes reddish-tinged; **stems** simple to more often freely branched, (0.5)1-6 dm long. **Leaves** numerous, alternate, sessile, linear, semiterete, rather succulent, 5-30 mm long, ca. 1 mm wide, acute, reduced to short bracts in the inflorescence. **Flowers** perfect to imperfect, greenish or sometimes reddish, very small, 1-2 mm across in fruit, smaller in flower, tightly clustered in sessile glomerules of 3-7 flowers in the axils of the bracts, the glomerules forming elongate spikes which usually comprise the bulk of the mature plant; **bracts** mostly 1-6 mm long, somewhat broader than the leaves; **perianth** deeply 5-parted, the lobes very unequal, fleshy, corniculate on the back, 1 or 2 much more corniculate on the back than the others, cucullate, ca. 1 mm long at fruit maturity; **stamens** 5 or fewer; **styles** usually 2(3-5), very short. **Fruit** enclosed by the perianth, horizontal, the membranous pericarp very loose on the seed; **seed** black, shiny, oval, ca. 1 mm in diameter. Aug—Sep. Alkaline or saline flats, shores, stream banks and seepage areas; common in ND and n SD, less so s SD and NE; (w MN to B.C., s to MO, TX, AZ and CA).



13. **Amaranthaceae**, the Pigweed Family

1. ***Amaranthus*** L. — Pigweed

Dioecious (in those treated here) and monoecious annual herbs with taproots, usually branched, erect to spreading, often weedy. **Leaves** simple, alternate, entire or sinuate-margined, petiolate, exstipulate. **Inflorescence** of dense terminal and often axillary spikes (actually spikelike thyrses) or clusters. **Flowers** individually small, subtended by a few bracts, the flowers and bracts greenish or sometimes strongly purple; **sepals** 1-5 (none in female flowers of *A. tuberculatus*), scarious or membranous, often resembling the subtending bracts, usually aristate or mucronate; **stamens** 5, free; **stigmas** (2)3 or 4, style short or obsolete, ovary superior, 1-celled, short and broad. **Fruit** a utricle, circumscissile or irregularly splitting; **seed** round, lenticular, smooth and shiny.

The best known members of the genus are common weeds of fields and disturbed areas, e.g., *Amaranthus retroflexus* L., rough or redroot pigweed, and *A. albus* L., tumbleweed. Unlike the water hemps treated here, these pigweeds are monoecious. They are sometimes encountered on shores or drawdown zones. Hybrids in *Amaranthus*, even between monoecious and dioecious species, are apparently frequent.

1 Plants pistillate.

2 Sepals 1 or 2, when 2 then one rudimentary; utricle circumscissile, with a distinct line of dehiscence around the middle . . . . . 1. *A. rudis*

2 Sepals none or rarely 1 or 2 rudimentary ones; utricle splitting irregularly, without a distinct line of dehiscence . . . . . 2. *A. tuberculatus*

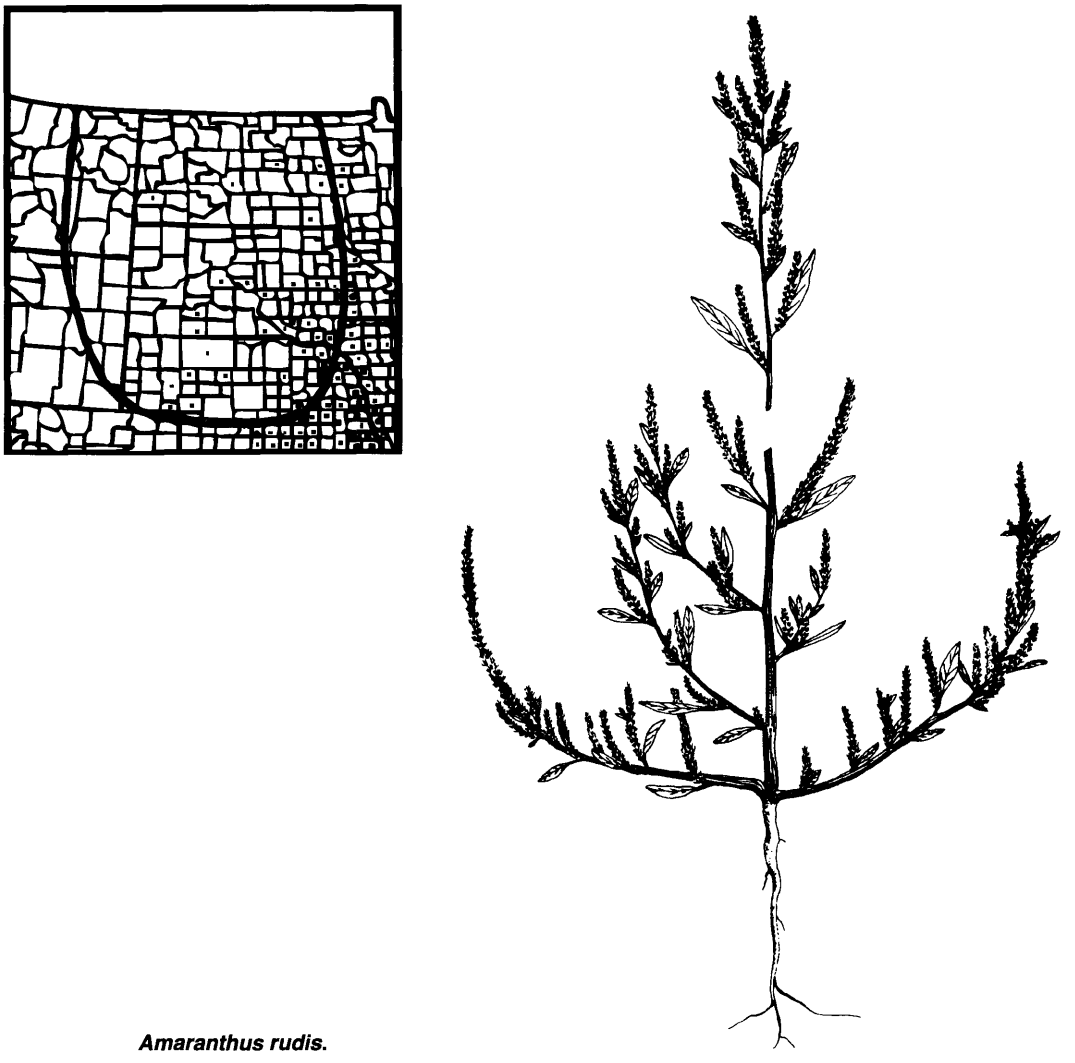
1 Plants staminate.

3 Outer sepals with midveins excurrent into a mucronate or aristate tip . . . . . 1. *A. rudis*

3 Outer sepals with midveins not excurrent, acuminate to the tip . . . . . 2. *A. tuberculatus*

1. *Amaranthus rudis* Sauer — Water hemp

Plants erect with ascending branches, 0.5-2 m tall, or often low and spreading with branches 1-5 dm long, glabrous or nearly so, green or sometimes the stems and inflorescences strongly purple. **Leaves** oblong-lanceolate to ovate-lanceolate or rhombic-oblong, 3-10 cm long, obtuse to rounded or sometimes notched at the tip, attenuate at the base, reduced to bracts upward in the inflorescence; petioles mostly 0.5-4 cm long. **Inflorescence** of usually many terminal and axillary spikelike branches, or some of the lateral branches merely short clusters. **Bracts** 1.5-2 mm long, with a shortly excurrent midrib in the male, a conspicuously excurrent midrib in the female; **male flowers** with 5 sepals 2.2-3 mm long, the outer longer than the inner and with midveins excurrent into a mucronate or aristate tip; **stamens** 5; **female flowers** with 1 or 2 sepals, when 2, one of the sepals rudimentary or less than 1 mm long, the longer (or single) one ca. 2 mm long. **Utricle** 1.2-1.6 mm long, circumscissile, with a distinct line of dehiscence around the middle, the top coming off like a lid, often with faint ridges of tubercles on the top portion; **style branches** 3-4; **seed** reddish-brown to black, 0.9-1.1 mm in diameter. Jul—Oct. Shores, stream banks, mud and sand bars and low places in fields where sometimes weedy, frequent in e SD and NE, less common w and n; (WI to ND, s to LA and TX, adventive elsewhere). *Acnida tamariscina* (Nutt.) Wood, *Amaranthus tamariscinus* Nutt.



Amaranthus rudis.

2. *Amaranthus tuberculatus* (Moq.) Sauer — Tall water hemp

Similar to the preceding, erect to spreading, usually much branched, 0.2-1(2) m tall, glabrous to rarely sparsely puberulent above, green or slightly tinged with purple. **Leaves** variable, the larger ones with blades ovate to lanceolate, 4-10 cm long, the smaller with blades oblong to spatulate, 1-4 cm long; petioles short to as long as the blade. **Inflorescence** of usually many simple, terminal and axillary spikes, and with some axillary clusters. **Bracts** 1-1.5 mm long, slender with the midrib excurrent in the male, strongly excurrent in the female; **male flowers** with 5 sepals, these nearly equal, 2.5-3 mm long, the inner ones obtuse to emarginate, the outer acuminate, the midvein not excurrent; **stamens** 5; **female flowers** without sepals or rarely with 1-2 rudimentary sepals. **Utricle** 1.5-2 mm long, splitting irregularly, without a distinct line of dehiscence, smooth or usually irregularly tuberculate; **seed** reddish-brown to black, 0.8-1 mm in diameter. Jul—Oct. Same habitats as the preceding; scattered; (VT to ND, s to NJ, OH, AR and NE). *Acnida altissima* Riddell.



14. **Caryophyllaceae**, the Pink Family

Annual or perennial herbs, often with a sticky, glandular pubescence. **Leaves** simple, opposite, sessile, entire, usually exstipulate. **Flowers** perfect, regular, solitary in forks of the stem or in terminal cymes; **sepals** 5; **petals** 5, often reduced or absent, often bilobed or deeply cleft, white or pinkish; **stamens** usually numbering the same or twice the number of the sepals, sometimes fewer; **pistil** 3- or 5-carpellary, **styles** 3 or 5, ovary superior, 1-celled. **Fruit** a many-seeded capsule, dehiscent by valves or terminally by teeth.

1 Stipules present, scarious; leaves rather succulent . . . . . 2. *Spergularia*

1 Stipules none; leaves not succulent.

2 Capsules laterally dehiscent by valves; styles 3 . . . . . 3. *Stellaria*

2 Capsules terminally dehiscent by teeth; styles 5 . . . . . 1. *Cerastium*

1. ***Cerastium*** L. — Mouse-ear chickweed

Low, erect to widely spreading annuals (in those treated here) with short, sticky pubescence. **Leaves** lanceolate, narrowly elliptic or oblanceolate, acute to obtuse, exstipulate. **Flowers** in compact to open, terminal cymes; **sepals** acute to blunt, scarious-margined; **petals** present or often absent, white, shorter than to exceeding the sepals, usually bilobed; **stamens** 5 or 10; **carpels** 5, styles 5. **Fruit** a many-seeded, straight or curved, membranous, cylindric capsule, terminally dehiscent by 10 teeth.

Reference:

Shinners, L. H. 1966. *Cerastium glutinosum* Fries (Caryophyllaceae) in Mississippi: new to North America. Sida 2:392-393.

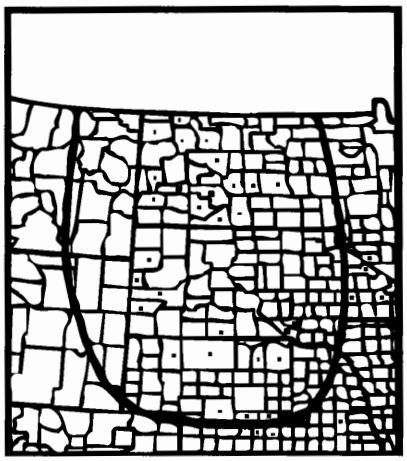
1 Pedicels 0.5-1.25X the length of the calyx in flower, to 3X the calyx length and straight or only slightly curved in age . . . . . 1. *C. brachypodum*

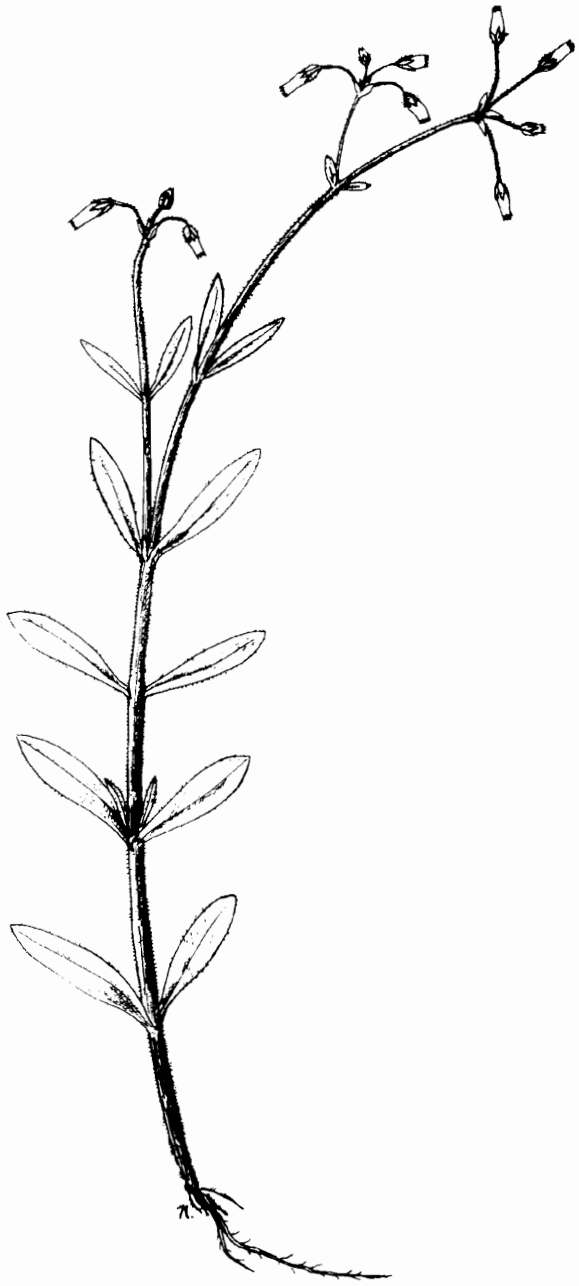
1 Pedicels 1-3X the length of the calyx in flower, to 5X the calyx length and sharply curved below the calyx in age . . . . . 2. *C. nutans*

1. *Cerastium brachypodum* (Engelm. ex A. Gray) Robins.

Short glandular-pubescent plant 0.5-3.5 dm tall; **stems** simple or branched from the base. **Leaves** 5-30 mm long, 1.5-5 mm wide. **Flowers** in rather compact cymes; **sepals** 2.5-4 mm long; **petals**, if present, shorter than to exceeding the sepals, often absent. **Capsules** 6-10 mm long; **pedicels** 0.5-1.25X the length of the calyx in flower, to 3X the calyx length and straight or only slightly curved in age. **Seeds** reddish-brown, angular-obovoid, papillate, 0.4-0.5 mm long. Late May—Jul. Wet alkali flats and drier places, often where sandy; occasional; (N.S. to Mack., s to GA, TX, AZ and OR).

C. brachypodum is sometimes treated as a variety of the following species. Although their largely sympatric ranges may lend credence to that interpretation, the two do seem quite distinct on the basis of habitat selection and morphology in the northern Great Plains and are thus viewed here as separate species.

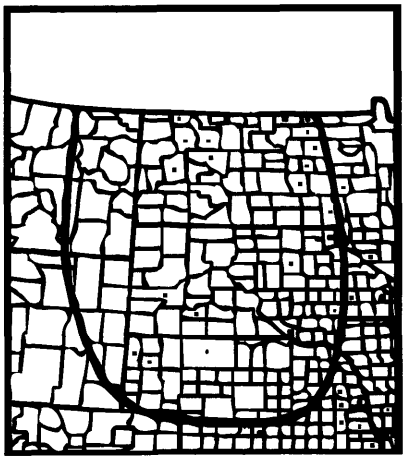




Cerastium brachypodum. **Note the powderhorn-shaped denticidal capsules protruding from the calyces of older flowers.**

2. *Cerastium nutans* Raf.

Quite similar to the preceding but attaining larger stature and usually more openly branched above, 1-5 dm tall. **Leaves** 8-60 mm long, 4-12 mm wide. **Flowers** in rather open and often widely branched cymes; **sepals** 2.5-5 mm long; **petals** as in *C. brachypodum*. **Capsules** 7-12 mm long; **pedicels** 1-3X the length of the calyx in flower, to 5X the calyx length and sharply curved below the calyx in age. **Seeds** as in the preceding, but 0.4-0.7 mm long. Late May—Aug. Shores, stream banks, springs, boggy places and wet woods; occasional in the n and e parts, scattered w; (Range similar to *C. brachypodum*).



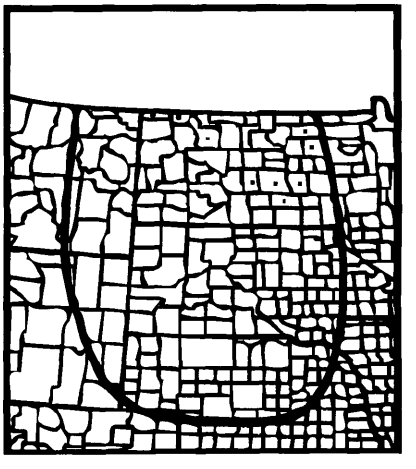
2. ***Spergularia*** J. & C. Presl — Sand-spurry

1. *Spergularia marina* (L.) Griseb. — Salt-marsh sand-spurry

Low decumbent to erect annual, simple to diffusely branched, 5-20 cm tall, glabrous or glandular-pubescent. **Leaves** rather succulent, linear, blunt to mucronate at the tip, 5-40 mm long, 0.5-1.5 mm wide; stipules present, broadly deltate to round or reniform, scarious. **Flowers** usually numerous, in a widely spreading, bracteate cyme, the inflorescence comprising most or nearly all of the plant; **bracts** similar to the leaves though smaller; **flowers** subsessile or on pedicels 1-10 mm long with age; **sepals** obtuse to rounded, 2-5 mm long; **petals** white or more often pinkish, 1/2 to nearly as long as the sepals; **stamens** 2-5; **carpels** 3, styles 3. **Capsules** 3-valved, ovoid, equaling or surpassing the calyx, mostly 3-6 mm long. **Seeds** light to dark brown, obovoid to nearly round, compressed, 0.5-0.9 mm long, smooth or slightly rough, sometimes winged. Jul—Sep. Wet alkali flats and shores; occasional in n and e ND; (Probably intro. from Eurasia, along the coasts from Que. to FL and w to TX, and B.C., s to CA, sporadically inland).

Reference:

Rossbach, R. P. 1940. *Spergularia* in North America and South America. Rhodora 42:57-83, 105-143, 158-193, 203-213.



3. *Stellaria* L. — Stitchwort

Low, spreading or erect perennials (in those treated here), mostly glabrous; **stems** slender, 4-angled. **Flowers** solitary in forks of the stem or in rather sparsely flowered terminal cymes; pedicels filiform. **Sepals** green with scarious margins; **petals** white, bilobed to deeply cleft; **stamens** 10 or sometimes fewer; **carpels** 3, styles 3. **Fruit** an ovoid or oblong capsule, laterally dehiscent by 6 valves.

References:

Chinnappa, C. C. and J. K. Morton. 1976. Studies on the *Stellaria longipes* Goldie complex — variation in wild populations. Rhodora 78:488-502.

Porsild, A. E. 1963. *Stellaria longipes* Goldie and its allies in North America. Natl. Mus. Canada Bull. 186:1-35.

1 Flowers solitary in forks of the stem, not subtended by scarious bracts . . . . . 1. *S. crassifolia*

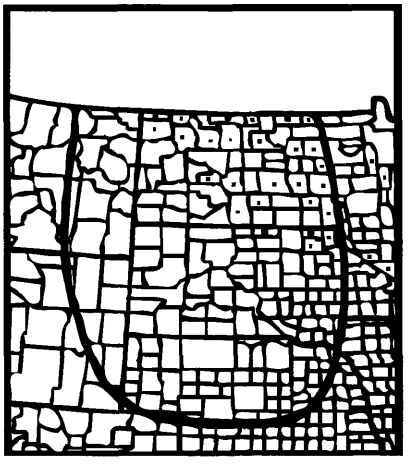
1 Flowers in terminal cymes, subtended by small scarious bracts.

2 Inflorescence widely branched, the pedicels spreading or reflexed with age; leaves spreading to ascending, widest at or above the middle . . 2. *S. longifolia*

2 Inflorescence rather narrow, the pedicels erect to ascending; leaves strongly ascending, widest near the base . . . . . 3. *S. longipes*

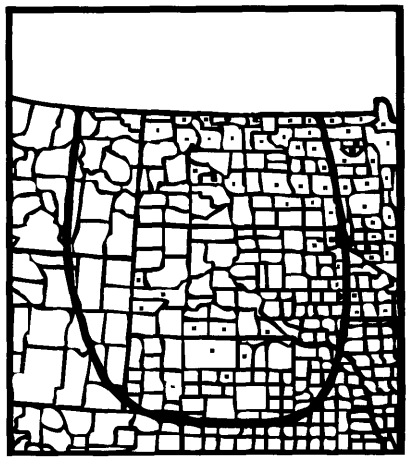
1. *Stellaria crassifolia* Ehrh.

Stems decumbent and matted to erect, often supported by surrounding vegetation, freely branched, 8-30 cm long. **Leaves** elliptic to lanceolate or oblanceolate, acute or blunt, narrowed at the base, 5-25 mm long, 1-3 mm wide. **Flowers** solitary in forks of the stem, on pedicels 1-5 cm long; **sepals** 2.5-4 mm long; **petals** surpassing the sepals. **Capsules** ovoid, equaling or exceeding the calyx, 3.5-5 mm long. **Seeds** reddish-brown, oblong-orbicular, 0.7-1 mm long. Jun—Jul. Springs, boggy areas and stream margins; occasional; n, c and e ND, nc and ne SD; (Circumboreal, in N.Amer. from Newf. to AK, s to NY, MN, ne SD, AZ and CA).



2. *Stellaria longifolia* Muhl. ex Willd. — Long-leaved stitchwort

Stems weak, decumbent to ascending, often sprawling among surrounding vegetation, prominently 4-angled, usually freely branched, 1-4.5 dm long. **Leaves** spreading to ascending, linear to narrowly lanceolate or oblanceolate, widest at or above the middle, acute at both ends, 1-5 cm long, 0.8-5(8) mm wide. **Inflorescence** widely branched, the pedicels spreading or reflexed with age, 1-8 cm long, subtended at the base by a pair of small scarious bracts. **Flowers** few to many; **sepals** 3-5 mm long, acute; **petals** equaling or slightly exceeding the sepals. **Capsules** greenish-yellow or occasionally dark brown at maturity, ovoid, usually surpassing the calyx. **Seeds** golden-brown or light reddish-brown, oblong, 0.7-1 mm long. Late May—Jul. Wet meadows, boggy areas, stream banks, shores and moist woods; frequent in e, c and nw ND, e, s and the Black Hills in SD and the NE Sandhills; (Circumboreal, in N.Amer. s to SC, LA, AZ and CA).

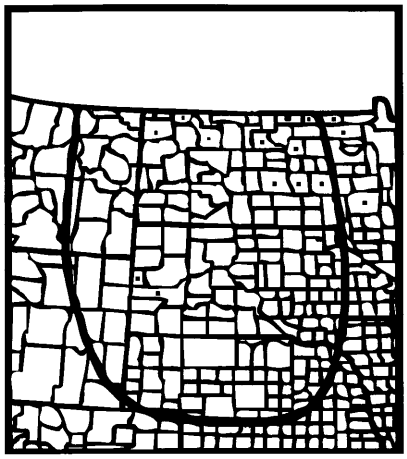




Stellaria longifolia. **Photo by James R. Johnson.**

3. *Stellaria longipes* Goldie

Stems erect or decumbent, often densely matted, 5-25 cm long, from slender rhizomes. **Leaves** strongly ascending, rather stiff and shiny, linear or linear-lanceolate, widest near the base, acute at the tip, 1-2.5(4) cm long, 0.8-3(5) mm wide. **Inflorescence** similar to that of the preceding but rather narrow, the pedicels erect to ascending, 1-3(6) cm long. **Flowers** 1-several per stem, seldom more; **sepals** 3-5 mm long, acute or obtuse; **petals** slightly shorter to slightly longer than the sepals. **Capsules** stramineous to shiny purplish at maturity, ovoid, surpassing the calyx. **Seeds** light to dark reddish-brown, oblong to oval, 0.7-1 mm long. Late May—Jul. Wet meadows, moist ditches and thickets; occasional in e and n ND and the Black Hills; (Circumpolar, in N.Amer. from Newf. to AK, s to N.S., NY, MN, SD, AZ and CA).



15. **Polygonaceae**, the Smartweed Family

Annual and perennial herbs with small flowers often aggregated in conspicuous inflorescences. **Leaves** simple, alternate, the blades sometimes undulate-crisped along the margin, otherwise entire; stipules united to form a membranous or papery sheath (the **ocrea**) around the stem at each node. **Flowers** borne in spikelike racemes or in small axillary clusters (*Polygonum*), or in dense, terminal panicles of racemes in which the flowers are densely whorled on the branches (*Rumex*), in the latter case, the inflorescence often comprising much of the upper part of the plant. **Flowers** perfect (in those included here), regular; **perianth** consisting of a calyx only; in *Polygonum* the sepals petaloid or at least so on the margins, whitish to pink or sometimes yellowish, in a cycle of (4)5(6); in *Rumex* the **sepals** herbaceous, green to brown, in 2 cycles of 3, the 3 inner sepals accrescent, becoming broadly winged and appressed to each other, persisting to enclose the achene; **stamens** 4-8; **pistil** 1, 2- or 3-carpellary, styles 2-3, ovary superior, 1-celled. **Fruit** a trigonous or lenticular achene.

1 Flowers in spikelike racemes or in groups of 1-few in the axils of ordinary leaves, whitish to pink or greenish, the calyx petaloid at least on the margins . . . . . 1. *Polygonum*

1 Flowers in dense terminal panicles of racemes in which flowers are in dense whorls, green to brown, the calyx herbaceous . . . . . 2. *Rumex*

1. ***Polygonum*** L. — Smartweed, knotweed, tear-thumb

Erect to sprawling, often weedy annuals and perennials, the **stems** often swollen at the nodes. **Leaves** sessile to short-petioled, the blades generally lanceolate to oblanceolate or elliptic (sagittate in ***P. sagittatum***); stipules fused to form a tubular or 2-lobed **ocrea** which sheaths the stem above each node, the ocreae (pl.) membranous or chartaceous, often lacerate or completely broken up at older nodes, sometimes fringed with bristles. **Flowers** small, greenish, whitish or pinkish, usually borne in spikelike racemes, or (in *P. ramosissimum*) the flowers in axillary positions, with 1-few flowers in the axils of ordinary leaves; in those spp. with flowers in racemes, the racemes terminal or both terminal and axillary, loosely to densely flowered, the flowers fascicled in the axils of small bracts (ocreolae), the pedicels included by or barely surpassing the ocreolae. **Sepals** usually 5(4-6), petaloid throughout or at least around the margins, greenish-white to deep pink (green with yellowish or pinkish margins in *P. ramosissimum*), somewhat accrescent, united near or well below the middle; stamens 8 or fewer; **styles** 2-3. **Achenes** brown to black, lenticular or trigonous, sometimes both in the same inflorescence, apiculate, surrounded by the persistent sepals.

References:

Martens, T. R. and P. H. Raven. 1965. Taxonomy of *Polygonum*, section *Polygonum* (*Avicularia*) in North America. Madrono 18:85-92.

Stanford, E. E. 1925. The amphibious group of *Polygonum*, subgenus *Persicaria*. Rhodora 27:109-112, 125-130, 146-152, 156-166.

1 Leaves sagittate; stems armed with reflexed prickles . . . . . 11. *P. sagittatum*

1 Leaves generally lanceolate to oblanceolate or elliptic; stems unarmed.

2 Flowers strictly axillary, with 1-few in the upper axils; leaves jointed at the base . . . . . 10. *P. ramosissimum*

2 Flowers all or mostly in spikelike racemes; leaves not jointed at the base.

3 Racemes strictly terminal, solitary or paired (rarely 3 or 4) at the tips of stems; plants perennial; flowers rose pink.

4 Racemes globose to short-cylindric, mostly 1-3.5 cm long; peduncles usually glabrous . . . . . 1. *P. amphibium*

4 Racemes cylindric, mostly 4-12 cm long; peduncles usually glandular-pubescent . . . . . 3. *P. coccineum*

3 Racemes terminal and axillary, often numerous on the stems; plants annual (except *P. hydropiperoides*); flowers white, greenish-white or pink.

5 Ocreae entire or lacerate.

6 Outer sepals strongly 3-nerved, each nerve ending in an anchor-shaped fork; racemes nodding to erect. . . . . 6. *P. lapathifolium*

6 Outer sepals with faint, irregularly forked nerves; racemes erect.

7 Stamens and styles unequal, either the stamens or styles exserted conspicuously beyond the perianth . . . . . 2. *P. bicorne*

7 Stamens and styles equal or nearly so, both included in or equaling the perianth . . . . . 7. *P. pensylvanicum*

5 Ocreae fringed with bristles.

8 Calyx conspicuously glandular-punctate on the outside.

9 Ocreae gibbous, concealing cleistogamous flowers; achenes brown to dark brown, dull . . . . . 4. *P. hydropiper*

9 Ocreae cylindrical; cleistogamous flowers none; achenes black, smooth and shiny . . . . . 9. *P. punctatum*

8 Calyx not glandular-punctate, or inconspicuously glandular on the inner sepals only.

10 Plants perennial; racemes slender, often interrupted, commonly exceeding 3 cm long; achenes all trigonous . . . . . 5. *P. hydropiperoides*

10 Plants annual; racemes rather thick and dense, mostly continuous, rarely reaching 3 cm long; achenes mostly lenticular, some often trigonous . . . . . 8. *P. persicaria*

1. *Polygonum amphibium* L. — Water smartweed

Aquatic, amphibious or terrestrial perennial, quite variable depending on the water regime, glabrous when aquatic, commonly with spreading to appressed pubescence when terrestrial, more often flowering when in water. **Stems** trailing through water or over mud, usually branched, with the tips erect and emersed, to 1 m long, freely rooting at the nodes, or in drier situations, the stems erect from an underground portion, usually simple, to 8 dm tall. **Leaves** of submersed plants commonly floating, with leathery, glabrous blades on petioles 1-8 cm long; leaves of emersed plants often pubescent, sessile or with petioles to 5 mm long; leaf blades elliptic, elliptic-oblong or elliptic-lanceolate, 4-12(18) cm long, 1-4 cm wide, acute to obtuse or rounded at the tip, subcordate to cuneate at the base; **ocreae** membranous, 0.5-2 cm long, truncate at the summit or often with a spreading herbaceous margin on emersed plants, glabrous to strigose-hispid. **Racemes** terminal, 1-2, rarely 3 or 4, globose to short-cylindric, 1-3.5(5) cm long, 1-1.5(2) cm thick; peduncles 1.5-6 cm long, glabrous or pubescent, seldom glandular. **Flowers** rose pink; **calyx** 5-lobed to below the middle, 4-6 mm long; **stamens** 5, included or exserted; **style branches** 2. **Achenes** brown to nearly black, lenticular, 1.9-2.5 mm long. Jul—Sep. Meadows, marshes, springs, fens, streams, ponds and lakes, usually where water is fresh; occasional; (Nearly cosmopolitan). *P. natans* Eat.

P. amphibium as described here is considered in the strict sense. See the comments under *P. coccineum*.

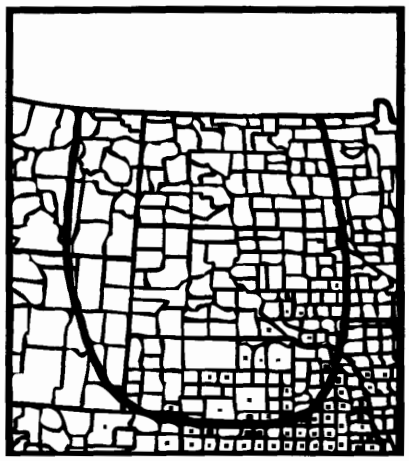




***Polygonum amphibium*, floating-leaved form.**

2. *Polygonum bicorne* Raf. — Pink smartweed

Very similar to *P. pensylvanicum* and often included in it by authors. Differing in having heterostylic flowers which are consistently pink; **racemes** appearing fringed due to the extruded stamens and styles, some flowers with the stamens exserted from the perianth and the styles included, others with the stamens included and the styles exserted; **calyx** 3-4 mm long, conspicuously exceeding the achene. **Achenes** lenticular, concave on both sides and usually with a slight elevation in the center of the concavity. Jul—Sep. Shores, stream banks, ditches and other wet, disturbed habitats; occasional in se SD, c and e NE; (IL to SD and e CO, s to LA, TX and into Mex.). *P. longistylum* Small.



3. *Polygonum coccineum* Muhl. ex Willd. — Marsh smartweed

Rhizomatous, semiaquatic or terrestrial perennial, somewhat like *P. amphibium* but the **stems** rigid, stout and freely branched below when submersed, often with greatly inflated nodes, 3-12 dm long, the secondary branches erect and emergent, not producing floating leaves; in drier situations, the stems procumbent with erect branches or the stems erect throughout, simple or sparingly branched from the base, to 1 m tall. **Leaf blades** elliptic-lanceolate to lanceolate, 8-20(23) cm long, 2-8 cm wide, glabrous to finely strigose, acute to long-acuminate, semicordate to cuneate at the base; petioles mostly 1-8 cm long; **ocreae** chartaceous or membranous, 1.5-4 cm long, truncate, strigose or glabrous. **Racemes** 1-2(3), cylindric, (2.5)4-12 cm long, 0.5-1.5 cm thick; peduncles 1.5-6 cm long, glandular-pubescent. **Flowers** deeply rose pink; **calyx** 5-lobed to below the middle, 4-6 mm long; stamens 5, included or exserted; **style branches** 2. **Achenes** dark brown to nearly black, lenticular, 2.3-3 mm long. Late Jun—Sep. Marshes, meadows, ditches, streams, ponds and lakes, where water is fresh to brackish; often weedy, especially in low areas previously disturbed by cultivation; very common, often abundant; (Que. and N.S. to B.C., s to NC, TN, TX and CA).

Some authors merge *P. coccineum* with *P. amphibium*, considering the former a variety (var. *emersum* Muhl.) of the latter. At least in our region, the two entities are distinctly different regardless of the depth of water they are growing in. It is common to find the emergent and emersed forms of *P. coccineum* growing with the floating-leaved and emersed forms of *P. amphibium*, with no evidence of intergradation between them. *P. coccineum* is a facultative wetland plant, often spreading into upland habitats adjacent to wetlands. *P. amphibium* as defined here is an obligate wetland plant.

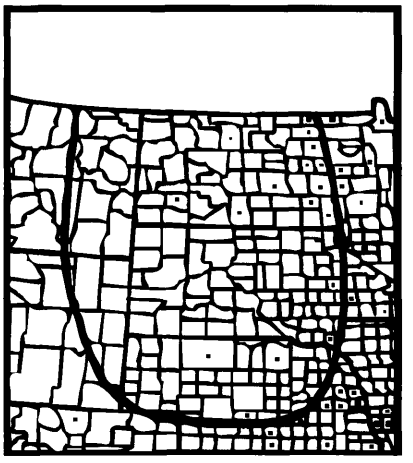




***Polygonum coccineum*, emergent colony.**

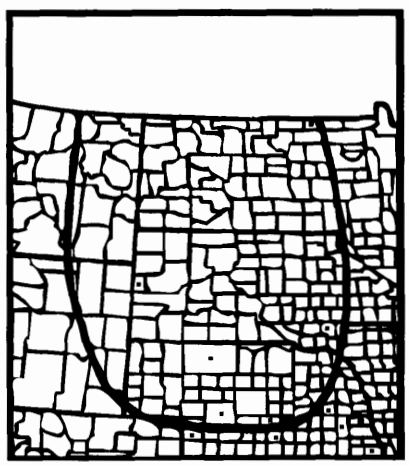
4. *Polygonum hydropiper* L. — Water pepper

Erect to decumbent, simple to freely branched annual 2-8 m tall; **stems** often reddish, sometimes rooting at the lower nodes, foliage and flowers peppery to the taste. **Leaf blades** lanceolate, 3-8 cm long, 0.5-2 cm wide, glabrous except for the strigulose margins, narrowed to a blunt or rounded tip, cuneate at the base, subsessile or short-petioled; **ocreae** membranous, 5-15 mm long, fringed with bristles, those on the upper half of the stem gibbous, concealing cleistogamous flowers which are like those in the racemes. **Racemes** often many, loosely flowered, elongate, interrupted in the lower portion, 2-9 cm long. **Flowers** greenish-white to greenish-pink; **calyx** 2.5-4 mm long, strongly glandular-punctate, usually 4-parted to slightly below the middle; **stamens** usually 4 or 6, included by the calyx; **style** branches 2 or 3. **Achenes** brown to dark brown, dull, lenticular or trigonous, 2-3 mm long. Late Jul—Sep. Shores and stream banks; frequent in the e part, occasional w; (Intro. from Europe, now ranging from Que. to B.C., s to FL, TX and CA).



5. *Polygonum hydropiperoides* Michx. — Mild water pepper

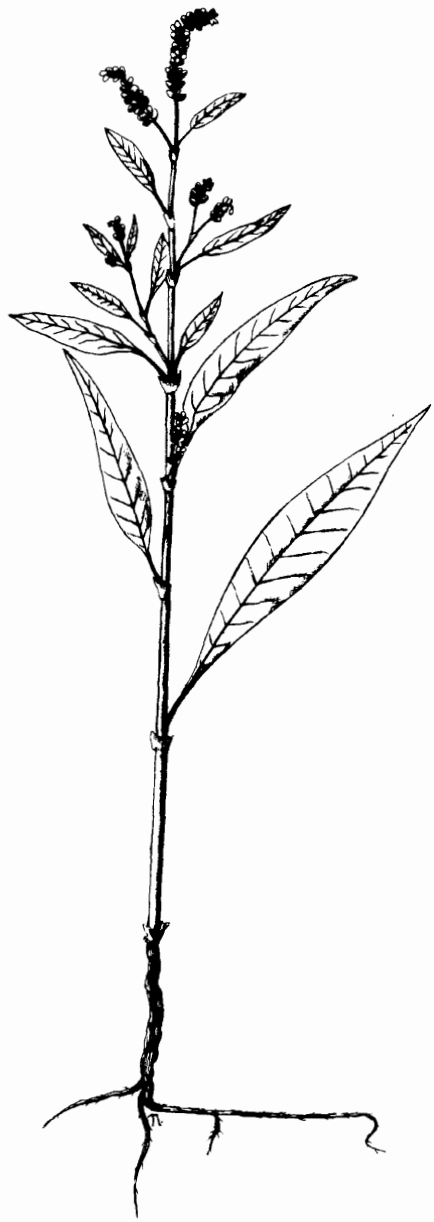
Erect to decumbent, usually branched perennial, nearly glabrous to strigose throughout; **stems** commonly rooting at the lower nodes when decumbent, to 1 m long. **Leaf blades** linear-lanceolate to lanceolate, 4-12 cm long, 0.3-2.5 cm wide, nearly glabrous to strigose, especially pubescent on the midvein and margins, gradually tapering to a narrow, blunt to acute tip, cuneate at the base, short-petioled to subsessile; **ocreae** membranous, 5-15 mm long, usually strigose, fringed with bristles. **Racemes** 2-several, slender, often interrupted in the lower portion, 1-6 cm long. **Flowers** greenish to white or pinkish; **calyx** 2-3 mm long, 5-parted to just below the middle, eglandular or only the inner sepals slightly glandular; **stamens** 8, included; **style branches** 3. **Achenes** black, shiny, trigonous with concave sides, 2-3 mm long. Aug—Sep. Wet soil or mud of meadows, marshes, ditches, stream banks and shores; uncommon and scattered; (Que. to B.C., s through the U.S. and into C. and S.Amer.).



6. *Polygonum lapathifolium* L. — Pale smartweed

Erect to decumbent, simple to widely branching annual (1)2-10 dm tall. **Leaf blades** lanceolate or elliptic-lanceolate, 4-17(20) cm long, 0.5-3.5(5) cm wide, glabrous above, glabrous to minutely strigose and often glandular-punctate beneath, occasionally finely white-tomentose beneath, acute or acuminate to the narrow, blunt tip, cuneate at the base, on short petioles to 2 cm long; **ocreae** 5-20 mm long, entire to lacerate, glabrous, not fringed with bristles. **Racemes** usually numerous, densely flowered, cylindric, erect or often nodding, 0.8-5 cm long, 0.5-1 cm thick. **Flowers** greenish-white or white to deep pink; **calyx** 2.5-3.5 mm long, 4- or 5-lobed to below the middle, the outer 2 sepals strongly 3-nerved, each nerve ending in an anchor-shaped fork; **stamens** usually 6, included; **style branches** 2. **Achenes** brown to dark brown, lenticular, concave on the sides, ca. 2 mm long, including the style beak. Jul—Sep. Marshes, wet meadows, ditches, shores, stream banks and other places where water stands temporarily; very common, often abundant; (Circumboreal, s throughout most of the U.S.).

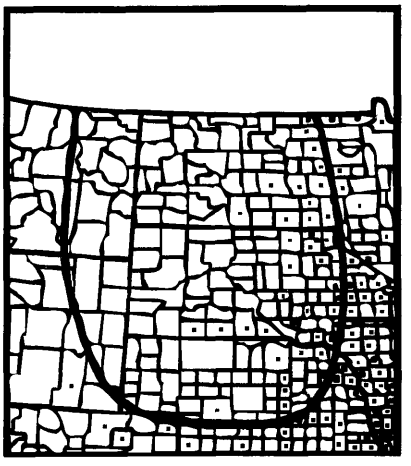




Polygonum lapathifolium. **The spikelike racemes are usually erect and shorter on smaller plants. The flowers can be strongly pink.**

7. *Polygonum pensylvanicum* L. — Pennsylvania smartweed

Erect, simple to widely branching annual 3-12 dm tall. **Leaf blades** ovate-lanceolate to lanceolate, 3-15 cm long, 0.7-4 cm wide, glabrous except for the minutely strigose margin, sometimes puncticulate on the lower surface, acute or acuminate to the narrow, blunt tip, cuneate at the base; **petioles** short to 2.5 cm long; **ocreae** 0.5-1.5 cm long, entire to lacerate, glabrous, not fringed with bristles. **Racemes** usually few to many, dense, cylindric, erect, 1-3 cm long, 0.7-1 cm thick; **peduncles** glandular-pubescent. **Flowers** pink to nearly white; **calyx** 3-4.5 mm long, 5-lobed to well below the middle, the outer sepals with faint, irregularly forked nerves; **stamens** 8 or fewer, included; **style branches** 2. **Achenes** dark brown to black, shiny, lenticular, concave on the sides, 2.5-3 mm long, including the beak. Jul—Aug. Stream banks, shores and ditches; occasional to common; e ND, e and c SD and NE; (N.S. and Que. to ND, s to FL, TX and AZ).



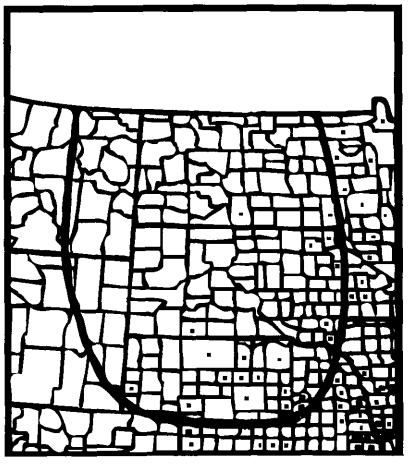
8. *Polygonum persicaria* L. — Lady's thumb

Erect to spreading, simple to branched annual 2-8 dm tall, the stems often reddish. **Leaf blades** lanceolate to elliptic-lanceolate, 3-15 cm long, 0.5-3 cm wide, glabrous to sparsely strigose, usually puncticulate, especially beneath, acute to long-acuminate, cuneate at the base, subsessile or on petioles to 1 cm long; **ocreae** 5-15 mm long, fringed with bristles, glabrous to strigose. **Racemes** usually few to many, globose to cylindric, 0.5-2.5 cm long, 0.5-1 cm thick. **Flowers** light to deep pink; **calyx** 2.5-3 mm long, 5-lobed to near the middle; **stamens** 6, included; **style branches** 2 or 3. **Achenes** black, shiny, lenticular or some often trigonous, 2-2.5 mm long. Jul—Sep. Springs, shores, stream banks and ditches, where water is fresh; occasional, most common in the e part; (Intro. from Europe and now throughout N.Amer.).



9. *Polygonum punctatum* Ell. — Water smartweed

Simple to branched, erect to spreading annual 3-10 dm tall. **Leaf blades** lanceolate, 4-10 cm long, 1-2 cm wide, glabrous except for the minutely strigose margin, usually puncticulate, especially beneath, acute or acuminate to the blunt tip, cuneate to the short-petioled base; **ocreae** 5-15 mm long, fringed with bristles, glabrous to strigose. **Racemes** usually many, slender, elongate, loosely flowered, interrupted in the lower portion, to 10 cm long. **Flowers** greenish-white; **calyx** 3-4 mm long, strongly glandular-punctate, 5-parted to about the middle; **stamens** 6-8, included; **style branches** 2-3. **Achenes** dark brown to black, shiny, lenticular or trigonous, 2-3 mm long. Aug—Sep. Shores and stream banks; uncommon in s ND to frequent in NE; (Throughout most of N.Amer., s to S.Amer.).



10. *Polygonum ramosissimum* Michx. — Bushy knotweed

Erect, sparingly to usually freely branched, taprooted annual 2-9 dm tall, the stems strongly ribbed. **Leaf blades** elliptic to mostly narrowly elliptic or nearly linear, 8-40 mm long, 2-15 mm wide, acute to obtuse, often revolute, cuneate and jointed at the subsessile or short-petioled base; **ocreae** membranous with 2 acute lobes, soon lacerate and breaking into brownish fibers. **Flowers** in axillary positions near the tips of branches, 1-few per axil; **calyx** 5(6)-parted, 3-4.5 mm long, the lobes united for about 1/3 of their length or less, green with yellowish, whitish or slightly pinkish margins, the outer 3 cucullate and enclosing the inner lobes; **stamens** usually 5, included; **style branches** 3. **Achenes** dark brown, dull to shiny, sharply trigonous, mostly 3-3.5 mm long and enclosed by the calyx, those produced later in the season often larger and distended beyond the calyx; **pedicels** mostly enclosed by the ocreae, 1-3 mm long. Jul—Sep. Shores and exposed flats, especially where alkaline; common; (Newf. to B.C., s to VA, IN, OK and CA). *P. prolificum* (Small) Robins.

Some other polygonums of the knotweed group are sometimes found in the same habitats as *P. ramosissimum*, but are more characteristic of disturbed upland habitats. Most typical of this group is *P. arenastrum* Jord. ex Bor. (formerly included in *P. aviculare* L.) which differs from *P. ramosissimum* in its spreading to erect habit; **calyx lobes** pink-margined, more or less flat and not cucullate at the tips; **achene** unequally trigonous, with 2 convex sides and 1 narrower concave side. Another is *P. erectum*, a spreading plant with broadly elliptic leaves; **calyx** united near the middle and constricted above to appear bottle-shaped.



11. *Polygonum sagittatum* L. — Tear-thumb, arrow-vine

Slender annual; **stems** weak, usually reclining on surrounding vegetation, to 2 m long, strongly 4-angled, armed with reflexed prickles on the angles, the prickles usually continuous onto the petioles, leaf midribs and peduncles. **Leaves** mostly long-petioled below, becoming short-petioled upward on the stem, the blades lanceolate to elliptic and sagittate, 3-10 cm long, 0.8-2.5 cm wide, acute, the basal lobes straight or incurved; **ocreae** 5-10 mm long, sparsely ciliate. **Racemes** terminal and axillary on slender peduncles, globose, 5-10 mm long. **Flowers** whitish or pinkish; **calyx** 2.5-3 mm long, 5-parted to below the middle; **stamens** 8, included; **style branches** 3. **Achenes** brown to black, shiny, trigonous, 2-3 mm long. Jul—Sep. Swamps, springs and wet meadows; rare in ND and SD, frequent in NE Sand Hills; (Newf. and Que. to Sask., s to FL and TX).



2. ***Rumex*** L. — Dock

Erect to spreading, often weedy perennials (annual in *R. maritimus*), usually from stout, often few-branched taproots, often tall in stature, some with a basal clump of large leaves, the stems often tinged with purple. **Leaves** generally oblong to lanceolate, cuneate to rounded, truncate or cordate at the base, flat to undulate-crisped along the margins, usually petioled, the lowest leaves often long-petioled; **ocreae** usually membranous, brittle when dry. **Inflorescence** consisting of 1 or more, often large, dense, terminal, leafy-bracteate panicles of racemose branches in which the flowers are crowded in whorls, the entire inflorescence often comprising much of the upper part of the plant. **Flowers** small and numerous, green, eventually turning brown; **calyx** herbaceous, the sepals in 2 cycles of 3, the outer 3 sepals remaining small after anthesis, the inner 3 sepals (the **valves**) expanding, becoming winged, the margins veiny, entire to sinuate, dentate or spinulose-toothed, the valves loosely coherent around the achene with the margins appressed to each other, giving the appearance of a 3-winged fruit, the midvein of the valve often swollen to produce a grainlike **tubercle** on the back; **stamens** 6; **styles** 3. **Achenes** brown, sharply trigonous, apiculate, enclosed by the persistent calyx.

References:

Love, D. and F. J. Bernard. 1958. *Rumex stenophyllus* in North America. Rhodora 60:54-57.

Rechinger, K. H., Jr. 1937. The North American species of *Rumex*. Publ. Field Mus. Nat. Hist., Bot. Ser. 17:1-151.

1 Margins of mature valves coarsely to spinulose-toothed.

2 Plants perennial from a stout taproot; margins of the valves coarsely toothed. . . . . 9. *R. stenophyllus*

2 Plants annual, fibrous-rooted or with a slender taproot; margins of the valves deeply dissected into spinulose teeth. . . . . 3. *R. maritimus*

1 Margins of mature valves entire to sinuate or shallowly erose, not toothed.

3 Valves, or at least one of them, with a grainlike tubercle on the back.

4 Pedicels without a visibly swollen joint; tubercles 3, the base of the tubercle distinctly above the base of the valve . . . . . 6. *R. orbiculatus*

4 Pedicels with a visibly swollen joint below the middle or near the base; tubercles 1-3, the base of the tubercle even with the base of the valve.

5 Plant branched and spreading, leafy throughout, with clusters of leaves or short branches in the axils of the main cauline leaves, the leaves not greatly reduced upward on the stem; blades flat to slightly undulate.

6 Principal leaves ovate-lanceolate to elliptic-lanceolate, mostly not more than 4X longer than broad; tubercle usually well- developed on only 1 of the 3 valves . . . . . 1. *R. altissimus*

6 Principal leaves oblong-lanceolate to linear-lanceolate, mostly more than 4X longer than broad; tubercles well developed on 1-3 of the valves . . . . . 4. *R. mexicanus*

5 Plant usually simple or seldom few-stemmed, the stem(s) erect, unbranched below the inflorescence, with large basal leaves and smaller leaves upward on the stem; blades undulate to undulate-crisped; valves ovate-deltate to rotund-ovate or reniform, rounded to cordate at the base.

7 Tubercles 1-3, well-developed, the largest at least 1/2 as long as the valve . . . . . 2. *R. crispus*

7 Tubercle 1, poorly developed, the largest 1/3 or less as long as the valve.

8 Valves 3.5-5 mm long . . . . . 8. *R. pseudonatronatus*

8 Valves (5)6-9 mm long . . . . . 7. *R. patientia*

3 Valves lacking grainlike tubercles.

9 Pedicels lacking a visibly swollen joint; principal leaf blades truncate to cordate at the base . . . . . 5. *R. occidentalis*

9 Pedicels with a visibly swollen joint near the base; principal leaf blades acute to rounded at the base.

10 Plant branched and spreading, leafy throughout, with clusters of leaves or short branches in the axils, the leaves not greatly reduced upward on the stem, flat to slightly undulate.

11 Principal leaves ovate-lanceolate to elliptic-lanceolate, mostly not more than 4X longer than broad . . . . . 1. *R. altissimus*

11 Principal leaves oblong-lanceolate to linear-lanceolate, mostly more than 4X longer than broad . . . . . 4. *R. mexicanus*

10 Plant usually simple or seldom few-stemmed, the stem(s) erect, unbranched below the inflorescence, with large basal leaves and smaller leaves upward on the stem, the blades undulate-crisped . . . . . 8. *R. pseudonatronatus*

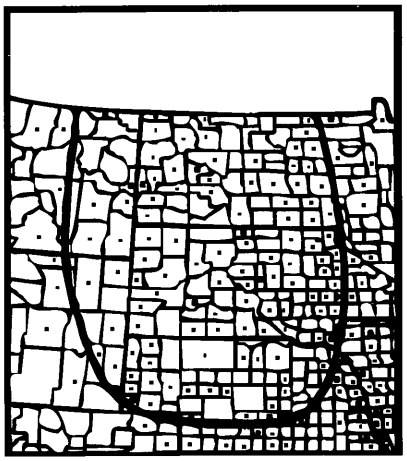
1. *Rumex altissimus* Wood — Pale dock

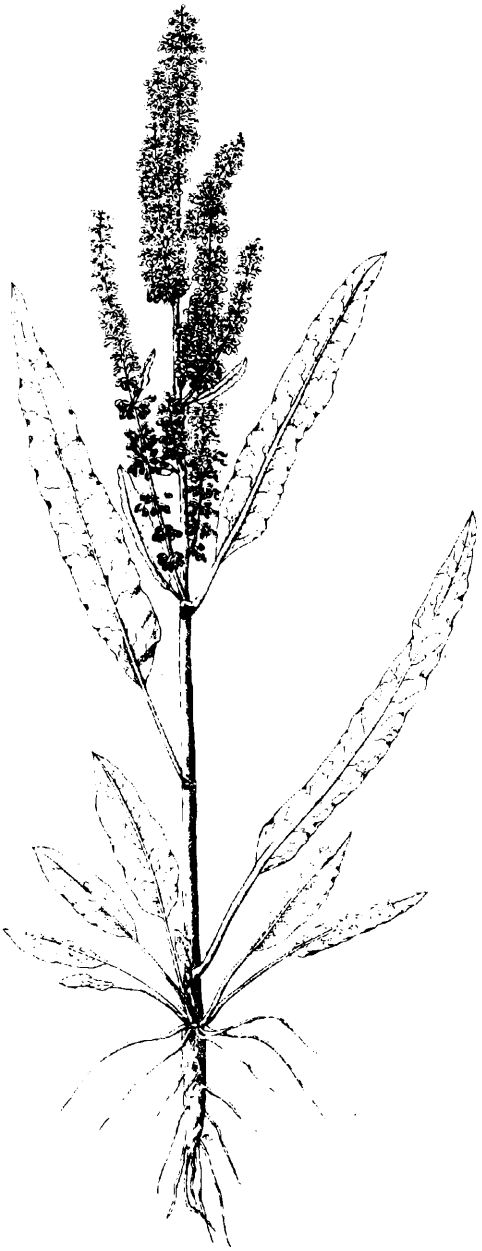
Quite similar to *R. mexicanus*, 3-10 dm tall, usually branched from the base and with short branches or axillary clusters of leaves above. **Leaf blades** ovate-lanceolate to elliptic-lanceolate, 6-18 cm long, 1.5-5.5 cm wide, mostly not more than 4X longer than broad, flat to slightly undulate-crisped along the margin, acute to acuminate at the tip, cuneate to obtuse or rounded at the base. **Panicles** 1-3 dm long, the branches erect to ascending, rather few; **pedicels** shorter than to about equaling the length of the valves, swollen-jointed near the base. **Valves** triangular to rotund-ovate, 4-5(6) mm long, about as wide, bluntly acute or obtuse at the tip, entire or erose-margined, truncate to subcordate at the base; **tubercle** well-developed usually on only 1 of the 3 valves, although sometimes present on none or all 3 of the valves, mostly 1/2 - 2/3 the length of the valve; **achenes** brown, 2.3-3 mm long. Jun—Aug. Wet meadows, marshes, shores, stream banks, ditches and other wet places; occasional; e, c and s SD, se WY and NE; (NH to MN and WY, s to GA, TX and AZ).



2. *Rumex crispus* L. — Sour dock, curled dock

Stout, erect, usually single-stemmed perennial mostly 5-10 dm tall, from a thick taproot. **Leaves** basal and cauline, the basal leaves large and long-petioled, often drying early, the stem leaves decreasing in size and shorter-petioled upward; blades elliptic to oblong-lanceolate, those of the basal leaves 10-30 cm long, 1-5 cm wide, conspicuously undulate-crisped, cuneate to rounded at the base. **Panicle** large, the branches erect to ascending, intermixed with some linear leaves; **pedicels** mostly 1.5-2X the length of the valves, swollen-jointed below the middle. **Valves** cordate-deltate to ovate-deltate, mostly 3-5 mm long and about as wide, entire to scarcely erose; **tubercles** usually 3 (or absent from 1 or 2 of the valves), often unequal, the largest 1/2 or more the length of the valve; **achenes** brown, 2-2.5 mm long. Jul—Sep. Wet meadows, shores, ditches and other low areas; common, weedy; (Intro. from Eurasia, now naturalized throughout the U.S. and s Can. and most of the world).



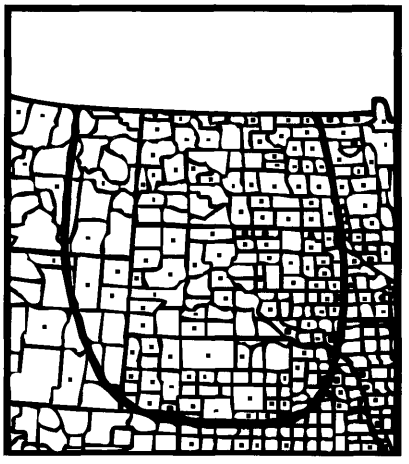


Rumex crispus. **Other species are often confused with this one. Correct identification requires close inspection of the winglike valves surrounding the achene.**

3. *Rumex maritimus* L. — Golden dock

Stout, erect annual, freely branched upward and often from the base, 0.5-7 dm tall. **Leaves** mostly cauline, reduced in size upward, the blades oblong-lanceolate to oblong-linear, 5-20 cm long, 0.5-4 cm wide, the margins flat to sometimes undulate, cuneate to truncate or sometimes cordate at the base; petiole to as long as the blades on the lower leaves, shorter upward. **Panicle** rather open, the branches spreading-ascending, leafy, puberulent or papillose, the verticils of flowers conspicuously separated, especially in the lower part; **pedicels** jointed near the base, slightly to greatly exceeding the valves in length. **Valves** ovate, acuminate-tipped, 2-3 mm long, the margins deeply incised into (1)2-4 spinulose teeth which are 1-3(6) mm long; **tubercles** 3, linear-lanceolate, running about 1/2 the length to the acuminate tip of the valve; **achenes** light brown, 1-1.5 mm long. Jul—Sep. Marshes, shores, stream banks and ditches, where water is fresh to brackish; common; (Eurasia and most of N. and S.Amer.).

American plants differ slightly from Eurasian counterparts and are distinguished as var. *fueginus* (Phil.) Dusen.



4. *Rumex mexicanus* Meisn. — Mexican dock, willow-leaved dock

Perennial from a stout taproot, 2-8 dm tall, usually branched and spreading from the base, also with short branches or axillary clusters of leaves above, rather leafy throughout except in the panicles. **Leaves** mostly cauline, not greatly reduced upward, the blades linear-lanceolate to oblong-lanceolate, 5-16 cm long, 0.8-2.5(4) cm wide, mostly more than 4X longer than broad, flat to slightly undulate, acute to acuminate at the tip, cuneate to slightly rounded at the base; petioles short, mostly 1-3 cm long, the leaves becoming subsessile upward. **Panicles** 1-3 dm long, leafy-bracteate only in the lower part, the branches ascending to divergent; **pedicels** shorter than to 1.5X the length of the valves, swollen-jointed near the base. **Valves** triangular, 3-5(6) mm long, 3-4 mm wide, entire to shallowly sinuate-dentate; **tubercles** absent or present on 1, 2 or all 3 of the valves, 1/2 to 2/3 as long as the valve; **achenes** brown, ca. 2 mm long. Jun—Aug. Wet meadows, marshes, ditches, shores, stream banks and other low areas, often where water is brackish; common; (Que. to AK, s to PA, KY, TX, CA and into Mex.; intro. in w Europe). *R. salicifolius* Weinm.



5. *Rumex occidentalis* S. Wats. — Western dock

Stout, taprooted perennial 5-15(20) dm tall, usually single-stemmed and unbranched below the panicle, with large, long-petioled basal leaves and smaller, shorter-petioled cauline leaves. **Basal leaf blades** oblong-ovate to oblong-lanceolate, 10-40 cm long, ca. 1/4 to 1/3 as wide, flat to somewhat crisp-margined, truncate to cordate at the base. **Panicle** large, rather narrow, sparsely leafy-bracteate in the lower portion, the branches ascending; **pedicels** mostly 1-2X the length of the valves, obscurely jointed near the middle. **Valves** rotund-ovate to triangular-ovate, cordate at the base, 3-10 mm long and about as wide, nearly entire to denticulate toward the base, lacking tubercles; **achenes** 3.5-4.5 mm long. Jul—Aug. Wet meadows, ditches and other moist or wet places; ND, MT, SD and WY; occasional; (Newf. and Que. to AK, s to ME, MN, SD, NM and CA).



6. *Rumex orbiculatus* A. Gray — Great water dock

Very similar to *R. occidentalis*, differing as follows: **Basal leaf blades** oblong-lanceolate, flat, acute to rounded at the base. **Pedicels** obscurely jointed below the middle, the joint not swollen; **valves** orbicular to rotund-ovate, truncate at the base, 5-8 mm long and about as wide, entire to denticulate; **tubercles** 3, ca. 1/2 the length of the valve, the base of the tubercle distinctly above the base of the valve. Springs, fens and fresh marshes; uncommon and scattered; (Newf. and Que. to ND, s to NJ, OH, IL, IA and NE).



7. *Rumex patientia* L. — Patience dock

Similar to *R. crispus* but averaging larger and paler green in color, 8-20 dm tall; **stems** 1-few, erect. **Basal leaves** long-petioled, the blades ovate-lanceolate to oblong-lanceolate, (2)3-4X longer than wide, to 15 cm wide, flat to undulate, broadly cuneate to truncate at the base; **cauline leaves** reduced upward. **Panicle** large and dense, with a few reduced leafy bracts, the branches ascending; **pedicels** equaling or longer than the valves, swollen-jointed near or below the middle. **Valves** rotund-ovate, strongly cordate at the base and ultimately forcing the small outer sepals into a reflexed position, (5)6-9 mm long (including lobes of the cordate base), at least as wide, entire to denticulate; **tubercle** on one of the valves only, to about 1/3 the length of the valve and only about 1/6 as wide; **achenes** brown, 3-3.5 mm long. Jun—Jul. Wet meadows, ditches, shores and waste places; uncommon and scattered; (Intro. from Eurasia and locally established in many parts of N.Amer.).



8. *Rumex pseudonatronatus* Borbas

Quite similar to *R. crispus*. **Leaf blades** oblong to oblong-lanceolate, widest near the middle, undulate to undulate-crisped, cuneate at the base. **Panicle** as in *R. crispus*; **pedicels** mostly 1-2X the length of the valves, swollen-jointed near the base. **Valves** rotund-ovate to reniform, mostly 3.5-5 mm long, about as wide, entire, lacking tubercles or with a weakly developed tubercle on one of the valves; **achenes** 2-3 mm long. Jun—Sep. Wet meadows, ditches, shores and other low areas, often where disturbed; common in ND, less so in SD; (Intro. from Europe and naturalized over much of the n U.S. and s Can.).

Reports of *R. longifolius* DC. (*R. domesticus* Hartm.) for the northern Great Plains are largely based on the above. Only one verified record of *R. longifolius* exists for this region. O. A. Stevens collected the plant in 1946 from along a railroad near Stanley, Mountrail Co., ND. It differs from *R. pseudonatronatus* in having larger valves (more than 5 mm wide) and broader leaves (not more than 4X longer than broad) with flat to slightly undulate margins.



9. *Rumex stenophyllus* Ledeb.

Very similar to *R. crispus* but the **leaves** not as undulate-crisped, otherwise differing as follows: **Valves** triangular to rotund-ovate in outline, 3.5-5.5 mm long, 4-5.5 mm wide, coarsely toothed on the margins, entire at the triangular tip; **tubercles** 3, ellipsoid, mostly 1/3 to 1/2 the length of the valve; **achenes** brown, 2-2.5(3) mm long. Jul—Sep. Wet meadows, shores, ditches, stream banks and disturbed places, often where alkaline or saline; frequent; (Intro. from Europe to e N.Amer., now known from MN, Man. and MT, s to MO, OK, n TX and WY, probably still spreading).



16. **Elatinaceae**, the Waterwort Family

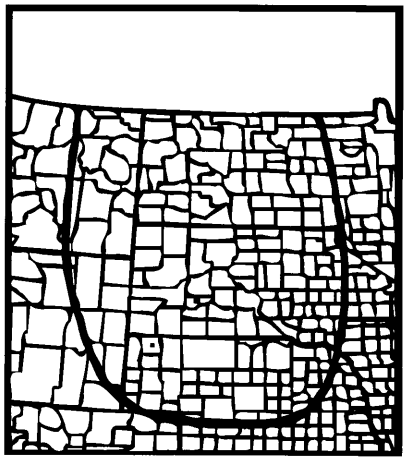
Small, usually freely branched annuals of shores, flats or shallow water. **Leaves** simple, opposite, entire or glandular-serrate, with small membranous stipules. **Flowers** axillary, 1-few per axil, small and nonshowy, perfect, regular, hypogynous; **sepals** and **petals** (2)3 or 5 (in those included here); **stamens** numbering the same or 2X the number of petals; **styles** 3 or 5, ovary 3- or 5-celled. **Fruit** a capsule; **seeds** few to many, pitted.

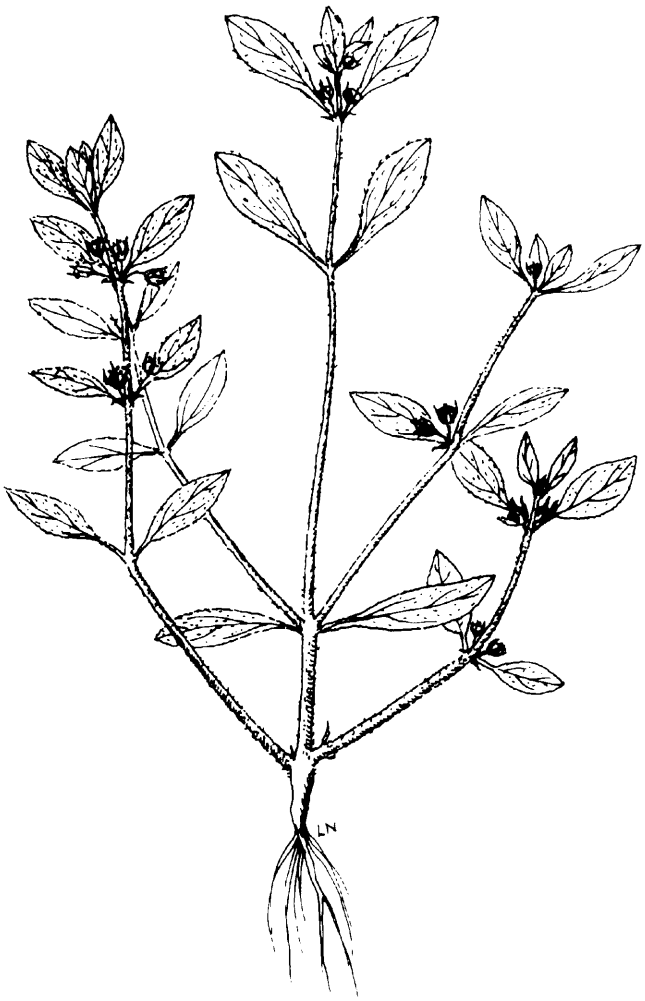
1 Plants glandular-pubescent; flowers 5-merous ..... 1. *Bergia*

1 Plants glabrous; flowers (2)3-merous ..... 2. *Elatine*

1. *Bergia texana* (Hook.) Walp.

Plant glandular-pubescent throughout, often reddish, simple to usually branched from the base, the **stems** decumbent and then ascending toward the tips, 1-4 dm long. **Leaves** opposite but crowded above to appear whorled, elliptic to oblong-lanceolate, 2-4 cm long, to 1.5 cm wide, acute, glandular-serrate, tapered to a short-petioled base; **stipules** subulate, serrate, ca. 1 mm long. **Flowers** 1-3 in the axils, short-pedicelled; **sepals** 5, 2-3.5 mm long, acuminate, scarious-margined with a thick, green midvein; **petals** 5, white, oblong, shorter than the sepals; **stamens** 5 or 10; **ovary** 5-celled. **Capsule** globose, 2-3 mm in diameter, firm-textured; **seeds** brown, shiny, elliptic-oblong and slightly curved, 0.3-0.5 mm long, obscurely pitted. Jul—Oct. Muddy or sandy shores and flats; rare, s SD, nw NE; (IL to WA, s to AR, TX and CA).



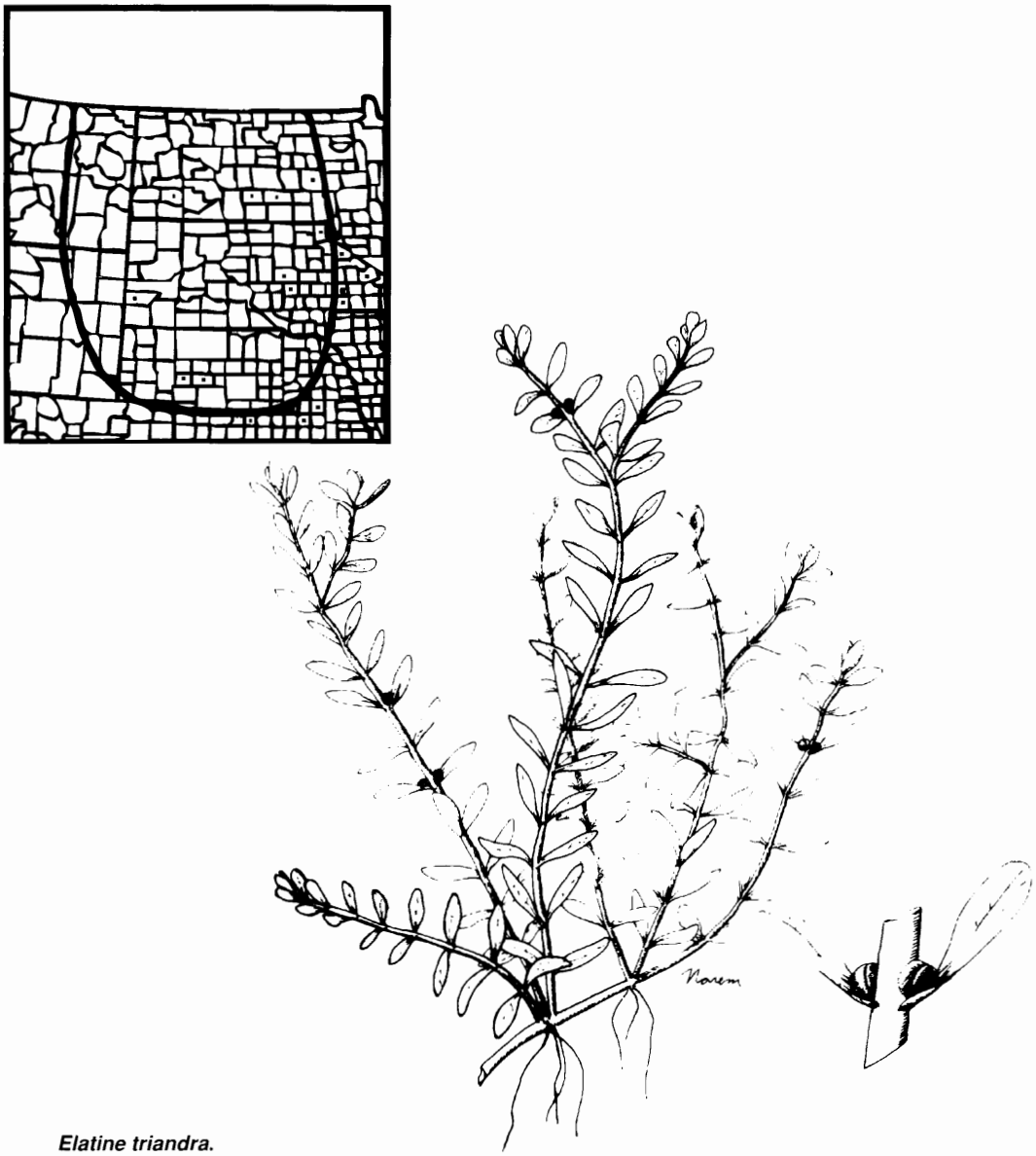


Bergia texana.

1. *Elatine triandra* Schkuhr

Plant glabrous, small, matted, rather fleshy, densely branched from the base, the **branches** sprawling or floating, often rooting at the nodes, 2-15 cm long. **Leaves** opposite, sessile, obovate to oblanceolate, 3-12 mm long, 1-3 mm wide, mostly truncate or emarginate at the tip, entire; **stipules** minute. **Flowers** sessile and solitary in the leaf axils, 1.5-2 mm across, (2)3-merous; ovary 3-celled. **Capsule** globose, 1-1.5 mm in diameter, membranous; **seeds** many, golden-yellow, oblong, ca. 0.5 mm long, ridged and obscurely pitted in rows. Jul—Sep. Mud flats or in shallow water of lakes and ponds; rare and scattered; (WI to Alta. and WA, s to TX, n Mex. and CA; also Eurasia).

References:
Fassett, N. C. 1939. *Elatine* and other aquatics. Rhodora 41:367-377.
Fernald, M. L. 1917. *Elatine* in east North America. Rhodora 19:10-15.



Elatine triandra.

17. **Clusiaceae**, the Mangosteen Family

Perennial and annual glabrous herbs (in those included here), usually simple below, branched above in the inflorescence. **Leaves** simple, opposite, sessile and often clasping at the base, glandular-punctate with brown or black glands, especially beneath. **Flowers** few to many in terminal cymes or clusters, or some also in lateral clusters from the upper axils, perfect, regular; **sepals** 5; **petals** 5, yellow or pink to greenish or purplish; **stamens** 9-35, free or united below by their filaments into 3 or more fascicles; **pistil** 3-carpellary, styles 3, ovary superior, maturing as a 3-valved, many-seeded capsule.

1 Petals yellow; stamens 15-35, free . . . . . 1. *Hypericum*

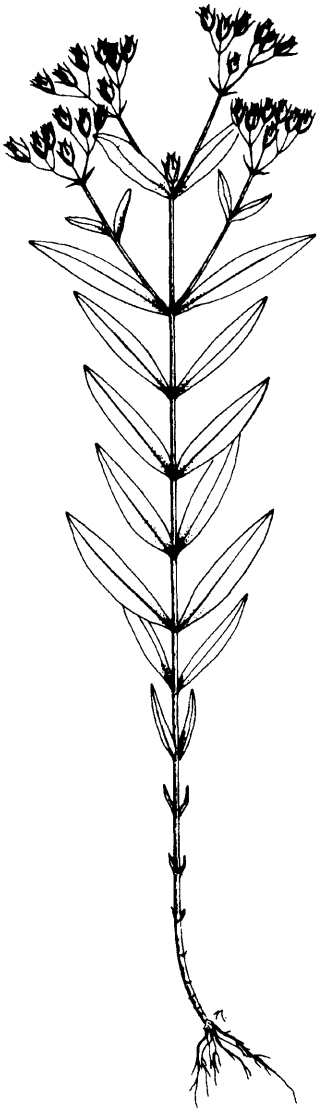
1 Petals pink to greenish or purplish; stamens 9(12), fascicled in 3 groups . . . . . 2. *Triadenum*

1. *Hypericum majus* (A. Gray) Britt. — Greater St. John's-wort

Annual or often perennial from short leafy stolons at the plant base. **Stems** upright, simple or branching above, 1-5 dm tall, ridged due to the decurrent leaf bases. **Leaves** lanceolate to oblong, 1-4 cm long, 2-11 mm wide, glandular-punctate, with minute brownish-translucent glands, 5- to 7-nerved from the base, with 3 major veins continuous to the obtuse or rounded tip, broadly rounded to somewhat cordate and clasping at the base. **Flowers** few to numerous in terminal cymes. **Sepals** lanceolate, mostly 3-5(7) mm long, acute; **petals** yellow, about equaling the sepals, somewhat marcescent and shriveling to ca. 1/2 the length of the sepals; **stamens** 15-35, free; **styles** 1 mm or less long, each with a capitate stigma, ovary 1-celled. **Capsule** often purplish, ovoid-conic, 5-7 mm long; **seeds** yellowish, narrowly ellipsoid, ca. 0.5 mm long. Mid Jul—Sep. Sandy wet meadows, shores and ditches; scattered but most common in NE Sand Hills; (Que. and Newf. to B.C., s to PA, NJ, IL, IA, KS and CO).

Reports of *Hypericum canadense* L. in the northern Great Plains are based on misidentifications of *H. majus*.



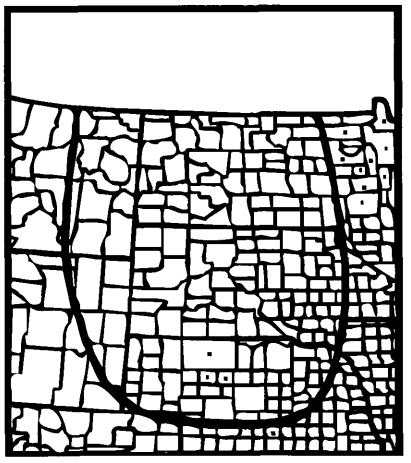


Hypericum majus.

2. ***Triadenum*** Raf. — Marsh St. John's-wort

1. *Triadenum fraseri* (Spach) Gl.

Erect perennial from creeping rhizomes, 3-6 dm tall, the **stem** simple or branched above. **Leaves** elliptic-ovate to oblong, 3-6 cm long, 1-3 cm wide, pinnately veined, glaucous and brown or black dotted beneath, rounded or emarginate at the tip, broadly rounded to cordate-clasping at the base. **Flowers** in terminal and axillary clusters of usually few to several, short-pedicelled. **Sepals** oblong-ovate, 2.5-5 mm long, obtuse or rounded; **petals** pink to greenish or purplish, 5-10 mm long; **stamens** 9(12), united below into 3 fascicles, the fascicles alternating with orange glands; **styles** 0.5-1.5(2) mm long, ovary 3-celled. **Capsule** purplish, ovoid to oblong, 7-12 mm long, blunt-tipped; **seeds** brown, oblong-ellipsoid, ca. 1 mm long. Jul—Aug. Marshes and shores; uncommon in NE Sand Hills; (Que. and Newf. to w MN, s to WV, IN and NE). *Hypericum virginicum* L. var. *fraseri* (Spach) Fern.

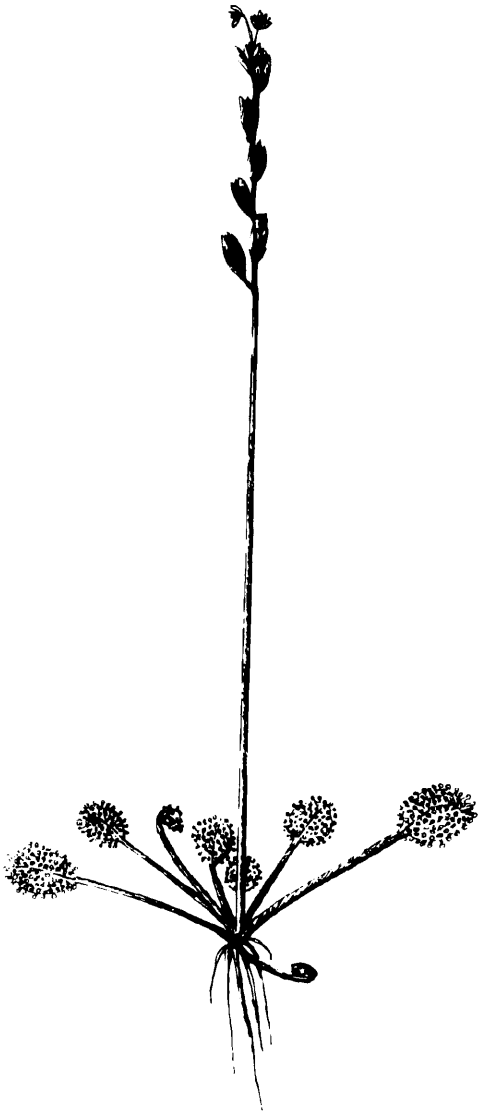


1. ***Drosera*** L. — Sundew

1. *Drosera rotundifolia* L. — Round-leaved sundew

Small perennial (or annual), insectivorous bog plant. **Leaves** in a basal rosette, circinate in bud, broadly obovate to rotund or depressed-obovate, 2-10 mm long, about as wide or wider, glandular-viscid, covered with long reddish, gland-tipped hairs, tapering to a stout petiole 2-5(9) cm long. **Flowers** 2-many, in a simple or forked, mostly 1-sided, racemelike cyme, borne on a naked scape usually 10-25 cm tall; **sepals** (4)5, connate below, narrowly oblong, 4-6 mm long, erose at the tip; **petals** (4)5, white, marcescent, oblong, slightly to considerably exceeding the calyx; **stamens** (4)5, slightly shorter than the petals; **carpels** 3(-5), deeply cleft, ovary slightly inferior. **Fruit** a many-seeded, 3(-5)-valved capsule, surpassing the calyx. **Seeds** light brown, finely striate and shiny, fusiform, 1-1.5 mm long. Jul—Aug. Swamps and bogs; rare, with one record from a sphagnum bog in Bottineau Co., ND; (Circumboreal, in N.Amer. s to VA, FL, AL, IL, MN, ND, ID, NV and CA).





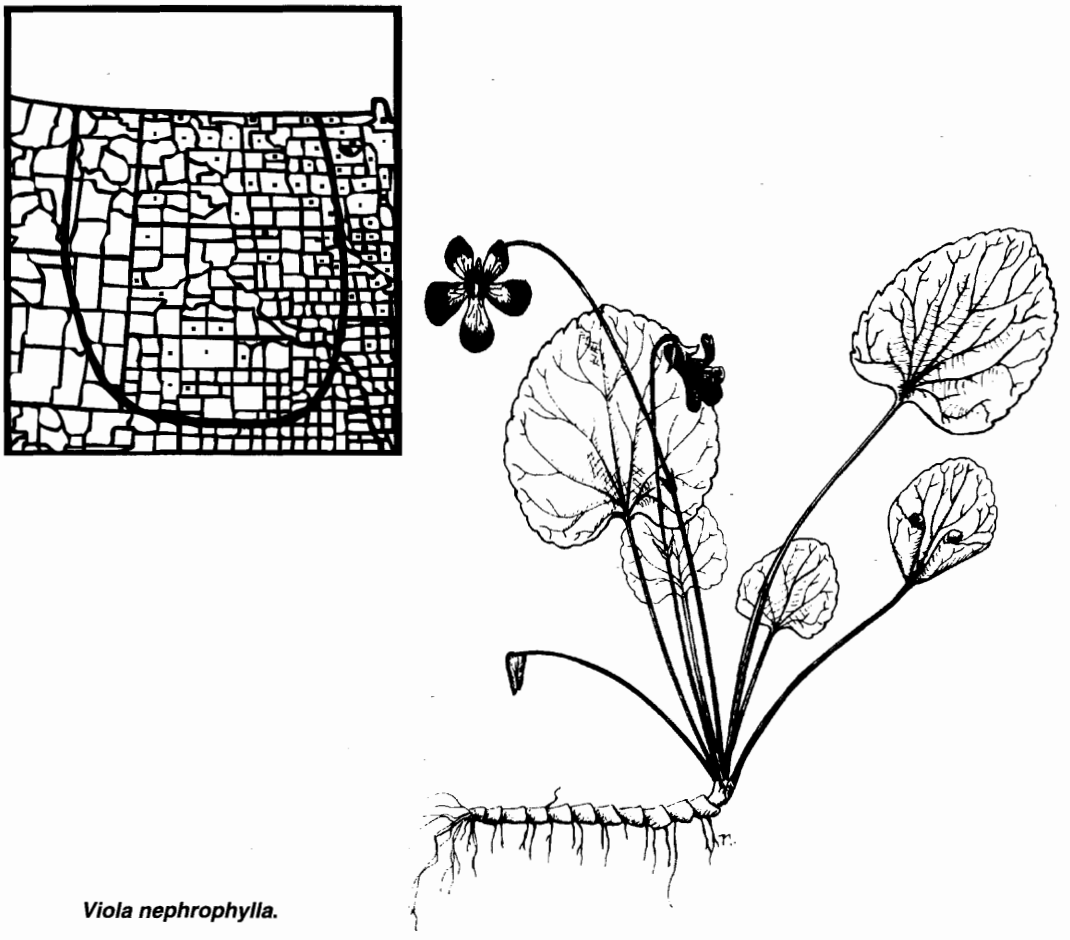
Drosera rotundifolia.

1. ***Viola*** L. — Violet

1. *Viola nephrophylla* Greene — Bog violet

Low, acaulescent perennial from short rhizomes. **Leaf blades** ovate-cordate to reniform, 1-4 cm long, 1.5-4(7.5) cm wide, obtuse to broadly rounded, crenate-serrate; **petioles** slender, 2-16 cm long. **Flowers** borne singly, nodding on slender peduncles, these about equal to or exceeding the petioles. **Flowers** violet, irregular, 12-24 mm long including the saccate spur; **sepals** 5, 1/3 to 1/2 the length of the corolla; **petals** 5, bearded toward the base on the inside, or the upper pair not bearded, the lowest petal saccate-spurred; **stamens** 5, the anthers connivent around the ovary, filaments short and broad, extending beyond the anthers; **pistil** 3-carpellary, style 1, ovary superior, 1-celled. **Fertile cleistogamous flowers** often produced after the normal ones on short, prostrate to erect peduncles. **Fruit** a many-seeded, 3-valved, ellipsoid capsule 5-10 mm long. Late May—Jun; sometimes flowering again late Aug—Sep. Wet meadows, fens, springs, ditches and stream banks; frequent in the e and c parts, less common w; (e Que. to B.C., s to CT, NY, WI, ne TX, NM and WA).

The similar *V. practincola* Greene (often named as *V. papilionacea* Pursh or *V. missouriensis* Greene) sometimes occurs in moist habitats and may be confused with *V. nephrophylla*. It differs from the latter in having only the lateral 2 petals bearded on the inner surface, the spurred petal glabrous inside. Its leaves are variable enough to sometimes fit *V. nephrophylla*, but they tend more to be acute or acuminate at the apex.

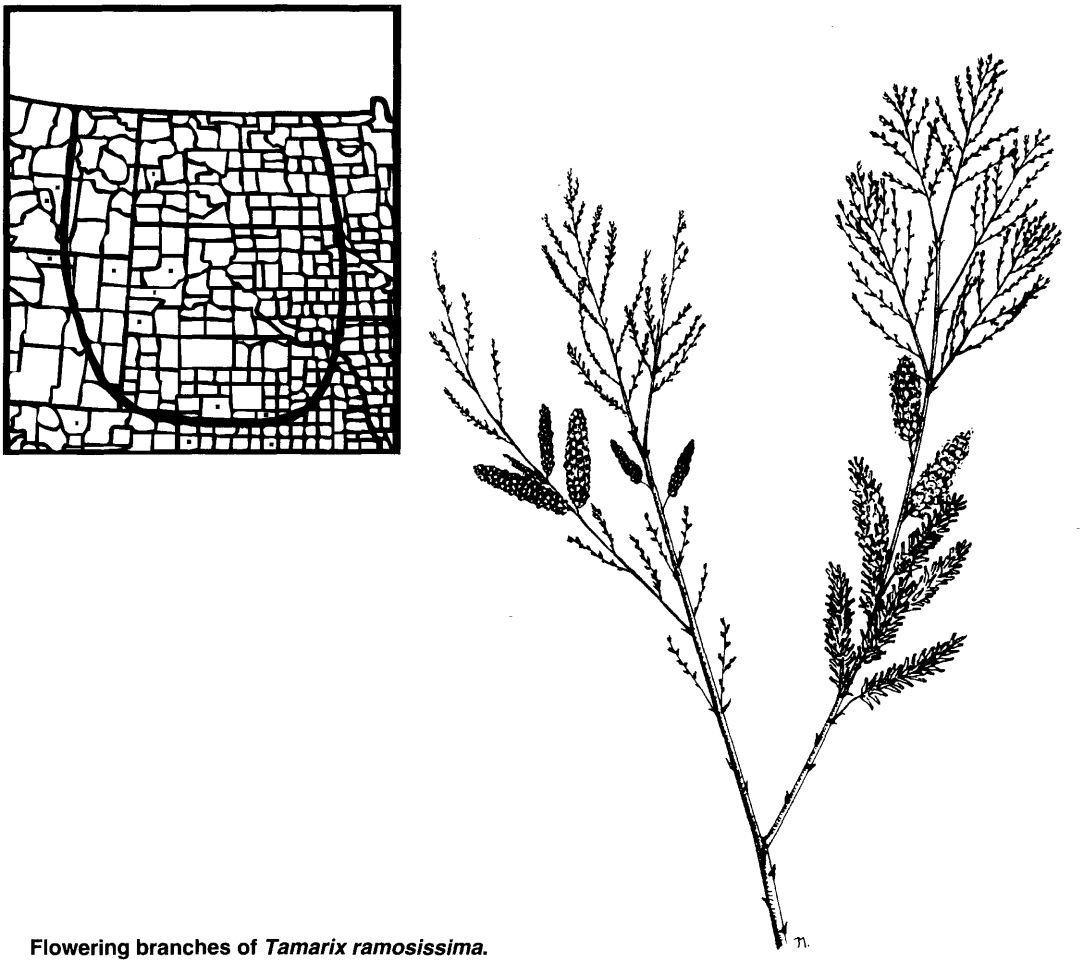


Viola nephrophylla.

1. ***Tamarix*** L. — Tamarisk, salt cedar

1. *Tamarix ramosissima* Ledeb.

Deciduous shrub 1-6 m tall, with reddish-brown bark and glaucous-green foliage. **Leaves** sessile, alternate, small and scalelike, scattered on main shoots but closely overlapping on short, lateral shoots, trullate, 1-5 mm long, acute to acuminate, narrowed at the base. **Inflorescences** of terminal and lateral bracteate racemes, these usually densely flowered and crowded on floriferous branches, or those produced earliest usually simple and more loosely flowered, 1-7 cm long, 3-5 mm thick; **bracts** similar to the leaves, pink to pale; **pedicels** shorter than the bracts. **Flowers** perfect, regular, hypogynous, pink or fading to stramineous; **sepals** 5, spreading, broadly ovate, ca. 0.5 mm long, scarious and erose to denticulate on the margin; **petals** 5, obovate to elliptic-obovate, 1-1.9 mm long, persistent and pale with age; **stamens** 5 or seldom more, arising from below and between the lobes of a brown hypogynous disk, shorter than to surpassing the petals; **pistil** flask-shaped, usually 3(-5)-carpellary and angled, styles 3(-5), clavate, deciduous, ovary 1-celled. **Fruit** a conic, 3(-5)-valved, many-seeded capsule; **seeds** tiny, erect, each with a tuft of hairs. Jun—Sep. Stream banks, floodplains, ditches and alkaline or saline flats; scattered in the w and s parts where sometimes locally common; (Intro. from Eurasia as an ornamental and now widely established in the s and w U.S.). *T. gallica* L., misapplied.



Flowering branches of *Tamarix ramosissima*.

21. **Salicaceae**, the Willow Family

Dioecious spring-flowering trees and shrubs with simple, alternate, usually stipulate leaves, the stipules often deciduous. **Flowers** in erect or pendulous, bracteate **catkins**, the **bracts** small and scalelike, often deciduous, each flower provided with either 1 or 2 enlarged basal glands (*Salix*) or an oblique, cup-shaped disk (*Populus*) positioned just inside the bract; **perianth** none; **male flowers** each consisting of 2-many stamens; **female flowers** comprised of a single pistil; **carpels** 2 or 4; stigmas equaling the number of carpels, sessile or with a common style, ovary 1-celled, ovules many. **Fruit** a many-seeded capsule, dehiscent by 2-4 valves; **seeds** minute, tufted with long, white silky hairs.

1 Large tree; leaf blades deltoid-ovate; flowers subtended by an obliquely cup-shaped disk; catkin bracts fimbriate; stamens (30)40-80; capsules 3- or 4-valved . . . . . 1. *Populus*

1 Shrubs and trees; leaf blades ovate, elliptic, lanceolate, linear-lanceolate, obovate or oblanceolate; flowers subtended by 1 or 2 enlarged glands; catkin bracts entire; stamens 2 or 3-8(12); capsules 2-valved . . . . . 2. *Salix*

1. *Populus deltoides* Bartr. ex Marsh. — Cottonwood

Large tree 20-30(40) m tall, with a massive trunk often 1 m or more in diameter, divided into large ascending branches near the base, forming a large rounded crown; **bark** gray, deeply furrowed; **twigs** olive-brown to yellowish, turning grayish with age; **leaf buds** covered by several bud scales, tan, ovoid, very resinous. **Leaves** light green, deltoid-ovate, mostly 4-10 cm long, 4-11 cm wide, caudate-acuminate at the tip, finely to coarsely crenate-serrate, obtuse to broadly truncate or cordate at the base; **petioles** flattened at the junction with the blade, 3-10 cm long; **stipules** minute, caducous. **Catkins** loosely flowered, pendulous; bracts fimbriate, caducous; **flowers** subtended by a cup-shaped disk 1.5-4 mm wide; **male catkins** dark red, soon deciduous; **male flowers** of (30)40-80 stamens; **female catkins** greenish, 7-13 cm long in flower, to 20.5 cm long in fruit; **female flowers** with stigmas expanded and spreading, plate-like. **Capsules** 3- or 4-valved, elliptic-ovoid, 6-15 mm long. Flowering late Apr—May, fruiting Jun—Jul. Floodplains, stream courses, shores, wet meadows, ditches and ravines, also commonly planted in yards and shelter belts; very common; (Que. to Sask., s to FL, TX and AZ).

Our representatives belong to subsp. *monilifera* (Ait.) Eckenw., which ranges from the Great Lakes to the Great Plains and s to n TX.

Among the species of *Populus*, cottonwood is the best known and the one most overwhelmingly associated with wetlands; however, balsam poplar (*P. balsamifera* L.) and its occasional hybrid with cottonwood, called balm-of-gilead (P. X *jackii* Sarg.) are sometimes found in lowland areas, especially in the eastern and northern parts of our region. Also in northern North Dakota, aspen (*P. tremuloides* L.) is often associated with wetland basins, although elsewhere it is typically upland in occurrence. A hybrid between *P. deltoides* and *P. angustifolia* James, called lanceleaf cottonwood (P. X *acuminata* Rydb.) is of uncommon occurrence along stream courses in the western portion. These entities are easily distinguished from cottonwood on the basis of tree size, leaf shape and leaf color, among other traits, but to discern between them, one should consult Eckenwalder's *Populus* treatment in the *Flora of the Great Plains*.

Reference:

Eckenwalder, J. E. 1977. North American cottonwoods (*Populus*, Salicaceae) of sections *Abaso* and *Aigeros*. J. Arnold Arbor. 58:193-207.





Twig of a female *Populus deltoides*, with maturing capsules.

2. *Salix* L. — Willow

Shrubs and trees of typically wet or moist habitats. **Leaves** variable in shape, from ovate to lanceolate or linear-lanceolate, or obovate to oblanceolate, the margins serrate, crenate-serrate or entire; **petioles** glandular or glandular-viscid at the summit in some spp.; **stipules** persistent or caducous, occasionally lacking. **Catkins** sessile or on leafy branchlets, erect to pendulous, often precocious; **bracts** entire, usually pubescent, often apparently ciliate on the margins. **Flowers** each subtended by 1 or 2 enlarged basal glands; **male flowers** of commonly 2 or 3-8(12) stamens, the filaments sometimes connate; **female flowers** each comprised of a 2-carpellary pistil, **stigmas** 2- or 4-lobed, styles well-developed or none. **Capsules** 2-valved, sessile or stipitate.

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Dorn, R. D. 1970. The willows of Montana. The Herbarium, Dept. of Botany and Microbiology, Montana State Univ., Bozeman. 18 pp.

Dorn, R. D. 1975. A systematic study of *Salix* section *Cordatae* in North America. Canad. J. Bot. 53:1491-1522.

Dorn, R. D. 1977. Willows of the Rocky Mountain states. Rhodora 79:390-429.

Froiland, S. G. 1962. The genus *Salix* in the Black Hills of South Dakota. Tech. Bull. U.S.D.A. 1269:1-75.

Raup, H. M. 1959. The willows of boreal western America. Contr. Gray Herb. 185:1-95.

1 Plants with female catkins.

2 Capsules glabrous (ovary pubescent in *S. exigua*, but glabrous at maturity).

3 Petioles bearing conspicuous, irregularly lobate glands at or near the attachment to the blade.

4 Leaves ovate-lanceolate, green on both surfaces, paler beneath but not white-glaucous; capsules 4-6.5 mm long at maturity.

5 Leaves acute to short-acuminate, dark green and glossy above, thick and rather leathery . . . . . 14. *S. pentandra*

5 Leaves mostly long-acuminate, bright green and semi-glossy above, not especially thick . . . . . 10. *S. lucida*

4 Leaves elliptic-lanceolate, white-glaucous beneath; capsules 7-10 mm long at maturity . . . . . 18. *S. serissima*

3 Petioles lacking glands or sometimes with minute vestiges of glands, or the petioles only glandular-viscid when young (often persistently glandular-viscid in *S. fragilis*).

6 Leaves conspicuously or inconspicuously toothed.

7 Leaves linear-lanceolate, mostly 8-20X longer than wide; rhizomatous shrub often forming dense thickets . . . . . 7. *S. exigua*

7 Leaves usually less than 10X longer than wide; trees and nonrhizomatous shrubs.

8 Shrubs or small trees up to 5(7) m tall; catkins emerging before or with the leaves, sessile or on short branchlets with a few small leaves; bracts brown to nearly black, persistent after capsule maturity.

9 Catkins sessile; leaves ovate to obovate . . . . . 17. *S. pseudomonticola*

9 Catkins sessile or often on short branchlets bearing a few small leaves; leaves lanceolate to somewhat oblanceolate.

10 Twigs gray-brown to dark brown, closely gray-pubescent the first year and often into the second . . . . . 6. *S. eriocephala*

10 Twigs yellow or yellowish-gray to yellowish-brown, glabrous . . . . . 11. *S. lutea*

8 Trees eventually 10-20 m tall; catkins emerging after the leaves, on leafy branchlets; bracts yellowish-green or pale yellow, deciduous before capsule maturity.

11 Capsules on stipes 1 mm or less long; introduced trees frequently escaping.

12 Twigs olive to brown; petioles glandular-viscid near the summit on vigorous shoots . . . . . 8. *S. fragilis*

12 Twigs golden-yellow to orange; petioles lacking glands or with minute traces of glands only . . . . . 1. *S. alba*

11 Capsules on stipes 1-2 mm long; native tree . . . . . 2. *S. amygdaloides*

6 Leaves entire . . . . . 13. *S. pedicellaris*

2 Capsules pubescent.

13 Catkins emerging and maturing ahead of the leaves.

14 Twigs of the previous year gray-pubescent or mostly so; leaves persistently gray-pubescent beneath (rarely glabrate); catkins 1-3(4) cm long; shrub usually of rather dry sites, often where sandy . . . . .9. *S. humilis*

14 Twigs of the previous year glabrous (rarely pubescent in *S. discolor*); mature leaves glabrous beneath at maturity; catkins 2-6(9) cm long; shrubs of wet habitats . . . . . .5. *S. discolor*

15 Capsules nearly sessile or on stipes to 1 mm long . . . . . 16. *S. planifolia*

15 Capsules on stipes 1.5-4 mm long . . . . . 5. *S. discolor*

13 Catkins emerging and maturing with the leaves.

16 Leaves entire or merely crenate-serrate, the shallow teeth unevenly distributed around the margin.

17 Leaves persistently white-tomentose beneath, linear-oblong to oblong or narrowly lanceolate; stipes ca. 1 mm long . . 4. *S. candida*

17 Leaves grayish-pubescent to glabrate beneath, elliptic to narrowly ovate or narrowly obovate; stipes 2-5 mm long . . . . 3. *S. bebbiana*

16 Leaves evenly serrate or mostly so.

18 Capsules 8-10 mm long, gray-tomentose; leaves somewhat paler green beneath but not glaucous, mostly 2-3.5X longer than wide. . . . . 12. *S. maccalliana*

18 Capsules 5-7 mm long, closely pubescent mostly toward the base; leaves white-glaucous beneath, mostly 3-6X longer than wide. . . . . 15. *S. petiolaris*

1 Plants vegetative or with male catkins, but with fully expanded leaves.

19 Petioles bearing lobate glands at or near the attachment to the blade; leaves finely glandular-serrate; stamens 3-8(12).

20 Leaves ovate-lanceolate, green on both surfaces, paler beneath but not white-glaucous.

21 Leaves acute to short-acuminate, glossy above, thick and rather leathery . . . . . 14. *S. pentandra*

21 Leaves mostly long-acuminate, semi-glossy above, not especially thick . . . . . 10. *S. lucida*

20 Leaves elliptic-lanceolate, white-glaucous beneath . . . . . 18. *S. serissima*

19 Petioles lacking glands or sometimes with minute vestiges of glands, or the petioles only glandular-viscid, in which case the leaves are narrowly lanceolate to lanceolate; leaves serrate or entire, occasionally glandular-serrate; stamens 2, except 4-7 in *S. amygdaloides.*

22 Leaves linear-lanceolate, mostly 8-20X longer than wide, entire to remotely serrulate; rhizomatous shrub often forming dense thickets . . . 7. *S. exigua*

22 Leaves broader in proportion to their length; nonrhizomatous shrubs and trees.

23 Leaves acuminate, gradually or abruptly tapered to a long, slender tip.

24 Leaves dark green and shiny above; twigs often brittle and easily snapping off at the base; introduced trees to 20 m tall.

25 Leaves coarsely serrate, with 4-6 glandular teeth per cm of leaf margin; petioles glandular-viscid at the summit; twigs olive to brown . . . . . 8. *S. fragilis*

25 Leaves more finely serrate, with 7-10 teeth per cm of leaf margin; petioles not glandular-viscid at the summit, or with only minute vestiges of glands; twigs golden-yellow to orange . . . . . 1. *S. alba*

24 Leaves yellowish-green to dark green and dull above; twigs flexible, not easily snapping off at the base; native shrubs or trees to 12 m tall.

26 Leaves ovate-lanceolate to lanceolate, mostly long-acuminate with tail-like tips; petioles commonly recurved; branchlets flexuous, somewhat drooping . . . . . 2. *S. amygdaloides*

26 Leaves lanceolate or somewhat oblanceolate, acuminate; petioles straight; branchlets erect to spreading, not drooping.

27 Twigs gray-brown to dark brown, closely gray-pubescent the first year and often into the second . . . . . 6. *S. eriocephala*

27 Twigs yellow or yellowish-gray to yellowish-brown, glabrous . . . . . 11. *S. lutea*

23 Leaves acute, obtuse, rounded or only short-acuminate at the tip.

28 Leaves persistently pubescent, especially on the lower surface (rarely glabrate in age in *S. humilis*).

29 Leaves elliptic, narrowly ovate or narrowly obovate, sparsely to densely pubescent beneath; leaf margins flat . . . . . 3. *S. bebbiana*

29 Leaves linear-oblong to narrowly lanceolate or oblanceolate to narrowly obovate, densely pubescent or white-tomentose beneath (rarely glabrate beneath in *S. humilis*); leaf margins usually revolute.

30 Leaves linear-oblong to oblong or narrowly lanceolate, white-tomentose beneath; leaf margins revolute; shrubs of cold springs or fens . . . . . 4. *S. candida*

30 Leaves oblanceolate to narrowly obovate, densely pubescent (rarely glabrate) and greenish beneath; leaf margins flat to slightly revolute; shrubs of drier, often sandy habitats . . . . . 9. *S. humilis*

28 Leaves glabrous or glabrate with age.

31 Leaves entire or nearly so, or with a few scattered inconspicuous teeth, sometimes to crenate-serrate with the teeth distributed unevenly around the margins.

32 Small bog shrubs 4-10 dm tall; leaves elliptic-lanceolate to oblanceolate, 2-4.5 cm long, acute to rounded and often apiculate at the tip . . . . . 13. *S. pedicellaris*

32 Larger shrubs and small trees of various habitats, mostly 2-7 m tall; leaves of various shapes, mostly 3-10 cm long, never apiculate at the tip.

33 Leaves dull grayish-green above, the lower surface usually rugose, with the veins raised prominently on the lower surface (except in var. *perrostrata*, with the lower leaf surface smooth, without raised veins) . . 3. *S. bebbiana*

33 Leaves bright to dark green above, smooth beneath, only the primary veins, if any, raised on the lower surface.

34 Leaves entire or nearly so, 3-6 cm long; twigs reddish-brown to nearly black, shiny . . . . . 16. *S. planifolia*

34 Leaves, or at least the larger ones, crenate-serrate, 4-10 cm long; twigs yellowish-brown to dark brown, dull . . . . . 5. *S. discolor*

31 Leaves mostly serrate or finaly serrate, the teeth evenly distributed around the margins.

35 Stipules persistent, often prominent; leaves ovate to obovate, rounded to cordate at the base . . . . . 17. *S. pseudomonticola*

35 Stipules lacking or caducous; leaves generally lanceolate, acute to obtuse at the base.

36 Leaves paler below than above, but not glaucous, elliptic-lanceolate to oblanceolate, mostly 2-3.5X longer than wide . . . . . 12. *S. maccalliana*

36 Leaves white-glaucous beneath, narrowly lanceolate or narrowly oblanceolate, mostly 3-6X longer than wide .. . . . . 15. *S. petiolaris*

1. *Salix alba* L. — White willow

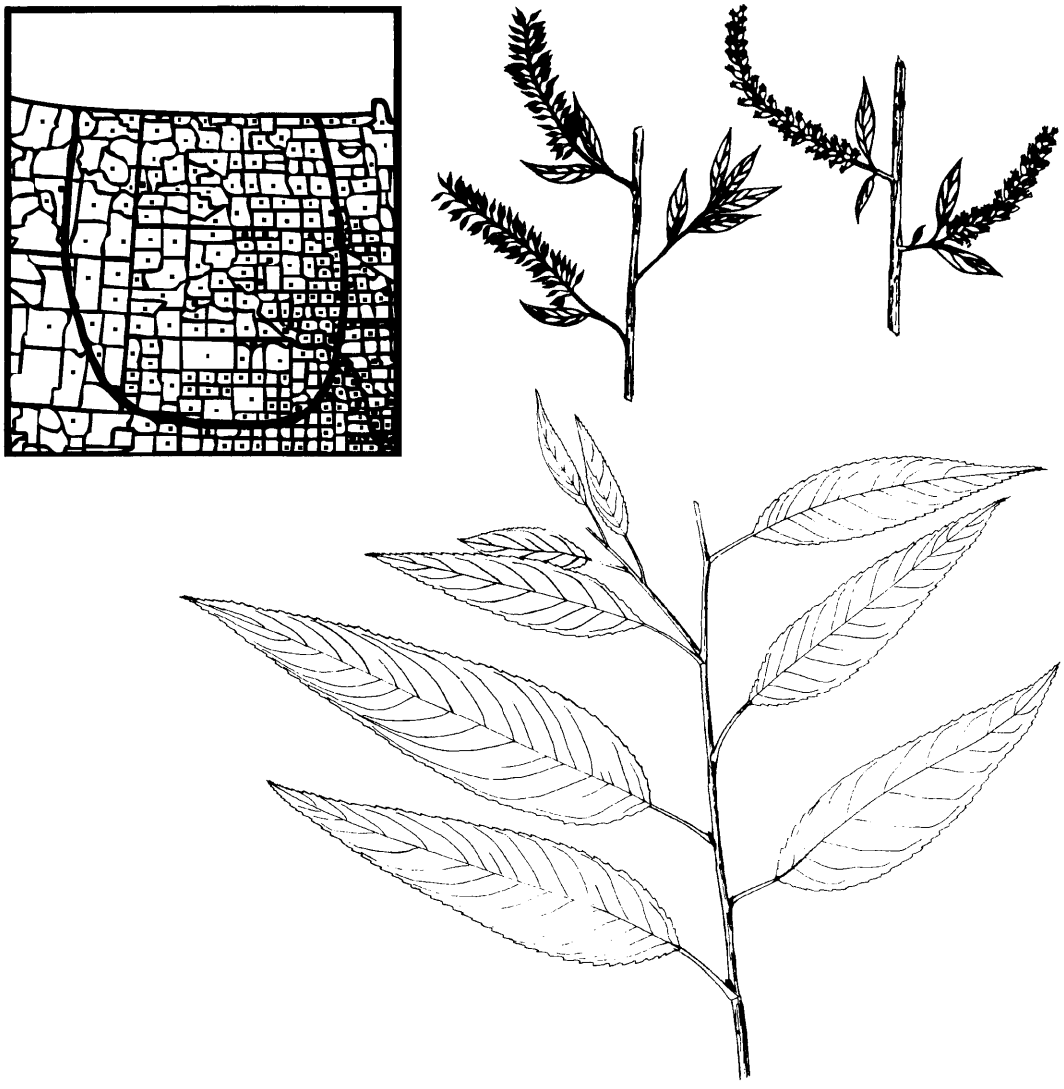
Large tree to 20 m tall; **twigs** golden yellow to orange, brittle or sometimes flexible; **branchlets** spreading, golden yellow to dark brown, glabrous with age. **Leaves** dark green and shiny above, white-glaucous beneath, glabrous to sparsely sericeous beneath, lanceolate to narrowly lanceolate, acuminate and often symmetric at the tip, cuneate at the base, mostly 4-10 cm long, 1-2.5 cm wide, serrate, mostly with 7-10 glandular teeth per cm of margin; **petioles** glandless or with minute vestiges of glands at the summit, 0.5-1.5 cm long; **stipules** caducous, lanceolate, entire, 2-4 mm long, sericeous. **Catkins** appearing with the leaves; **female catkins** 3-6 cm long, on leafy branchlets 1-3(5) cm long; **bracts** yellowish-green to pale yellow, early deciduous, pubescent, ciliate at the tip; **stamens** 2. **Capsules** ovoid-conic, 3.5-5 mm long, glabrous, nearly sessile or on **stipes** to 1 mm long. Flowering May, fruiting early Jun. Intro. from Europe and frequently escaping to wet areas from shelter belts and ornamental plantings throughout the region; (widely established in temperate N.Amer.; Eurasia).

The prevalent form in this region is the yellowstem white willow, *S. alba* var. *vitellina* (L.) Stokes. The golden yellow to orange twigs characteristic of this variety are especially conspicuous during winter and early spring. Typical *S. alba* has gray or brown twigs and persistently white-sericeous leaves. *S. alba* hybridizes freely with *S. fragilis* and many collections seem to show introgression with that species.



2. *Salix amygdaloides* Anderss. — Peachleaf willow

Small to medium-sized tree with 1-several trunks, to 12 m tall; **twigs** gray to light yellow, shiny, flexible; **branchlets** spreading to drooping, yellow to dark brown, glabrous. **Leaves** yellowish-green above, pale to white-glaucous beneath, glabrous, lanceolate to ovate-lanceolate, short to mostly long-acuminate with tail-like tips, acute to nearly rounded at the base, mostly 3-8 cm long, 1-3 cm wide, occasionally much larger on vigorous shoots, finely serrate; **petioles** glandless or rarely with vestiges of glands on vigorous shoots, often recurved, 5-20(30) mm long; **stipules** minute and very early deciduous, occasionally well-developed and persistent on vigorous shoots, reniform, 3-12 mm long, serrate. **Catkins** emerging with the leaves; **female catkins** 3-8 cm long, on leafy branchlets 1-4 cm long; **bracts** deciduous, pale yellow, villous on the inside; **stamens** 4-7. **Capsules** ovoid, 3-5 mm long, glabrous, uncrowded on the axis giving the catkins a loose, open appearance; **stipes** 1-2 mm long. Flowering May, fruiting Jun. Floodplains, stream banks, lake and pond borders, moist ravines, ditches and other wet or damp places; common; (Que. and NY to se B.C. and WA, s to PA, KY, MO, nw OK, n TX, NM and AZ).



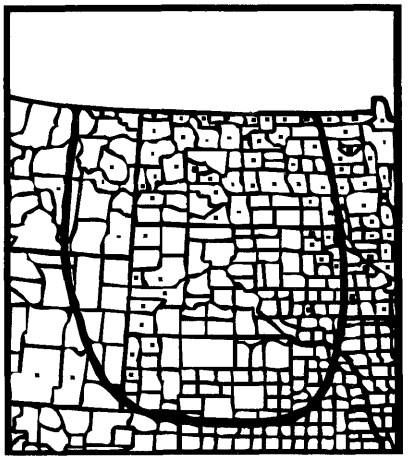
***Salix amygdaloides*. Drawings show the early-emerging male (top left) and female (top right) catkins, and a twig with fully expanded leaves.**

3. *Salix bebbiana* Sarg. — Beaked willow

Shrub to 4 m tall; **twigs** grayish-brown, closely pubescent to eventually glabrous, gnarled and rough in appearance owing to jutting leaf scars, irregular growth and die back; **branchlets** spreading, yellowish-brown to dark brown, tomentulose, occasionally glabrate toward the base. **Leaves** dull grayish-green and glabrous to pubescent above, pale to gray-pubescent and rugose beneath, with the veins raised prominently on the lower surface (except smooth beneath in var. *perrostrata*), elliptic to narrowly ovate or narrowly obovate, acute to short-acuminate, cuneate at the base, mostly 3-6 cm long, 1-3 cm wide, entire to shallowly toothed; **petioles** glandless, 5-10(15) mm long; **stipules** deciduous or persistent on vigorous shoots, ovate to reniform, 2-6 mm long, 1-3 mm wide, shallowly dentate. **Catkins** emerging and maturing with the leaves; **female catkins** persistent for some time after capsule dehiscence, 2-5 cm long, on short leafy branchlets 0.5-2 cm long, with 2-4 small leaves; **bracts** persistent, pale with a reddish or darkened tip when young, yellowish to brown with age, villous; **stamens** 2. **Capsules** ovoid-conic, 5-8 mm long, finely pubescent; **stipes** 2-5 mm long. Flowering late Apr—May, fruiting late May—Jun. Wet meadows, stream banks, moist wooded ravines and hillsides, marsh borders and seepage areas; ND, e MT, e and w SD, e WY and w NE, most common in the n part; (Newf. to AK, s to MD, OH, IL, IA, NE, AZ, NM and CA).

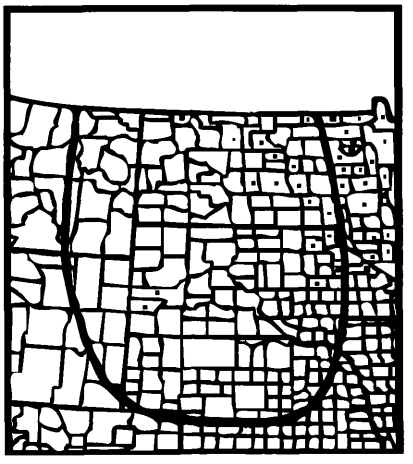
Some plants in this region are var. *perrostrata* (Rydb.) Schneid., differing from the typical in having leaves thinner, more often glabrous, more entire-margined, and smooth, not rugose, beneath. This variety seems more characteristic of drier woodland habitats.

Salix scouleriana Barr., western pussy willow, is a similar species that occurs on moist slopes at higher elevations in the Black Hills. It differs from *S. bebbiana* in having the leaves arranged in a fanlike fashion at the tips of the branchlets. Also, the leaves have some reddish-brown hairs mixed with silvery ones on one or both surfaces.



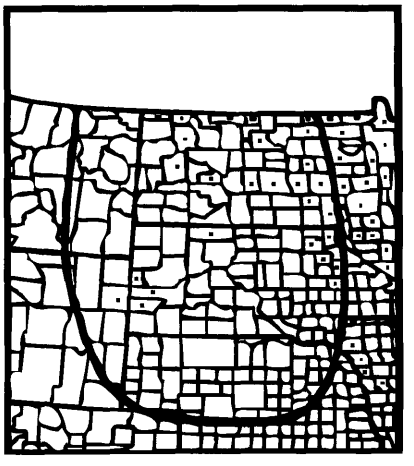
4. *Salix candida* Fluegge — Sage-leaved willow, hoary willow

Low shrub to 1.5 m tall; **twigs** yellow to reddish-brown or brown, usually with patches of white tomentum; **branchlets** strongly ascending, yellow to brown, mostly white-tomentose. **Leaves** dark green and glabrate or thinly white-tomentose above, densely white-tomentose beneath, linear-oblong to oblong or narrowly lanceolate, acute at the tip, cuneate at the base, mostly 3-9(11) cm long, 0.5-1.5(2) cm wide, the margin revolute; **petioles** glandless, 3-10 mm long; **stipules** persistent, obliquely ovate to lanceolate, 2-10 mm long, tomentose, entire or serrulate. **Catkins** emerging with the leaves; **female catkins** 1.5-4.5 cm long, on leafy branchlets 4-15 mm long, with 2 or 3 small leaves; **bracts** persistent, yellow to brown, villous; **stamens** 2. **Capsules** narrowly ovoid, 4-8 mm long, white-tomentose; stipes 1 mm long. May—Jun. Cold springs, fens and boggy areas associated with marshes and streams; e, c and nw ND, ne SD and the Black Hills; uncommon; (Labr. to AK, s to NJ, PA, OH, IL, SD, CO, ID and s B.C.).



5. *Salix discolor* Muhl. — Pussy willow

Shrub or small tree to 5 m tall; **twigs** reddish-brown to dark brown, dull, glabrous to slightly pubescent, rarely densely pubescent; **branchlets** spreading, yellowish-brown to nearly black, tomentulose, often glabrous with age. **Leaves** bright to dark green above, pale to white-glaucous beneath, glabrous, not rugose beneath, only the primary veins, if any, raised on the lower surface, elliptic to narrowly ovate or narrowly obovate, acute to short-acuminate, cuneate to narrowly rounded at the base, mostly 3-10 cm long, 1-3 cm wide, subentire to more often shallowly and irregularly crenate-serrate; **petioles** glandless, 5-20 mm long; **stipules** deciduous, often persistent on vigorous shoots, obliquely ovate to flabellate, 3-10 mm long, about as wide, glabrous, sometimes deeply lobed. **Catkins** emerging and maturing before the leaves; **female catkins** sessile, sometimes with 2 or 3 minute, bractlike leaves at the base, soon deciduous after capsule dehiscence, 2-6(9) cm long; **bracts** persistent, black or very dark brown, villous; **stamens** 2. **Capsules** ovoid with a long neck, 5-10 mm long, finely pubescent; **stipes** 1.5-4 mm long. Flowering mid Apr—early May, fruiting mid May—early Jun. Swamps, fens, stream banks, floodplains, marsh borders, ditches and other wet places; e, c and nw ND, ne SD and the Black Hills, most common e and n; (Newf. to B.C., s to DE, n GA, KY, IL, n MO, SD, WY and ID.)

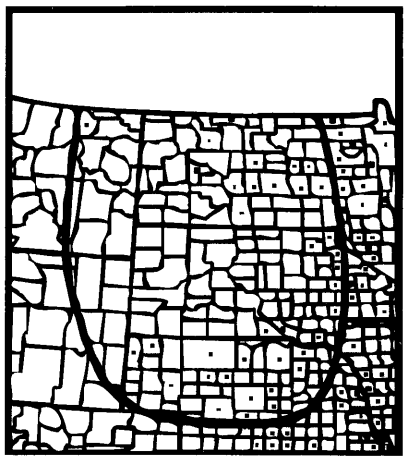




***Salix discolor*, as catkins emerge in spring. Photo courtesy of U.S. Fish & Wildlife Service.**

6. *Salix eriocephala* Michx. — Diamond willow, Missouri willow

Shrub or small tree to 7 m tall; **twigs** gray-brown to dark brown, closely gray-pubescent, the pubescence often patchy; **branchlets** reddish-brown, gray-pubescent. **Leaves** dark green to yellowish-green above, pale to weakly glaucous beneath, glabrous on both sides or pubescent beneath, lanceolate to somewhat oblanceolate, acuminate at the tip, cuneate, rounded or cordate at the base, 3-8(12) cm long, 1-3(4) cm wide, finely serrate; **petioles** glandless, 3-15 mm long; **stipules** persistent on vigorous shoots, semicordate, ovate or reniform, to 12 mm long, glabrous, serrate. **Catkins** emerging with or prior to the leaves; **female catkins** 2-8 cm long, on short leafy or bracteate branchlets to 1.5 cm long; **bracts** persistent, brown to nearly black, pubescent; **stamens** 2. **Capsules** ovoid with a long neck, 4-7 mm long, glabrous; **stipes** 1-2 mm long. Flowering Apr—early May, fruiting May—early Jun. Shores, stream banks, floodplains, ditches and wet meadows, especially along major river courses; e, c and nw ND, ne MT, e SD and NE; (N.S. and s Que. to Sask. and MT, s to VA, MO and KS, also GA and AR). *S. rigida* Muhl. var. *vestita* Anderss., *S. missouriensis* Bebb, *S. rigida* Muhl. var *rigida*.



7. *Salix exigua* Nutt. — Sandbar willow, coyote willow

Colonial, rhizomatous shrub to 4 m tall, often forming dense thickets; **twigs** light yellow to orange, glabrous; **branchlets** erect, yellow to orange, glabrous. **Leaves** yellowish-green above, the same or paler beneath, initially pubescent and soon glabrous (rarely persistently silvery-pubescent), or persistently gray-pubescent, linear-lanceolate, slowly tapered to an acute tip, acuminate at the base, 4-10 cm long, 2-10 mm wide, remotely and irregularly dentate; **petioles** glandless, 1-5 mm long; **stipules** minute or absent. **Catkins** emerging after the leaves, borne on leafy branchlets 0.5-10 cm long, these often branched; **female catkins** 1.5-8 cm long; **bracts** deciduous, yellowish; **stamens** 2. **Capsules** narrowly ovoid, 4-8 mm long, glabrous (although pubescent when immature); **stipes** 0.5-1 mm long. Flowering May—early Jun, fruiting Jun—early Jul. Shores, stream banks, alluvial bars, ditches and other wet places; often a pioneer species in the stabilization of sand bars and other alluvium; common; (N.B. and Que. to AK and B.C., s to VA, TN, LA, TX, CO and MT). *S. interior* Rowlee.

Two subspecies of *S. exigua* occur within the northern Great Plains. The prevalent form by far is subsp. *interior* (Rowlee) Cronq., sandbar willow, with the **leaves** usually glabrous at maturity, although rarely silvery-pubescent; **capsules** 5-8 mm long and distinctly stipitate so that the female catkins appear rather loose and elongate. This subspecies occurs throughout our area.

Subsp. *exigua*, coyote willow, enters our range from the west, occurring sparingly in w SD, w NE, e MT and e WY. It differs from subsp. *interior* in having the **leaves** persistently gray-pubescent, at least beneath; **capsules** 3-5(6) mm long, sessile or nearly so, the female catkins mostly dense and short. This form is characteristic of western North America.





***Salix exigua* subsp. *interior*, showing a closeup of a twig with female catkins. Photo by James R. Johnson.**

8. *Salix fragilis* L. — Crack-willow, brittle willow

Large tree to 20 m tall; **twigs** olive to yellowish-brown, brittle, easily snapping off at the base; **branchlets** spreading, green to reddish-brown, eventually glabrous. **Leaves** dark to yellowish-green and shiny above, pale to white-glaucous beneath, glabrous, lanceolate to narrowly lanceolate, acuminate, often asymmetric at the tip, acute at the base, mostly 7-13 cm long, 1.5-3 cm wide, coarsely serrate, mostly with 4-6 glandular teeth per cm of margin; **petioles** 0.5-1.5 cm long, glandular-viscid at the summit, the glands often stipitate; **stipules** caducous, narrowly lanceolate, 2-3 mm long when well-developed, pubescent, entire. **Catkins** appearing with the leaves; **female catkins** 3-6 cm long, on leafy branchlets 1-3(5) cm long; **bracts** early deciduous, yellowish, pubescent, ciliate at the tip; **stamens** 2. **Capsules** narrowly conic, 4-5.5 mm long, glabrous, subsessile or on **stipes** to 1 mm long. Flowering May, fruiting early Jun. Intro. from Europe and planted as a shade tree, sometimes escaping to wet places throughout the region; (widely established in temperate N.Amer.; Eurasia).

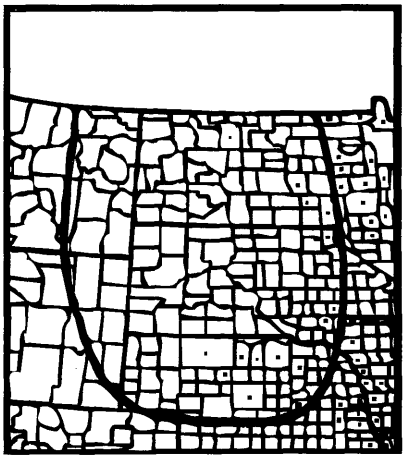
See the discussion under *S. alba*.



9. *Salix humilis* Marsh. — Prairie willow

Shrub to 3 m tall; **twigs** yellowish-brown to dark brown, gray-pubescent or mostly so; **branchlets** strongly ascending, brown, gray-pubescent. **Leaves** dark green and usually glabrous above, glaucous and densely short-pubescent (rarely glabrate) beneath, with the golden-yellow veins raised prominently on the lower surface, oblanceolate to narrowly obovate, acute, cuneate at the base, mostly (1.5)4-8 cm long, 7-25 mm wide, the margins coarsely and irregularly serrate to subentire, flat to slightly revolute; **petioles** glandless, 3-10 mm long; **stipules** commonly persistent on vigorous branchlets, lanceolate to ovate, 3-7 mm long, pubescent, sparsely serrate. **Catkins** emerging and maturing before the leaves; **female catkins** sessile, 1-3(4) cm long; **bracts** persistent, dark brown or purplish, villous on the back; **stamens** 2. **Capsules** ovoid-conic, 4-6(8) mm long, pubescent; **stipes** 0.5-1.5 mm long. Flowering Apr—May, fruiting May—early Jun. Moist or dry places, often in sandhill areas; e and c parts of ND, SD and NE; (Newf. and s Que. to ND, s to FL and TX). *S. humilis* var. *rigiduscula* (Anderss.) Robins. & Fern.

S. humilis var. *microphylla* (Anderss.) Fern. occurs sparingly in this region, differing from the typical as follows: Shorter in stature, only 0.5-1 m tall; **leaves** narrowly oblanceolate, 2-5 cm long, 7-12 mm wide, mostly entire; **stipules** absent or very small. *S. tristis* Ait.



10. *Salix lucida* Muhl. — Shining willow

Shrub or small tree to 4 m tall; **twigs** gray to yellowish-brown; **branchlets** ascending, yellowish-brown to dark brown, glabrous. **Leaves** yellowish-green to green and semiglossy above, pale beneath, initially reddish-pubescent, soon glabrous, lanceolate to ovate-lanceolate, acuminate to long-acuminate and asymmetric at the tip, broadly cuneate to nearly rounded at the base, 4-8(12) cm long, 1.2-2.5(4) cm wide, finely glandular-serrate; **petioles** glandular above, usually with few to several lobate glands, 0.5-1.5(2) cm long; **stipules** often persistent for some time toward the tips of branchlets, flabellate, well-developed ones 2-3 mm long, 2-4 mm wide, strongly glandular. **Catkins** produced with the leaves; **female catkins** 1-3 cm long, on leafy branchlets 1-3 cm long; **bracts** deciduous, yellowish, pubescent; **stamens** 3-5 or more. **Capsules** ovoid with a long neck, 4-6.5 mm long, glabrous; **stipes** 0.5-1.5 mm long. Flowering May, fruiting Jun. Swamps, shores and wet meadows; fairly common in the Turtle Mts., ND, otherwise rare in e ND and the Black Hills; (Labr. and Newf. to Sask., s to DE, OH, IA and SD).

Many earlier accounts of *S. lucida* were based largely on misidentified specimens of *S. amygdaloides*.



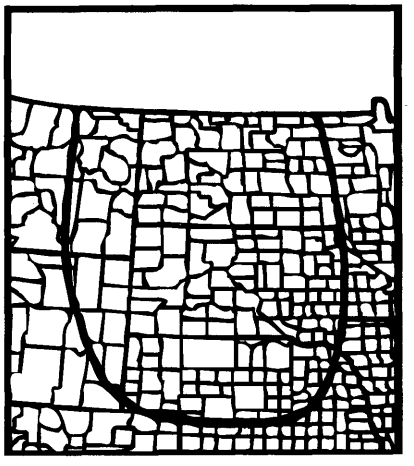
11. *Salix lutea* Nutt. — yellow willow

Very similar to *S. eriocephala* and perhaps better treated as a variety of it. More often shrubby, to 5 m tall; **twigs** yellow or yellowish-gray to yellowish-brown, glabrous or nearly so. Shores, stream banks, floodplains, ditches and wet meadows; more common than *S. eriocephala*; (n Que. to Alta., s to w IA, NE, NM, AZ and CA). *S. cordata* Muhl., *S. rigida* Muhl. var. *angustata* (Pursh) Fern., *S. rigida* var. *watsonii* (Bebb) Cronq.



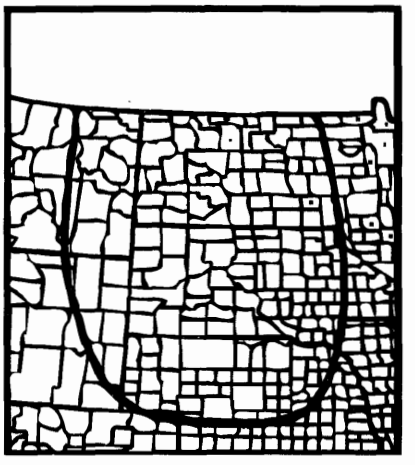
12. *Salix maccalliana* Rowlee

Upright shrub mostly 1-2 m tall; **twigs** reddish-brown to purplish-brown, glabrous; **branchlets** spreading, yellowish to purplish-brown, glabrous. **Leaves** rather firm and leathery, dark green and glossy above, somewhat paler (but not glaucous) and conspicuously reticulate beneath, glabrous, elliptic-lanceolate to oblanceolate, acute to short-acuminate at the tip, acute to obtuse at the base, mostly 4-8 cm long, 12-25 mm wide, the margins glandular-serrate; **petioles** glandless, 4-10 mm long; **stipules** lacking. **Catkins** emerging with the leaves; **pistillate catkins** on short, leafy branchlets; **bracts** persistent, dark brown to yellowish, pubescent on the back, especially toward the base; **stamens** 2. **Capsules** elongate-conic, 8-10 mm long, gray-tomentose; **stipes** 1-2 mm long. Flowering May, fruiting Jun. Swamps and bogs; rare, with one record from Bottineau Co., ND; (Que. to Alta., s to n ND and s B.C.).



13. *Salix pedicellaris* Pursh — Bog willow

Slender shrub 4-10 dm tall; **twigs** grayish-brown, glabrous; **branchlets** erect to spreading, dark brown, glabrous. **Leaves** green above, white-glaucous beneath, glabrous, narrowly oblanceolate to oblanceolate or obovate, acute to obtuse and often apiculate at the tip, acute to obtuse at the base, 2-4(6) cm long, 1-1.5(2) cm wide, the margin entire, often slightly revolute; **petioles** glandless, 2-8 mm long; **stipules** absent. **Catkins** emerging with the leaves; **female catkins** 1-3 cm long, on leafy branchlets 1-3 cm long; **bracts** persistent, yellow to brown, glabrous or pubescent only at the tip; **stamens** 2. **Capsules** narrowly conic, 5-8 mm long, glabrous; **stipes** 2-4 mm long. Flowering late May—early Jun, fruiting Jun—early Jul. Sphagnum bogs, swamps and fens; rare, with records from Bottineau, McHenry and Ransom Counties in ND; (Newf. to Mack. and B.C., s to NY, n IA, ND, n ID and WA).



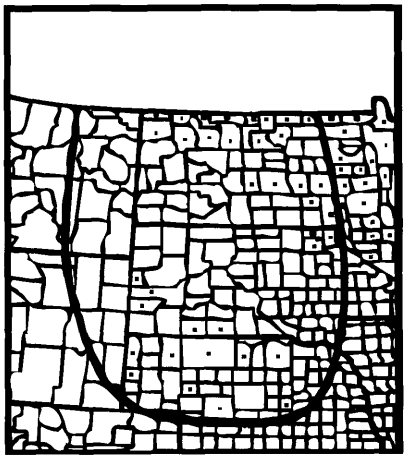
14. *Salix pentandra* L. — Laurel-leaved willow

Medium-sized tree or shrub 2-8 m tall; **twigs** yellowish-green, shiny; **branchlets** spreading, dark brown and shiny. **Leaves** dark green and glossy above, light green and dull beneath, glabrous, thick and leathery, ovate to ovate-lanceolate, acute to short-acuminate at the tip, obtuse to rounded at the base, mostly 4-10 cm long, 2-3 cm wide, finely glandular-serrate; **petioles** strongly glandular at the summit, 5-10 mm long; **stipules** deciduous or persistent for a short time on vigorous shoots, reniform, ca. 1 mm long, 2 mm wide, glandular-dentate. **Catkins** produced after the leaves; **female catkins** 3-5 cm long, on leafy branchlets 2-3 cm long; **bracts** early deciduous, yellowish, pubescent; **stamens** (4)5(-12). **Capsules** ovoid-conic, the 2 halves bulged at the base, 4-5 mm long, glabrous; **stipes** 0.5-1 mm long. Flowering May—early Jun, fruiting Jun—Jul. Intro. from Europe as an ornamental, occasionally escaping to marsh borders, ditches, stream banks, ravines and other moist places; (Established as an escape in much of n U.S. and s Can.; Eurasia).



15. *Salix petiolaris* Sm. — Meadow willow

Clumped or few-stemmed shrub to 3 m tall; **twigs** reddish-brown to dark brown or almost black, glabrous; **branchlets** spreading to erect, yellowish-green to dark brown, tomentulose, often glabrous with age. **Leaves** dark green above, white-glaucous beneath, pubescent when young, becoming glabrous with age, narrowly lanceolate to narrowly oblanceolate, acute to abruptly short-acuminate at the tip, acute to slightly rounded at the base, 2.5-8 cm long, 4-15 mm wide, entire to finely serrate; **petioles** glandless, 3-10 mm long; **stipules** absent. **Catkins** emerging with the leaves; **female catkins** 1-3(5) cm long, sessile or on short branchlets to 1.5 cm long, naked or with 2-3 small leaves; **bracts** persistent, brown, villous; **stamens** 2. **Capsules** narrowly conic, 5-7 mm long, closely pubescent mostly toward the base; **stipes** 1-3 mm long. Flowering May, fruiting Jun. Wet meadows, stream banks, shores, ditches and other wet places; frequent in e and n ND, ne and sw SD and the NE Sand Hills; (N.B. to Alta., s to NJ, OH, IL, IA, ne SD and n MT, with outliers in sw SD, n NE and CO). *S. gracilis* Anderss.



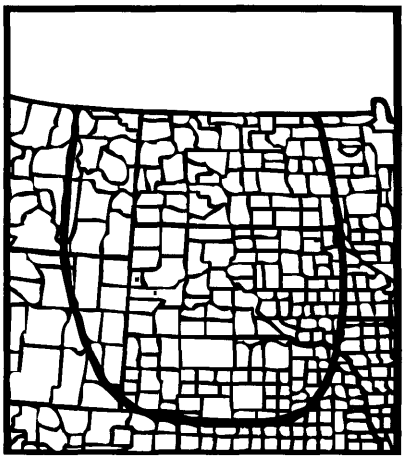
16. *Salix planifolia* Pursh — Planeleaf willow

Shrub or shrubby tree with clustered trunks, to 3 m tall; **twigs** dark reddish-brown to nearly black, shiny, glabrous; **branchlets** spreading to ascending, brown, glabrous. **Leaves** green above, paler to glaucous beneath, initially short-pubescent but soon glabrous, elliptic to oblanceolate, acute or occasionally obtuse at the tip, rounded to acute at the base, 3-6 cm long, 12-20 mm wide, entire or only sparsely crenulate; **petioles** glandless, 3-6 mm long; **stipules** minute, deciduous. **Catkins** emerging slightly before or with the leaves; **female catkins** 2-4 cm long, sessile or on short branchlets with 1-3 bractlike leaves; **bracts** persistent, black, villous; **stamens** 2. **Capsules** ovoid with a long neck, 5-8 mm long, pubescent, nearly sessile or on **stipes** to 1 mm long. Flowering May, fruiting Jun. Stream banks, meadows and moist hillsides at higher elevations in the Black Hills; (Newf. and Labr. to AK, s to ME, NH, VT, n MN, w SD, NM and n CA). *S. phylicifolia* L. subsp. *planifolia* (Pursh) Hiitonen.



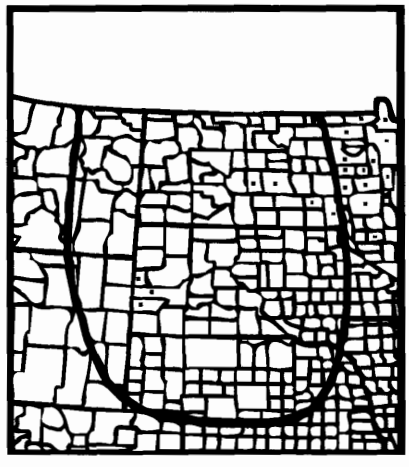
17. *Salix pseudomonticola* Ball — Serviceberry willow

Shrub to 3(5) m tall; **twigs** light brown to dark grayish-brown, dull, glabrous; **branchlets** spreading, brown, glabrous. **Leaves** dull green above, paler to glaucous beneath, glabrous, ovate to obovate, acute at the tip, rounded to cordate at the base, 3-8 cm long, 12-35 mm wide, serrate; **petioles** glandless, 3-15 mm long; **stipules** persistent, often prominent, broadly ovate, cordate at the base, 5-15 mm long and about as wide, serrate. **Catkins** emerging before the leaves; **female catkins** 3-7 cm long, sessile or very short-peduncled with 1-few leafy bracts at the base; **bracts** persistent, dark brown to black, long-villous on the back; **stamens** 2. **Capsules** ovoid with a narrow neck, 6-8 mm long, glabrous; **stipes** 1-1.5 mm long. Flowering May, fruiting Jun. Open meadows and stream banks at high elevations in the Black Hills; (Labr. and Que. to AK, s to w SD, NM and c ID). *S. monticola* Bebb ex Coult., *S. padophylla* Rydb.



18. *Salix serissima* (Bailey) Fern. — Autumn willow

Shrub to 3 m tall; **twigs** gray to yellowish-brown, shiny, glabrous; **branchlets** erect to spreading, yellow to dark brown, glabrous. **Leaves** yellowish-green to green and semi-glossy above, white-glaucous beneath, glabrous, elliptic-lanceolate, acute to short-acuminate at the tip, cuneate to narrowly rounded at the base, 4-8 cm long, 1-2.5 cm wide, finely glandular-serrate; **petioles** glandular at the summit, 0.5-1 cm long; **stipules** rarely present, flabellate, 1.5 mm long, 2 mm wide, glandular-serrate. **Catkins** emerging after the leaves; **female catkins** 2-4 cm long, on leafy branchlets 1.5-3 cm long; **bracts** deciduous, light yellow, pubescent; stamens 3-5 or more. **Capsules** ovoid with a long neck, 7-10 mm long, glabrous; **stipes** 0.5-2 mm long. Flowering Jun—early Jul, fruiting late Jun—Aug. Swamps, fens and bogs; uncommon in e and c ND and rare in the Black Hills; (Newf. to Alta., s to PA, n OH, n IL, MN, ND, MT and CO).



22. **Brassicaceae**, the Mustard Family

Annual, biennial or perennial herbs with alternate, exstipulate, simple to compound leaves, the **blades** entire to dentate, sinuate, laciniate or pinnately lobed or divided. **Flowers** in terminal and lateral, ebracteate racemes, these indeterminate in development so that the lower portion is often in fruit while flowers continue to be produced at the tip; **pedicels** elongating in fruit. **Flowers** minute to conspicuous, perfect, regular; **sepals** 4, usually deciduous; **petals** 4, yellow, white or pink, clawed at the base; **stamens** 6, the outer 2 stamens shorter than the inner 4; **pistil** 1, 2-carpellary, style 1, short, elongating in fruit, ovary superior, 2-celled, elongating or enlarging in fruit, maturing into an elongate to cylindrical or globose, sometimes curved, 2 (rarely 4)-valved capsule (termed a **silique** in those included here), the 2 halves separated by a membranous replum which persists on the pedicel after dehiscence, the **seeds** in 1 or 2 rows in each cell of the fruit.

1 Flowers white or pink.

2 Plants stoutly taprooted; siliques distinctly stipitate, borne on a stipe that extends about 1 mm or more beyond the tip of the pedicel ..... 5. *Thelypodium*

2 Plants fibrous-rooted, sometimes bulbous at the base as well; siliques sessile on the pedicels.

3 Seeds in 1 row in each cell of the silique; plants of wet habitats but not usually growing in water ..... 2. *Cardamine*

3 Seeds in 2 rows in each cell of the silique; plants usually growing in water ..... 3. *Nasturtium*

1 Flowers yellow or yellowish-green.

4 Siliques linear or curved-linear, 20-30X or more longer than wide; seeds in 1 row in each cell of the silique ..... 1. *Barbarea*

4 Siliques linear-elongate or cylindrical to globose, 1-8(10)X longer than wide; seeds in 2 rows in each cell of the silique ..... 4. *Rorippa*

1. *Barbarea vulgaris* R. Br.

Glabrous to sparsely hirsute, taprooted biennial or perennial 2-6 dm tall; simple below, branched above, often purplish at the base. **Basal leaves** all or mostly lyrate-pinnatifid and long-petioled, with a large, round to oblong terminal lobe and (0)1-4 pairs of small lateral lobes, 3-15 cm long including the petiole, 1-3 cm wide; **cauline leaves** similar to the basal ones but short-petioled to sessile and auriculate-clasping, reduced upward, the uppermost sinuate-lobed or angular-toothed, not pinnatifid. **Inflorescence** of few to many, terminal and lateral ebracteate racemes; **pedicels** 3-6 mm long. **Flowers** rather showy; **sepals** yellowish-green, oblong, 2-3 mm long; **petals** yellow, spatulate, 5-8 mm long. **Siliques** 2-valved, linear to curved-linear, 10-30 mm long, 0.5-1 mm thick, slightly 4-angled, the style persistent as a beak 1.5-3.5 mm long; **seeds** in 1 row in each cell of the fruit. Late May—Jun. Wet meadows, stream banks and alluvial bars; common in the Black Hills, otherwise sporadic; (Intro. from Europe and naturalized throughout most of N.Amer.).

Reports of the more northern *B. orthoceras* Ledeb. for this region, and the Black Hills in particular, are apparently based on misidentified specimens of *B. vulgaris*.



2. *Cardamine* L. — Bitter cress

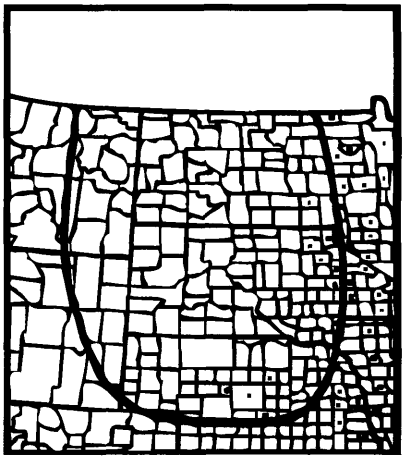
Annual, biennial or perennial plants, glabrous throughout or puberulent toward the base. **Leaves** petiolate to sessile, simple to pinnately compound, the basal leaves often differing in shape from the upper cauline leaves. **Flowers** small or medium in size, white; **sepals** green to yellowish, obtuse, caducous; **petals** white, obovate to spatulate. **Siliques** 2-valved, linear, mostly straight, slightly flattened, 10-30X longer than wide, the seeds in a single row in each cell.

1 Leaves simple, the blades entire to sinuate-dentate; petals 6-12 mm long . . . . . 1. *C. bulbosa*

1 Leaves pinnately compound; petals 1.5-3 mm long . . . . . 2. *C. pensylvanica*

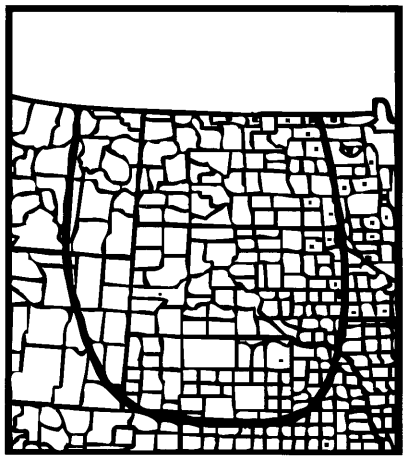
1. *Cardamine bulbosa* (Schreb.) B.S.P. — Spring cress

Erect perennial from a short thick tuber, 1.5-6 dm tall, the foliage watercress-flavored; **stems** single or few together, simple or sparingly branched above into lateral racemes, glabrous or puberulent near the base. **Leaves** simple, the basal leaves long-petioled, with blades oval to rotund, slightly sinuate to remotely crenate, rounded to cordate at the base; cauline leaves short-petioled to sessile upward, the blades oblong to elliptic, 2-7 cm long, 0.5-2.5 cm wide, irregularly sinuate to sinuate-dentate, cuneate at the base. **Sepals** 2-4 mm long; **petals** 6-12 mm long. **Siliques** 10-25 mm long, 1-1.5 mm wide, on pedicels 1-3 cm long. Late May—Jun. Springs, fens, wet meadows and stream margins, where water is fresh; occasional in se ND, e SD, e and c NE; (Que. to se ND, s to FL and e TX).



2. *Cardamine pensylvanica* Muhl. ex Willd. — Bitter cress

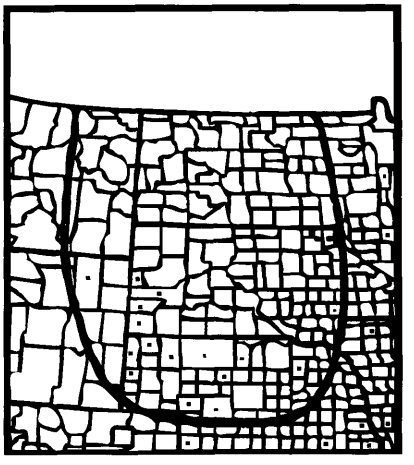
Annual or biennial 1-6 dm tall, forming a basal rosette of leaves in the first year when biennial; **stems** simple and erect to branched and spreading, usually pubescent toward the base. **Leaves** pinnately compound, divided into usually 2-5 pairs of lateral leaflets and a single terminal lobe, the lower leaves typically divided into broader segments than the upper ones; blades 2-7 cm long, 1-4 cm wide, the leaflets oblong to obovate or oblanceolate, entire to remotely dentate or lobed, the terminal leaflet the largest, usually 5-35 mm long, 4-15 mm wide; **petioles** shorter than the blades, decreasing in length upward. **Sepals** 1-1.5 mm long; **petals** 1.5-3 mm long. **Siliques** 10-30 mm long, 0.5-1 mm wide, on pedicels 2-15 mm long. Jun—Jul. Stream banks, springs and swamps; occasional in n and e ND and e SD, otherwise rare and widely scattered; (Labr. to B.C., s to FL, AL, AR, OK and n CA).



1. *Nasturtium officinale* R. Br.

Glabrous, fibrous-rooted, perennial aquatic; **stems** rather lax and trailing in water or on mud, freely rooting from lower nodes, erect or ascending toward the tips, 1-5 dm long. **Leaves** 4-13 cm long including the short to long petiole, 2-5 cm wide, pinnate or sometimes the earliest ones simple with only the terminal leaflet present; terminal leaflet ovate-cordate to subrotund or obovate, often much larger than the elliptic to obovate lateral leaflets, entire or weakly crenate. **Racemes** 1-several per stem, flat-topped and elongating in fruit. **Sepals** greenish-white, oblong, the outer pair saccate at the base, 1.5-2.5 mm long; **petals** white, sometimes tinged with purple, obovate, 3.5-5 mm long. **Siliques** linear, often curved, 10-25 mm long, ca. 2 mm thick, subterete, tipped with a short, truncate style beak 1 mm or less long; **seeds** in 2 rows in each cell of the fruit, conspicuously areolate. Jun—Oct. Springs and streams where water is fresh; e and sw SD and NE, especially common in streams of the Black Hills; (Intro. from Eurasia and established throughout most of the U.S. and s Can.). *Rorippa nasturtium-aquaticum* (L.) Hayek.

This plant is the watercress of commerce and is often used as a salad green.





Nasturtium officinale.

4. ***Rorippa*** Scop. — Yellow cress

Annual, biennial or perennial herbs, glabrous or variably pubescent. **Leaves** often forming a basal rosette in young plants, short-petiolate to sessile, simple, often deeply sinuate, pinnatifid or pinnately lobed to divided, otherwise entire, irregularly serrate, repand or laciniate. **Flowers** minute or small, yellow or yellowish-green; **sepals** green to yellowish, deciduous by fruiting time; **petals** yellow, often fading to whitish when dried, obovate to oblanceolate or spatulate, considerably shorter than to longer than the sepals. **Siliques** 2 (4)-valved, linear-elongate or more often cylindrical to globose, the seeds crowded in 2 irregular rows.

References:

Booth, W. E. and J. C. Wright. 1959. *Rorippa.* Page 95 in Flora of Montana. Part II. Department of Botany and Microbiology, Montana State University, Bozeman.

Mulligan, G. A. and A. E. Porsild. 1966. *Rorippa calycina* in the Northwest Territories. Canad. J. Bot. 44:1105-1106.

Stuckey, R. L. 1972. Taxonomy and distribution of the genus *Rorippa* in North America. Sida 4:279-430.

1 Petals shorter than or equal to the sepals.

2 Oldest siliques on the lower portion of the terminal raceme; petals usually longer than 1.2 mm; plants stout and erect, rarely decumbent or prostrate . . . . . 4. *R. palustris*

2 Oldest siliques on loeer axillary racemes, or siliques nearly equal in age at corresponding points on the terminal and lateral racemes; petals usually shorter than 1.2 mm; plants prostrate to decumbent and spreading, seldom erect.

3 Plants mostly shorter than 3 dm, prostrate to decumbent; pedicels ascending to divergent; siliques truncate to obtuse or acute at the apex (where the style adjoins), but if acute, then the valves minutely papillate; leaves mostly lobed to the middle or nearly so.

4 Siliques and usually the pedicels rough with minute papillae, the silique body tapering to the style, not constricted at the middle; leaves lyrate-divided, the margin of the lobes entire . . . . . 7. *R. tenerrima*

4 Siliques and pedicels glabrous, the silique body not at all or only slightly tapering to the style, obtuse to truncate at the apex, constricted near the middle; leaves mostly pinnately divided to the midrib, the margin of the lobes angularly toothed . . . . . 8. *R. truncata*

3 Plants mostly taller than 3 dm, prostrate, decumbent or erect; pedicels ascending or strongly recurved, sometimes so that the raceme appears 1-sided; siliques acute to obtuse or sometimes truncate at the apex, the valves glabrous; leaves mostly entire to irregularly serrate or repand, only the lower deeply lobed . . . . . 3. *R. curvipes*

1 Petals longer than the sepals.

5 Stems decumbent to prostrate; leaves and stems with few to many hemispherical trichomes or slender, pointed trichomes; leaves sinuate-lobed or pinnatifid.

6 Trichomes hemispherical on stems, lower leaf surfaces and sometimes on pedicels and siliques; siliques short to elongate-cylindrical with a pointed apex, (2.5)4-8X longer than wide; sepals caducous in fruit . . 5. *R. sinuata*

6 Trichomes elongate and pointed on stems, lower leaf surfaces and sometimes on pedicels and siliques; siliques oblong to subglobose with a rounded apex, 1.3-2.3X longer than wide; sepals persistent in fruit . . . . . 2. *R. calycina*

5 Stems erect; leaves and stems glabrous, puberulent or sparsely hirsute; leaves unlobed except for the auriculate base, or pinnately divided to the midrib.

7 Cauline leaves pinnately divided to the midrib; siliques linear-elongate, 5-10 mm long . . . . . 6. *R. sylvestris*

7 Cauline leaves unlobed except for the auriculate-clasping base, otherwise irregularly serrate; siliques globose, 1-2 mm long . . . . . 1. *R. austriaca*

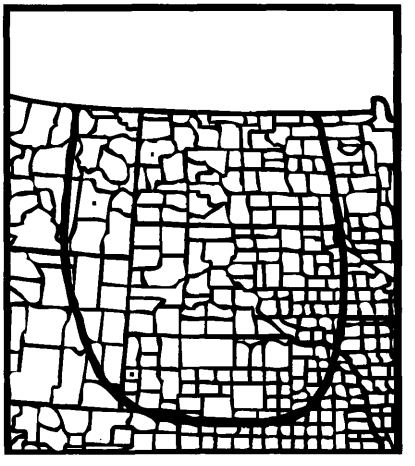
1. *Rorippa austriaca* (Crantz) Bess. — Austrian field cress

Stout, erect perennial 3-9 dm tall, from a fleshy taproot, often forming patches by creeping rootstocks, simple or branched from the base, branched toward the tip, glabrous to minutely strigose or puberulent on the leaves and stems. **Leaves** short-petioled near the base, becoming smaller, sessile and auriculate-clasping upward, the blades elliptic to oblanceolate, 3-10 cm long, 0.8-4 cm wide, obtuse to rounded at the tip, irregularly serrate to subentire, unlobed except for the auriculate-clasping base. **Racemes** terminal and in upper axils, often branched. **Sepals** yellowish-green, 1.5-2 mm long; **petals** yellow, 2-3 mm long, exceeding the sepals. **Siliques** rarely producing seed, globose, 1-2 mm long, the persistent style about equaling or exceeding the fruit body; **pedicels** spreading or a few recurved, 6-10(15) mm long. Jun—Aug. Low wet areas in and near fields; uncommon, intro. at scattered points in e and c ND, e SD and e NE, showing little proclivity for spreading; (Intro. from Europe and found at scattered localities in the U.S. and Can.).



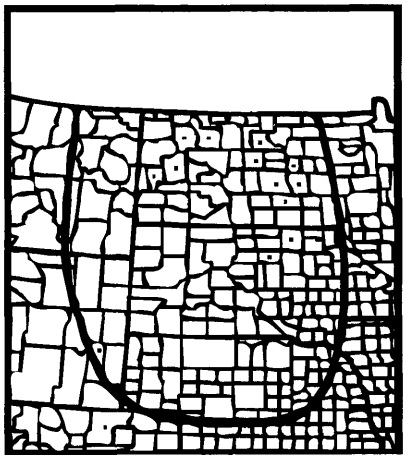
2. *Rorippa calycina* (Engelm.) Rydb.

Decumbent to prostrate, much-branched perennial from rhizomes, 1-4 dm tall, moderately to densely hirsute with slender, elongate trichomes. **Leaves** sessile, the blades oblong to oblanceolate in outline, 2.5-5 cm long, 0.5-1 cm wide, hirsute on both surfaces, especially on the midrib, acute to obtuse, shallowly to deeply sinuate, auriculate and partly clasping at the base. **Racemes** terminal and axillary, all about the same age or the lowest ones with the oldest siliques. **Sepals** yellowish-green, 2.1-3.1 mm long, persistent with fruit; **petals** bright yellow, (2)2.5-3.7 mm long, to 1 mm longer than the sepals. **Siliques** globose to subglobose, 2.3-3.4 mm long, 1.2-2.3 mm wide, ca. 1.3-2X longer than wide, densely strigose on the valves; **pedicels** strongly recurved, sometimes giving the raceme a 1-sided appearance, 3.5-6.5 mm long. May—Jul. Rare or possibly extinct in this region, with old collections from w ND, MT, WY and w NE; (N.W.Terr., w ND, MT, WY and w NE).



3. *Rorippa curvipes* Greene

Annual or possibly a shortlived perennial, usually over 3 dm tall; **stems** prostrate to decumbent or occasionally erect, 1-5 dm long, single or branched from the base, sparingly to moderately hirsute in the lower portion. **Leaves** short-petioled to sessile, auriculate and clasping to nonauriculate and nonclasping, the blades oblong, obovate, spatulate or oblanceolate, mostly 3-10 cm long, 0.5-2(3) cm wide, glabrous on both surfaces or sparingly hirsute above, obtuse to acute at the tip, the margin entire to irregularly toothed or repand, or the lower leaves sometimes pinnately divided to the midrib, the lobe margins entire to slightly toothed, the terminal lobe acute to obtuse. **Racemes** terminal and axillary, all about the same age or the siliques somewhat older on the lower portion of the terminal raceme. **Sepals** greenish, 0.8-1.7 mm long, caducous; **petals** yellow, fading to whitish when dried, 0.5-1 mm long, mostly shorter than the sepals. **Siliques** short-cylindrical, 1.4-5 mm long, 1.5-2.5X longer than wide, straight or curved upward and inward toward the raceme axis, the valves glabrous; **pedicels** ascending or strongly recurved, sometimes so that the raceme appears 1-sided, mostly 2-6 mm long. Jul—Aug. Shores, stream banks and mud flats; uncommon and scattered in ND, SD, MT and WY; (ND and Sask. to WA, s to KS, NM, AZ and CA; apparently intro. in WI). *R. obtusa* (Nutt.) Britt., in part.



4. *Rorippa palustris* (L.) Bess. — Bog yellow cress

Annual, biennial or shortlived perennial; **stems** erect, rarely prostrate or decumbent, usually single from the base, simple or branched upward, 3-12 dm long, glabrous or sparingly to densely hirsute below, sparingly hirsute to glabrous above. **Leaves** short-petioled to sessile, auriculate and clasping to nonauriculate and nonclasping, the blades oblong to oblanceolate, 4-20(30) cm long, 1-5(8) cm wide, glabrous or sparingly to densely hirsute, narrowly to broadly acute at the apex, the margin irregularly serrate, incised, deeply cleft, repand or variously pinnate-divided. **Racemes** terminal and axillary, the terminal one developing earliest, the oldest siliques on the lower portion of the terminal raceme. **Sepals** greenish, 1.2-2.5 mm long, caducous; **petals** yellow, drying whitish, 0.8-2.5 mm long, shorter than or equal to the sepals. **Siliques** globose to oblong or cylindrical, straight or slightly curved upward, 2-2.8 mm long, 1.2-3.4 mm wide, mostly 1-4X longer than wide, not at all to slightly tapering to the apex, truncate, obtuse or acute at the apex, the valves glabrous, the style 0.2-1.2 mm long; **pedicels** ascending, divergent or slightly to strongly recurved, 3-10 mm long. Jun—Sep. Marshes, wet meadows, shores, stream banks, ditches and other wet places; common; (Labr. to AK, s to n S.Amer.). *R. islandica* (Oeder) Bourbas.

See discussion on the following page.





Rorippa palustris.

Stuckey (op. cit.) recognizes several subspecies within this polymorphic species of which two occur in our region. *R. palustris* subsp. *glabra* (Schulz) Stuckey is characterized by **leaves** glabrous to sparingly hirsute on the upper surface, glabrous below, and stems glabrous to sparingly hirsute near the base, glabrous upward. This is the most common form in our area. *R. palustris* subsp. *hispida* (Desv.) Jonsell is somewhat less common, with **leaves** hirsute on the lower surface and stems hirsute usually up to the terminal raceme.

Stuckey has further divided these subspecies into varieties mainly on the basis of fruit characters. In our area there are two varieties of subsp. *glabra*. In *R. palustris* subsp. *glabra* var. *fernaldiana* (Butt. & Abbe) Stuckey, the **style** is expanded in fruit and the **silique** is constricted at the middle so that the replum has concave margins and becomes twisted with age and upon drying. Our other variety is *R. palustris* subsp. *glabra* var. *glabrata* (Lunell) Stuckey, which differs from var. *fernaldiana* in that the **style** is unexpanded in fruit and the **silique** is not constricted at the middle, thus the replum has straight margins and remains flat with age and upon drying. There often seems to be little if any correlation between the condition of the stigma in fruit and the silique/replum shapes.

Both varieties of *R. palustris* subsp. *hispida* occur in our range. *R. palustris* subsp. *hispida* var. *hispida* is the common phase, with **siliques** globose to subglobose, mostly 2.5-6 mm long, 1.3-3 mm wide, ca. 1-2X longer than wide; **replum** circular to elliptic in outline; **petals** 1-1.5(2) mm long; **pedicels** usually divergent to ascending; **stem** usually densely hirsute below. Of much lesser occurrence is *R. palustris* subsp. *hispida* var. *elongata* Stuckey. This differs from var. *hispida* in having **siliques** cylindrical, mostly 5-8 mm long, 2.1-3.1 mm wide, ca. 2X or more longer than wide; **replum** oblong in outline; **petals** 1.5-2(2.8) mm long; **pedicels** usually divergent to recurved; **stem** usually sparingly hirsute below.

5. *Rorippa sinuata* (Nutt.) A. S. Hitchc. — Spreading yellow cress

Decumbent to prostrate, branched perennial from rhizomes, the **stems** 1-5 dm long, sparsely to densely pubescent with hemispherical vesicular trichomes. **Leaves** sessile, auriculate and clasping to nonauriculate and nonclasping, the blades oblong to oblanceolate, 1.5-6 cm long, 0.4-2 cm wide, glabrate on the upper surface, sparsely to densely covered with vesicular trichomes on the midrib beneath, acute to mucronate, the margin shallow to deeply sinuate, pinnatifid to subpinnatifid, the lobes entire to slightly toothed. **Racemes** terminal and axillary, all about the same age or the axillary ones with the oldest siliques. **Sepals** yellowish-green, 2.7-4.5 mm long, caducous; **petals** bright yellow, 3-5.5(6) mm long, to 3 mm longer than the sepals. **Siliques** short to elongate-cylindrical, straight to strongly curved upward, 5-12 mm long, 1-2 mm thick, tapered to the style, the valves glabrous or roughened with hemispherical trichomes; **pedicels** strongly recurved to divergent or ascending, 4-10 mm long. Jun—Aug. Stream banks, ditches, wet meadows and other low places; occasional in the c and w ND, MT, SD, WY and NE; (IL to s Sask. and WA, s to AR, OK, n TX, NM, AZ and CA).



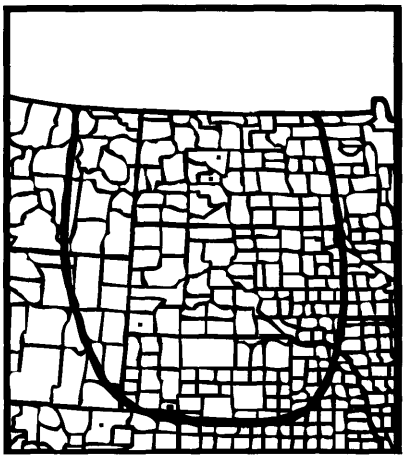
6. *Rorippa sylvestris* (L.) Bess. — Creeping yellow cress

Rhizomatous and sometimes stoloniferous perennial 2-5 dm tall, glabrous or sparsely hirsute, the **stems** erect and branched. **Leaves** short to long-petioled at the base, becoming sessile upward, nonauriculate and nonclasping to auriculate and partly clasping, the blades of cauline leaves pinnately divided to the midrib, 3-12 cm long, 2-5 cm wide, glabrous, the lobes oblong or oblanceolate, entire to irregularly toothed or cleft, the blades of lower and basal leaves often larger with broader lobes. **Racemes** terminal and axillary, all about the same age or the oldest siliques on the lower portion of terminal racemes. **Sepals** yellowish-green, 2-2.5 mm long; **petals** yellow, 2.5-4 mm long, up to 2 mm longer than the sepals. **Siliques** linear-elongate, 4-10 mm long, 0.5-1 mm wide, mostly 5-10X longer than wide, usually ascending on divergent to deflexed pedicels 5-12 mm long. Jun—Aug. Thus far found only at very scattered locations but potentially spreading to native wetland habitats, e.g., stream banks, shores and ditches; (Intro. to N.Amer. from Europe, now occurring from Newf. to B.C., s to NC, AL, LA, KS, CO and OR).



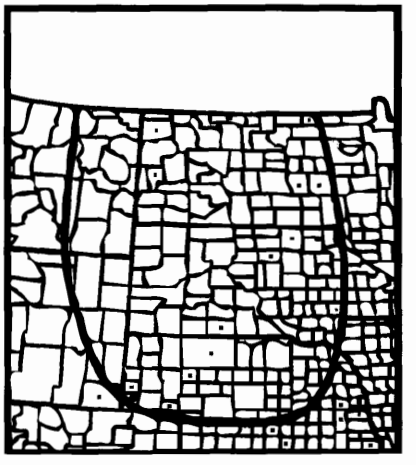
7. *Rorippa tenerrima* Greene

Glabrous, decumbent to prostrate annual, much-branched from the base, the **stems** 1-2 dm long. **Leaves** short-petioled, nonauriculate and nonclasping, the blades oblong or oblanceolate to spatulate, 2-5(8) cm long, 0.8-1.5 cm wide, lyrate-divided nearly to the midrib, rarely undivided, the lobes entire, the terminal lobe wider than the lateral ones, obtuse at the tip. **Racemes** terminal and axillary or all lateral, all about the same age or the lowest racemes with the oldest siliques. **Sepals** green, 0.7-1.2 mm long, caducous; **petals** yellow, fading to whitish when dried, 0.6-0.8 mm long, shorter than the sepals. **Siliques** elongate-cylindrical, slightly curved, tapering to the style, not constricted at the middle, 3-8 mm long, 0.8-2 mm wide, roughened with minute papillae; **pedicels** ascending, 1.5-4 mm long, usually rough with papillae. Jul—Sep. River bottoms and stream banks; rare, with collections from along the Missouri R., c ND, also sw SD and w NE; (MT to WA, s to NM and CA, sparingly e along major rivers to ND, SD, NE and MO). *R. obtusa* (Nutt.) Britt., in part.



8. *Rorippa truncata* (Jeps.) Stuckey

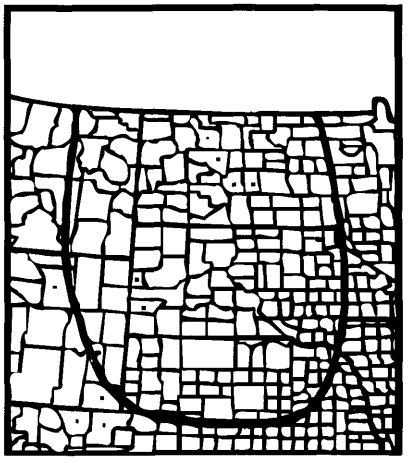
Quite similar in habit to the preceding, but sometimes taller, to 4 dm tall, the **stems** 1-3(5) dm long, freely branched. **Leaves** short-petioled or the upper ones sessile, slightly auriculate to nonauriculate, nonclasping, the blades oblong to narrowly oblanceolate, 5-12(26) cm long, 0.8-1.6(2.5) cm wide, glabrous on both surfaces or sparingly hirsute on the midrib above, mostly pinnately divided to the midrib or nearly so, the lobes entire to toothed, the terminal lobe as wide or wider than the lateral ones, mostly obtuse at the tip. **Racemes** lateral, without a true terminal raceme, the oldest siliques on the lower axillary racemes. **Sepals** green, 0.8-1.5 mm long, caducous; **petals** yellow, fading to whitish when dried, 0.7-1.2 mm long, shorter than the sepals. **Siliques** short-cylindrical, straight, constricted near the middle, not at all or only slightly tapered to the style, obtuse to truncate at the apex, 2.5-8 mm long, 1-2 mm wide, smooth or roughened with minute hyaline ridges; **pedicels** ascending to divergent, 1-4 mm long, glabrous. Jul—Sep. Muddy shores, flats and stream banks; uncommon and scattered; (ND to WA, s to IL, MO, TX, NM, AZ and CA). *R. obtusa* (Nutt.) Britt., in part.



5. ***Thelypodium*** Endl.

1. *Thelypodium integrifolium* (Nutt.) Endl.

Erect, stoutly taprooted biennial 6-10 dm or more tall, glabrous, somewhat glaucous, simple below, usually freely branched above. **Leaves** simple, the basal ones usually withering early, 10-25 cm long, with blades ovate-lanceolate to narrowly lanceolate or oblanceolate, entire to sinuate-dentate; **petioles** about equaling the blades; **cauline leaves** sessile, linear-lanceolate and acute below, becoming linear-attenuate and reduced above, 3-10 cm long, 2-15 mm wide. **Racemes** flat-topped, elongating in fruit; **pedicels** slender, 4-12 mm long, ascending to spreading. **Sepals** whitish to purple-tinged, linear to linear-lanceolate, 3.5-5 mm long; **petals** white to pink or purple-tinged, spatulate, long-clawed, 6-9 mm long. **Siliques** linear, ascending, sometimes upcurved, 20-35 mm long, borne on a stipe that extends about 1 mm or more beyond the tip of the pedicel; **seeds** in 1 row in each cell of the fruit. Jun—Aug. Wet meadows, stream banks and flats, often where alkaline or saline; ND, MT, w SD, WY and w NE; (ND to WA, s to NE, CO, NV and OR).



23. **Primulaceae**, the Primrose Family

Perennial herbs; **leaves** simple, exstipulate, entire, opposite or mostly so (sometimes alternate above in *Glaux*; occasionally appearing whorled in *Lysimachia quadriflora* due to leaf fascicles in the axils), or the leaves all basal. **Flowers** perfect, regular, axillary and single or in dense axillary racemes or in a terminal umbel; **calyx** deeply (3-)5(-9)-parted, often nearly to the base; **corolla** (absent in *Glaux*) deeply (3-)5(-9)-lobed, rotate or salverform; **stamens** typically 5, epipetalous and opposite the corolla lobes (free and alternate with the sepals in *Glaux*); **staminodes** sometimes present, alternating with the stamens; **stigma** capitate at the tip of the single, slender style, ovary superior, 1-celled, with free-central placentation. **Fruit** a few- to many-seeded, 5-valved capsule.

1 Leaves all basal, strongly whitened beneath . . . . . 3. *Primula*

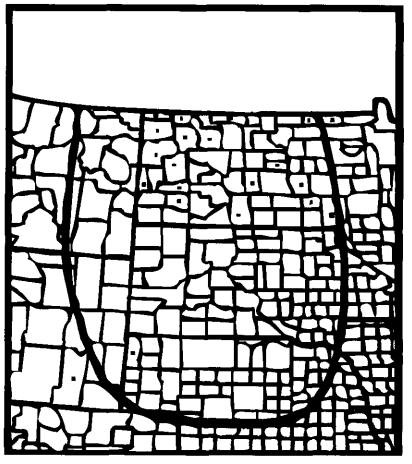
1 Leaves cauline, green on both surfaces.

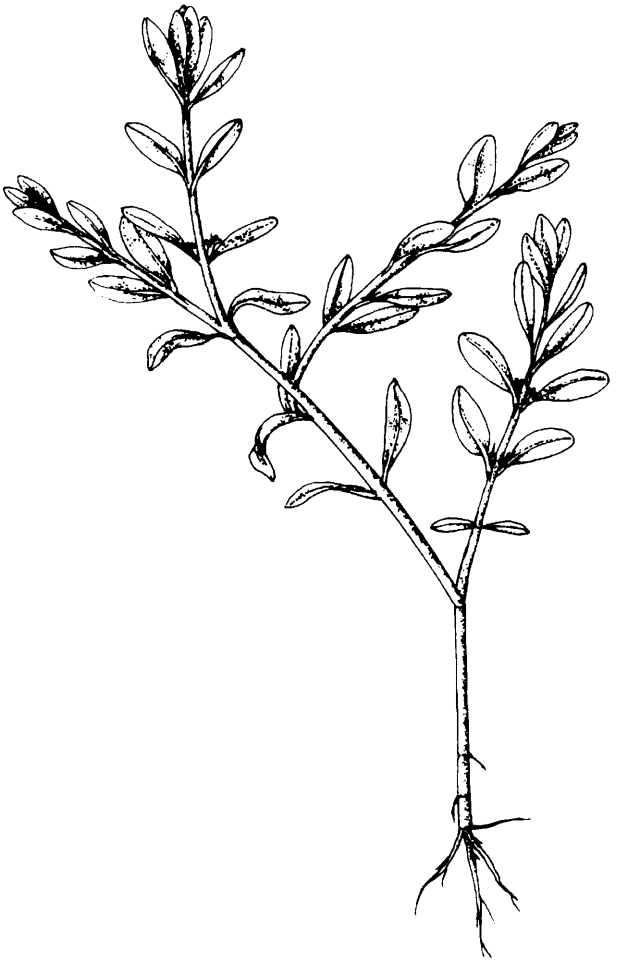
2 Flowers white to pinkish, solitary and sessile in the leaf axils; corolla absent, the perianth comprised of a petaloid calyx . . . . . 1. *Glaux*

2 Flowers yellow, solitary and pedicellate from the axils, or in axillary racemes; calyx and corolla both present . . . . . 2. *Lysimachia*

1. *Glaux maritima* L.

Low, glabrous, usually glaucous perennial from shallow rhizomes, 3-25 cm tall; **stems** leafy, simple and erect to branched and spreading. **Leaves** opposite or mostly so, sometimes becoming alternate above, sessile, rather succulent, elliptic to oblong or oblanceolate, 3-20 mm long, 1-5 mm wide, obtuse to subacute. **Flowers** small, solitary and sessile in the leaf axils, white to pinkish; **calyx** campanulate, 3-4 mm long, lobed to about the middle, the lobes petaloid, rounded; **corolla** absent; **stamens** free of the calyx, alternate with the calyx lobes, about equal to or slightly exceeding the calyx. **Capsules** ovoid to globose, 2.5-3 mm long; **seeds** several, black, roughly elliptic and flattened, 1-1.5 mm long, coherent to the placenta. Mid Jun—Sep. Wet meadows, seepage areas, stream margins and flats, where alkaline or saline; ND, MT, w NE, WY and probably SD, most common n; (Circumboreal, in N.Amer. s to VA, NE, NM and OR).





Glaux maritima.

2. *Lysimachia* L. — Loosestrife

Typically erect, rhizomatous perennials. **Leaves** opposite (occasionally appearing whorled in *L. quadriflora* due to axillary leaf fascicles), sessile or petiolate, the blades generally ovate, ovate-lanceolate, lanceolate or linear, the petioles or leaf bases frequently fringed with cilia. **Flowers** yellow, single and pedicellate from the leaf axils, or numerous in pedunculate, axillary racemes; **calyx** green, deeply (3-)5(-9)-parted nearly to the base; **corolla** yellow or pale yellow, deeply (3-)5(-9)-parted, rotate, the tube very short; **stamens** adnate to the corolla near the base, sometimes alternating with small, membranous staminodes. **Capsules** globose to broadly ovoid, tardily dehiscent from the apex, containing few to many angular seeds which cohere to the placenta.

References:

Coffey, V. J. 1973. Biosystematic study of the section *Seleucia*, genus *Lysimachia* (Primulaceae). Unpubl. Ph.D. thesis, Univ. of Georgia. 244 pp.

Ray, J. D., Jr. 1956. The genus *Lysimachia* in the New World. Illinois Biol. Monogr. 24:1-160.

1 Flowers clustered in dense axillary racemes; foliage punctate with dark glands . . . . . 4. *L. thyrsiflora*

1 Flowers single from the axils, borne on slender pedicels; foliage not punctate.

2 Cauline leaves sessile, linear, 1.5-6 mm wide . . . . . 3. *L. quadriflora*

2 Cauline leaves distinctly petioled or subsessile, the blades ovate to lanceolate, 6-60 mm wide.

3 Leaf blades ovate to ovate-lanceolate, 20-60 mm wide; petioles distinct, fringed with cilia for the entire length . . . . . 1. *L. ciliata*

3 Leaf blades ovate-lanceolate to lanceolate, 6-20 mm wide; petioles of middle and upper cauline leaves rather poorly distinguished from the blade, especially shortened upward, winged, ciliate at least in the lower half . . . . . 2. *L. hybrida*

1. *Lysimachia ciliata* L. — Fringed loosestrife

Plants erect, simple or sparingly branched above, 3-10 dm tall, from long-spreading rhizomes. **Leaves** distinctly petioled, the blades dark to bright green above, slightly paler beneath, ovate to ovate-lanceolate, 4-13 cm long, 2-6 cm wide, acute to acuminate, short-ciliate on the margin, subcordate to rounded or somewhat attenuate at the base; **petioles** 0.5-4 cm long, ciliate for the entire length. **Flowers** single from the upper axils, on pedicels 2-6(8) cm long; **calyx lobes** lanceolate, 4-8 mm long; **corolla lobes** rotund to obovate, 5-12 mm long, finely erose, apiculate; **anthers** 2-3.5 mm long; staminodes present, inconspicuous, narrowly triangular, 1-2 mm long, membranous. **Capsules** 4-7 mm in diameter, containing many angular, dark brown to black seeds 1-2 mm long. Jul—Aug. Shores, stream banks, wet meadows, ditches, floodplains, moist woods and thickets; common; (Que. to AK, s to FL, TX, NM, UT and OR).

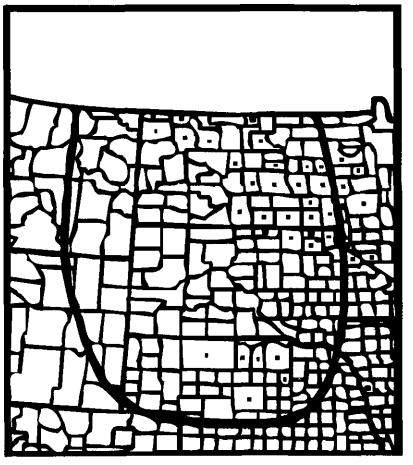




Lysimachia ciliata.

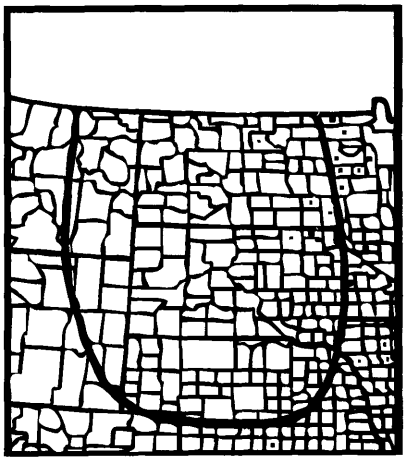
2. *Lysimachia hybrida* Michx.

Erect or sometimes reclining, rhizomatous perennial 1.5-7 dm tall, simple or occasionally branched from the base, usually branched above. **Leaves** opposite and petioled below, becoming subverticillate and subsessile above, the basal and lower leaves usually not persistent; blades green above, the same or only slightly paler beneath, ovate-lanceolate to lanceolate, 2-7 cm long, 0.6-2 cm wide, acute, tapered to the subsessile or petiolate base; **petioles** (0.2)0.6-3(4) cm long, longest on the lower leaves, ciliate at least on the lower half, often over the entire length but more sparingly toward the blade. **Flowers** solitary from the axils, usually appearing clustered above due to close spacing of the nodes; pedicels 0.8-4 cm long; **calyx lobes** lanceolate, 3-6 mm long; **corolla lobes** rotund to obovate, 4-9 mm long, weakly erose, apiculate; **anthers** 1.5-2 mm long; staminodes as in *L. ciliata*, 1.2-1.7 mm long. **Capsules** 3.5-5 mm in diameter; seeds several to many, black, angular, 1-1.5 mm long. Jul—Aug. Wet meadows, marshes, ditches and shores, often in shallow water; occasional, in nw, c and e ND, ne SD and NE Sand Hills; (ME to s Sask., s to n FL, TN, AR and KS; also in NM and AZ). *L. verticillata* Greene.



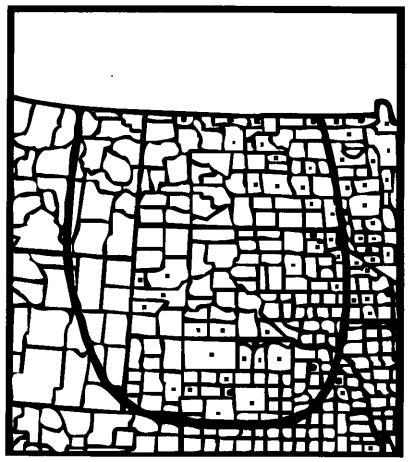
3. *Lysimachia quadriflora* Sims

Slender erect perennial 2-8 dm tall, from slender rhizomes which commonly form lateral offshoots of basal rosettes. **Leaves** opposite, sometimes appearing whorled due to leaves fascicled in the axils; lower (and rosette) leaves, when persistent, petioled, with elliptic to obovate blades 2-3 cm long, 0.5-1 cm wide; cauline leaves sessile, linear, 2-7(9) cm long, 1.5-6 mm wide, acute, revolute along the margin, cuneate and sometimes ciliate at the base. **Flowers** solitary in upper leaf axils on pedicels 1-4 cm long; **calyx lobes** lanceolate, 3.5-6 mm long; **corolla lobes** oval to obovate, 7-12 mm long, erose or entire, apiculate; **anthers** ca. 2 mm long; staminodes as in *L. ciliata*. **Capsules** 3-5 mm in diameter, containing many black angular seeds ca. 1.2 mm long. Jul—Aug. Wet meadows and pond margins, usually where sandy; occasional in sandhills of se ND; also Benson Co., ND; Brown and Marshall Counties, SD; and Franklin Co., NE; (MA to s Man., s to GA, AL and NE). *L. longifolia* Pursh.



4. *Lysimachia thyrsiflora* L. — Water loosestrife

Stout erect perennial from rather thick rhizomes, 3-7 dm tall, usually simple or occasionally branched from lower nodes, strongly punctate throughout with dark glands; stems glabrous or brownish-villous in patches. **Leaves** opposite, sessile, the lower ones reduced, scalelike and scarious, the main cauline and upper leaves lanceolate, elliptic-lanceolate or oblanceolate, 4-13 cm long, 0.6-3.5 cm wide, glabrous above, glabrous or sparsely villous beneath, acute to acuminate, often blunt, cuneate at the base. **Flowers** small and numerous, in dense axillary racemes, the racemes bracteate, globose to ovoid, 1-3 cm long, 1-2 cm thick, on peduncles 2.5-5.5 cm long; **bracts** linear-subulate, 2-5 mm long; **pedicels** 0.5-4 mm long. **Calyx** strongly punctate, deeply (3)5-7(9)-parted, the lobes lance-subulate, 1.5-3 mm long; **corolla lobes** usually equal in number to the calyx lobes, often streaked or punctate, linear, 3-5 mm long; **stamens** usually 5-7, much surpassing the corolla, anthers 0.5-0.8 mm long, on slender filaments; staminodes none. **Capsules** 2-4 mm in diameter, strongly punctate; seeds few, cocoa-colored, 1.2-1.5 mm long. Jun—Aug. Fens, bogs, springs, marshes, wet meadows and shores, where water is fresh, usually growing in shallow water; frequent in n, c and e ND; ne, s and the Black Hills in SD; most of NE; (Circumboreal, in N.Amer. s to NJ, OH, IL, MO, NE, CO, ID and CA).

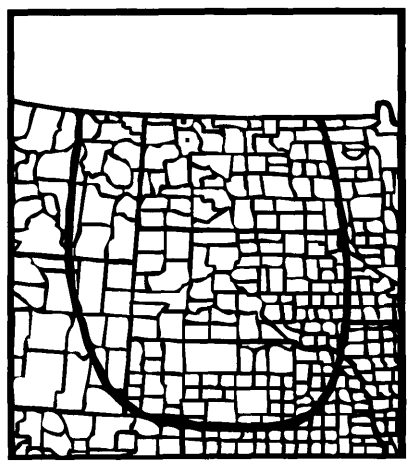


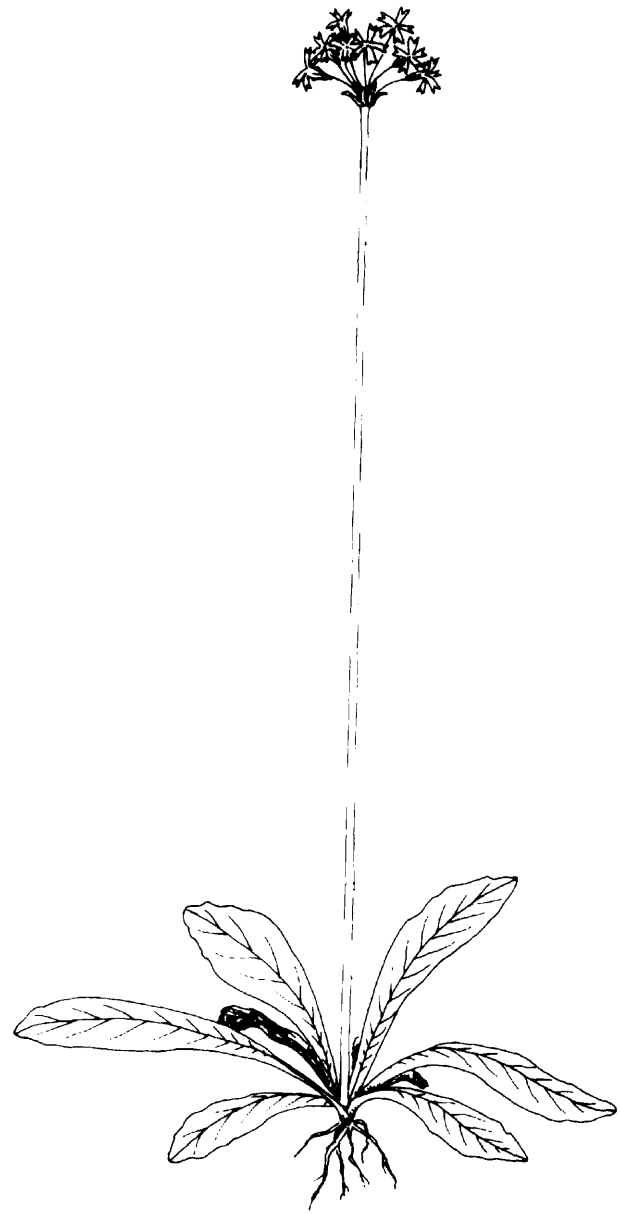


Lysimachia thyrsiflora.

1. *Primula incana* M. E. Jones

Scapose plant 6-40 cm tall, the foliage variously farinose; **leaves** in a basal rosette, strongly white-farinose beneath and usually less so above, elliptic to oblanceolate or spatulate, 2-6 cm long, 0.5-2 cm wide, shallowly denticulate to subentire, sessile or with winged petioles mostly 3-6 cm long. **Flowers** 3-12 in an umbel; **bracts** several, linear-lanceolate, 5-10 mm long, gibbous at the base; **pedicels** about equaling the bracts. **Calyx** farinose to some degree, 6-8 mm long, 5-lobed for ca. 1/3 of its length, the lobes obtuse to subacute; **corolla** lilac, salverform, the tube 8-11 mm long, the lobes deeply 2-lobed, 2-3 mm long; **stamens** attached in the upper 1/3 of the corolla tube. **Capsule** ellipsoid, about equaling to slightly exceeding the calyx; seeds strongly angular, 0.5-0.7 mm long, reticulate. Wet meadows, springs and shores, often where alkaline; rare, with a few collections from nw ND; (ne Hudson Bay to AK, s to ND, CO, UT, ID and B.C.).





Primula incana.

24. **Grossulariaceae**, the Gooseberry Family

1. ***Ribes*** L. — Currant, gooseberry

Rather low shrubs with erect to spreading or reclining stems, the **stems** smooth or armed with nodal spines and sometimes with internodal prickles as well. **Leaves** alternate, often fascicled on short, lateral branches, the blades palmately veined, palmately 3- to 5-lobed and toothed, rotund to angular in outline; stipules absent or adnate to the petioles. **Flowers** 1-few in short clusters or few to many in bracteate racemes, produced on short, axillary branches, greenish to white or yellow, perfect, regular, epigynous. **Sepals** 5, erect, spreading or reflexed, arising from the summit of a tubular to saucer-shaped hypanthium; **petals** 5, erect to spreading, shorter than the sepals, inserted at or near the top of the hypanthium; **stamens** 5, inserted on the hypanthium, alternate with the petals; **pistil** 2-carpellary, styles 2, separate to below the middle or united nearly to the stigmas, ovary mostly inferior, 1-celled with 2 parietal placentae. **Fruit** a many-seeded berry, usually with the dried floral remains persisting at the tip.

1 Stems armed with nodal spines . . . . . 2. *R. missouriense*

1 Stems lacking spines.

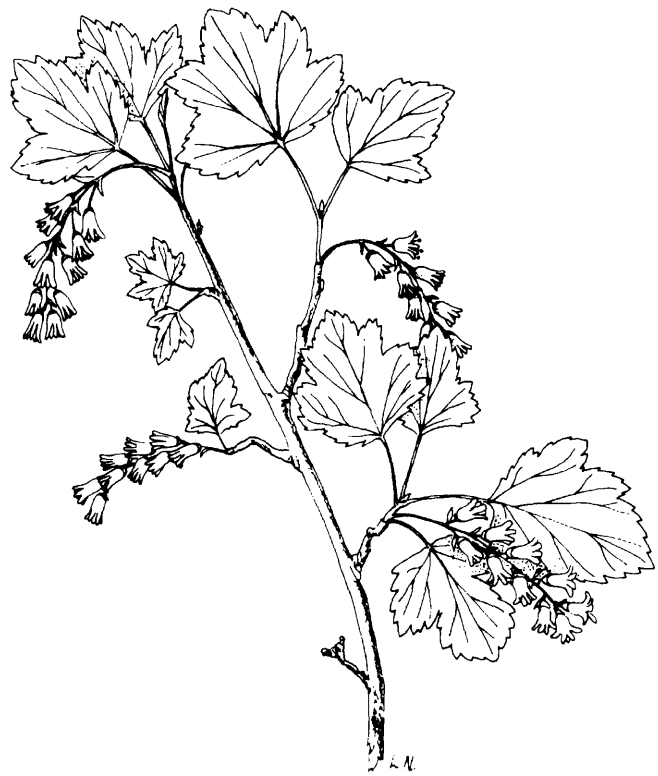
2 Leaves dotted beneath with shiny, yellow to brown, resinous glands . . . . . 1. *R. americanum*

2 Leaves without resinous glands . . . . . 3. *R. triste*

1. *Ribes americanum* Mill. — Wild black currant

Shrub 1-1.5 m tall, the branches erect to spreading; **stems** unarmed, the new growth closely pubescent; twigs gray to grayish-brown and glabrous, blackish with age, often with low corky wings decurrent from the nodes. **Leaves** 3-lobed and usually with 2 shallow basal lobes, 2-6(9) cm long, 2.5-8(11) cm wide, dotted with shiny, yellow to brown resinous glands especially beneath, glabrous or puberulent above, hirsute beneath, coarsely serrate or crenate-serrate, broadly rounded to cordate at the base; **petioles** shorter than to longer than the blade, ciliate and pubescent. **Inflorescences** racemose, 6- to 15-flowered, drooping, 3-8 cm long, the axis short-pubescent; **bracts** linear-lanceolate, exceeding the pedicels; **pedicels** 2-5 mm long. **Flowers** greenish-white to cream-colored, 8-12 mm long; **sepals** erect to spreading, oblong, 4-5 mm long, rounded; **petals** creamy white, 2-3 mm long; **stamens** about equaling the petals; **styles** united nearly to the tip; **hypanthium** campanulate in flower, tubular in fruit, 3-4.5 mm long. **Fruit** a black berry, 6-10 mm in diameter. Flowering May—June, fruiting Jul—Aug. Marsh and lake borders, wet meadows, stream banks, floodplains and moist woods; common; (N.B. to Alta., s to DE, WV, IN, NE and NM).





***Ribes americanum*, in flower.**

2. *Ribes missouriense* Nutt. — Missouri gooseberry

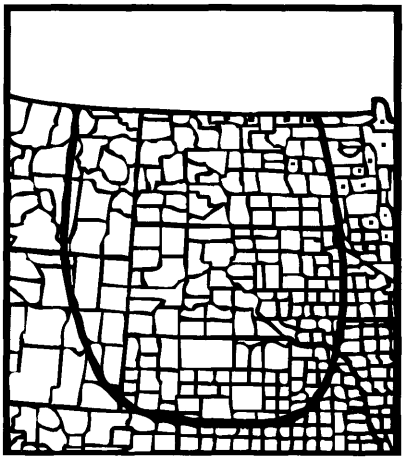
Shrub 1-1.5 m tall, the **branches** arching, armed with 1-4 stout spines at each node, these 5-15 mm long, rarely with some internodal prickles as well; new growth closely pubescent; twigs gray to yellowish-gray, exfoliating with age. **Leaves** 3-lobed and usually with 2 small basal lobes, 1-5 cm long, 1.5-6 cm wide, short-pubescent to nearly glabrous above, hirsute beneath, crenate-serrate, obtuse to subcordate at the base; **petioles** shorter than to about equaling the blade, densely pubescent and often with a few glandular hairs. **Inflorescences** of short clusters containing 2-5 flowers, on lateral branches 1-3 cm long; **bracts** ovate, ciliate, shorter than the pedicels; **pedicels** 3-10 mm long. **Flowers** greenish to white; **sepals** erect to eventually reflexed, 4-6 mm long, linear-oblong; **petals** erect, white to cream-colored, 2-3.5 mm long; **stamens** strongly exserted at anthesis, ca. 2X the length of the sepals; **styles** fused from about 1/2 to their entire length; **hypanthium** short-cylindric, 1-3 mm long. **Fruit** brown or purple at maturity, 6-11 mm in diameter. Flowering May—Jun, fruiting late Jun—Aug. Stream banks, floodplains and moist to dry woods; common in the e and c parts, scattered w; (CT to MT, s to TN and KS).

Ribes lacustre (Pers.) Poir. occurs in wet places in the Black Hills. It is similar to *R. missouriense* in its spiny habit but differs as follows: **flowers** in racemes rather than short clusters; **hypanthium** saucer-shaped and spreading; **ovary** and **fruit** beset with glandular bristles and hairs.



3. *Ribes triste* Pall. — Swamp currant

Low, straggling shrub 0.4-1 m tall, the spreading branches usually rooting adventitiously along the lower portion; **stems** unarmed, the new growth pubescent and with some short, stipitate glands, soon glabrous and gray to brownish-gray, turning dark brown and exfoliating with age. **Leaves** broadly 3(5)-lobed, 2-11 cm long, 2.5-11 cm wide, glabrous or nearly so above, short-pubescent at least on the veins beneath, coarsely dentate-serrate, broadly cordate at the base, the lobes broadly triangular, projecting forward; **petioles** shorter than to about equaling the blade, short-pubescent and often glandular, ciliate toward the base. **Inflorescence** racemose, 5- to 12-flowered, drooping, 2-9 cm long, the axis short-pubescent, often glandular; **bracts** broadly cordate, shorter than the pedicels; **pedicels** 1-4 mm long. **Flowers** green or purple-tinged; **sepals** spreading, broadly rounded, 1-2 mm long and about as wide; **petals** erect, red to purple, ca. 1 mm long; **stamens** about equaling the petals; **styles** united 1/3 to 1/2 of their length; **hypanthium** saucer-shaped, 0.5-1 mm long. **Fruit** a red berry 8-10 mm in diameter. Flowering May, fruiting Jun—Jul. Bogs and swampy woods; uncommon in nc and ne ND; (Labr. to AK, s to NJ, MI, MN, ND, and OR; also n Asia).



25. **Saxifragaceae**, the Saxifrage Family

Perennial herbs with basal rosettes of leaves and scapose inflorescences or with leafy stems and terminal inflorescences (*Penthorum*). **Leaves** simple, petiolate, stipulate or exstipulate (*Penthorum*), all basal or with 1 sessile or short-petioled leaf on the otherwise naked scape, or the leaves cauline (*Penthorum*), the blades entire, crenate or serrate. **Flowers** perfect, regular, perigynous, solitary on scapes or in simple or branched racemes; **sepals** 5; **petals** 5 or none (*Penthorum*), white and entire (*Parnassia*) or green and pinnately divided into fine segments (*Mitella*); **stamens** 10 or 5, when 5, the stamens alternating with staminodes; **pistil** 1 or 5, when 1 the pistil 2- or 4-carpellary and stigmas 2 or 4, sessile or nearly so; when 5, the pistils fused laterally in a ring; ovary(ies) superior to partly inferior, 1-celled. **Fruit** a 2- or 4-valved capsule or each pistil ripening as a circumscissile capsule, containing few to many seeds.

1 Leaves cauline; pistils 5, fused near the base . . . . . 3. *Penthorum*

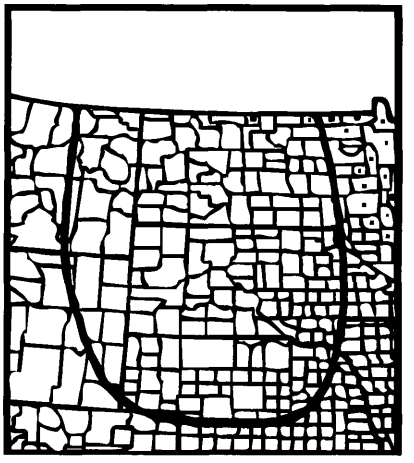
1 Leaves mostly basal; pistil solitary, 2- or 4-carpellary.

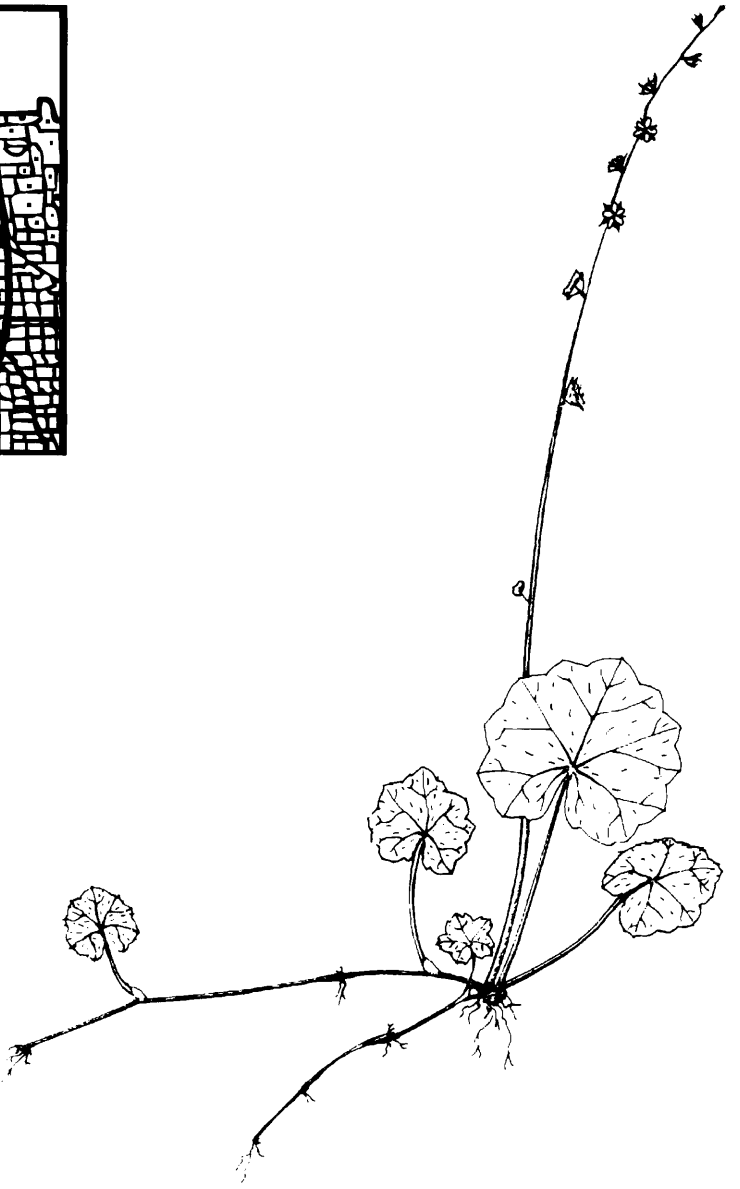
2 Leaves crenate; flowers greenish, in few- to several-flowered racemes; petals pinnately segmented . . . . . 1. *Mitella*

2 Leaves entire; flowers white, solitary on the scapes; petals entire . . . . . 2. *Parnassia*

1. *Mitella nuda* L.

Small rhizomatous and often stoloniferous perennial with scapes 0.7-2.5 dm tall, glandular-pubescent especially upward. **Leaves** all basal or with 1 sessile or short-petioled leaf below the middle on the scape; **blades** rotund-cordate to reniform, 1-3.5 cm across, sparingly hirsute at least on the upper surface, crenate on the margin; **petioles** mostly 2-9 cm long; **stipules** brownish, ovate, 2-4 mm long. **Flowers** small, greenish, in racemes of 3-12 flowers; **sepals** ovate, 1-2 mm long; **petals** green, pinnately divided into usually 4 pairs of filiform segments, 2-4 mm long; **stamens** 10; **pistil** 2-carpellary, stigmas 2, on short divergent styles, ovary ca. 1/2 inferior or less; **hypanthium** saucer-shaped; **pedicels** 1-6 mm long. **Capsules** splitting open widely, the seeds rather few, black, shiny, ellipsoid, ca. 1 mm long. Jun—Jul. Bogs and swamps, often growing among mosses; rare, with records from Bottineau and Pembina Counties, ND; (Labr. to AK, s to PA, MI, MN, ND, MT and WA; also e Asia).





Mitella nuda.

2. *Parnassia* L. — Grass-of-Parnassus

Single or clumped, glabrous perennials. **Leaves** all basal except 1 sessile leaf usually present near or below the middle on each scape, the blades entire; **petioles** winged at the base by the elongate brownish stipules. **Flowers** rather showy, white, solitary on the scapes; **calyx** usually adnate to the ovary in the connate lower portion, the sepals acute to rounded; **petals** white, strongly nerved; **functional stamens** 5, inserted on the hypanthium opposite the sepals and alternating with 5 staminodes which are opposite the petals, **staminodes** dilated from the base and divided into 3-many filamentlike segments tipped with glandular knobs, shorter than to slightly exceeding the functional stamens; **pistil** 4-carpellary, stigmas 4, sessile or nearly so, ovary superior to slightly inferior; **hypanthium** very short. **Capsule** 4-valved, containing numerous oblong, angular seeds.

1 Staminodes 3-parted; sepals with a narrow hyaline margin . . . . . 1. *P. glauca*

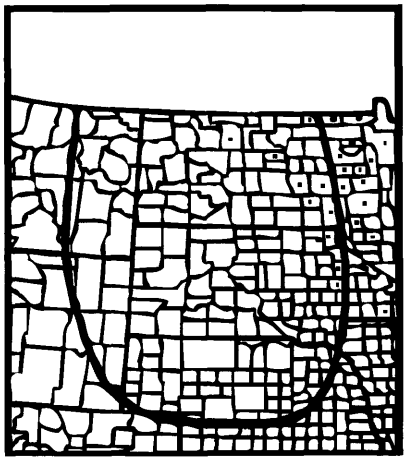
1 Staminodes (5)7- to many-parted; sepals herbaceous throughout.

2 Leaf blades ovate to subrotund, broadly rounded to usually cordate at the base, not decurrent on the petiole; bract-leaf often clasping; petals 7- to 11-nerved . . . . . 2. *P. palustris*

2 Leaf blades elliptic to elliptic-ovate, tapered to and decurrent on the petiole; bract-leaf not clasping; petals usually 5(7)-nerved . . . . . 3. *P. parviflora*

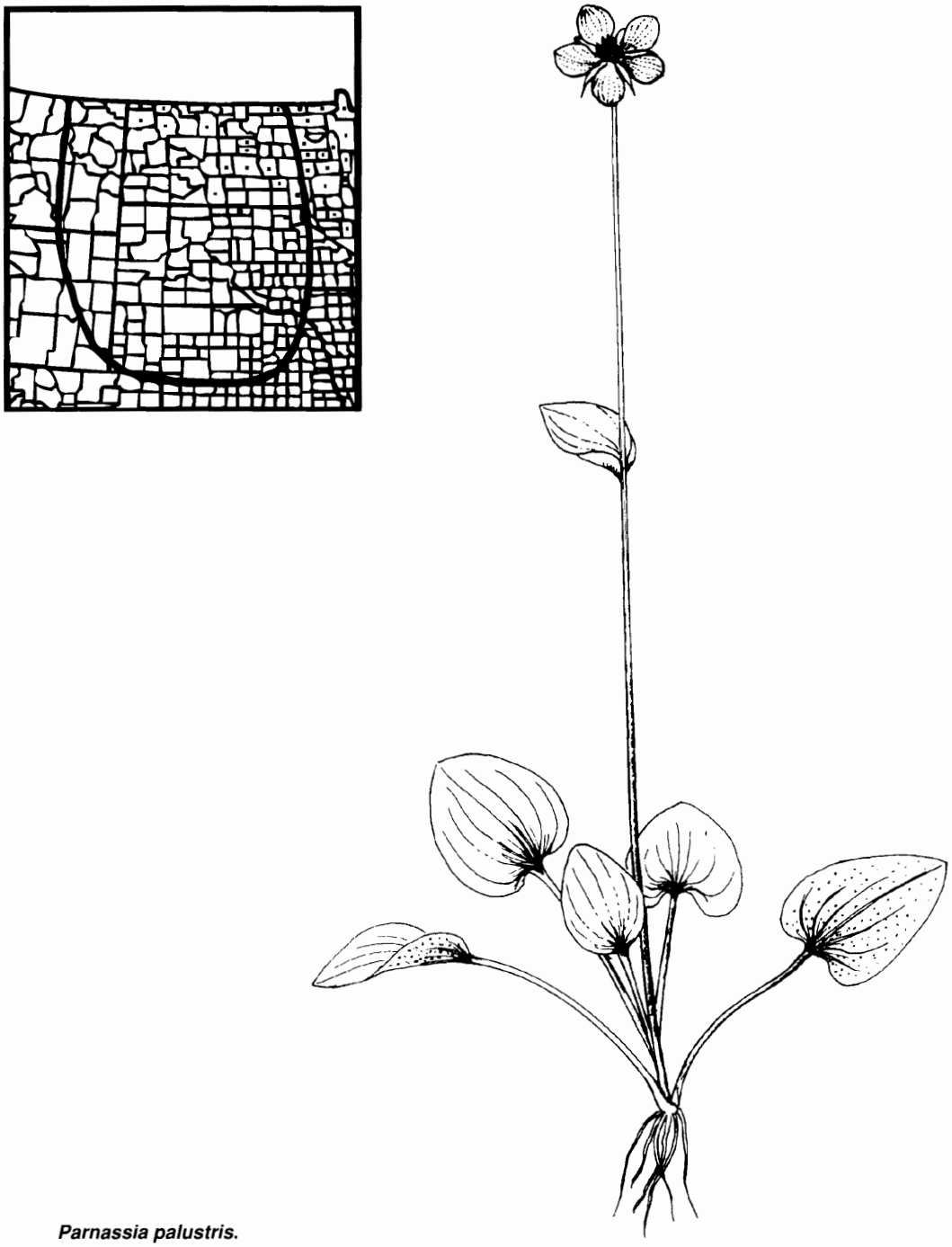
1. *Parnassia glauca* Raf.

Plants with scapes 1-4 dm tall. **Leaf blades** rotund-ovate to ovate, 2-7 cm long, 1-5 cm wide, somewhat coriaceous, rounded to subacute at the tip, rounded to truncate or subcordate at the base, decurrent on the upper part of the petiole; **bract-leaf** usually present, clasping or not. **Sepals** oblong to oval, 2.5-5.5 mm long, herbaceous with a narrow hyaline margin, 3- to 7-nerved, rounded; **petals** oblong to oval, 9-18 mm long, 7- to 9-nerved; **staminodes** 3-parted from below the middle, shorter than to slightly exceeding the stamens. Jul—Sep. Calcareous fens and wet meadows; uncommon in e and c ND and e SD; (Que. and N.B. to Sask., s to VA, IN, IA and SD).



2. *Parnassia palustris* L.

Plants with scapes 1.5-4 dm tall. **Leaf blades** ovate to subrotund, 1-3 cm long, broadly acute to obtuse or rounded at the tip, rounded to usually cordate at the base, not decurrent on the petiole; **bract-leaf** usually cordate-clasping on the scape. **Sepals** lanceolate to oblong-lanceolate, 4-11 mm long, herbaceous throughout, 5- to 9-nerved, acute; **petals** ovate to elliptic-ovate, 8-15 mm long, usually 1.5-2X longer than the sepals, 7- to 11-nerved; **staminodes** (7)9- to many-parted toward the dilated tip, 5-9 mm long. Jul—Sep. Calcareous fens, shores, stream banks and wet meadows; occasional in e, c and nw ND and n SD; (Circumboreal, in N.Amer. s to NY, MN, n SD, CO, NV and CA).



Parnassia palustris.

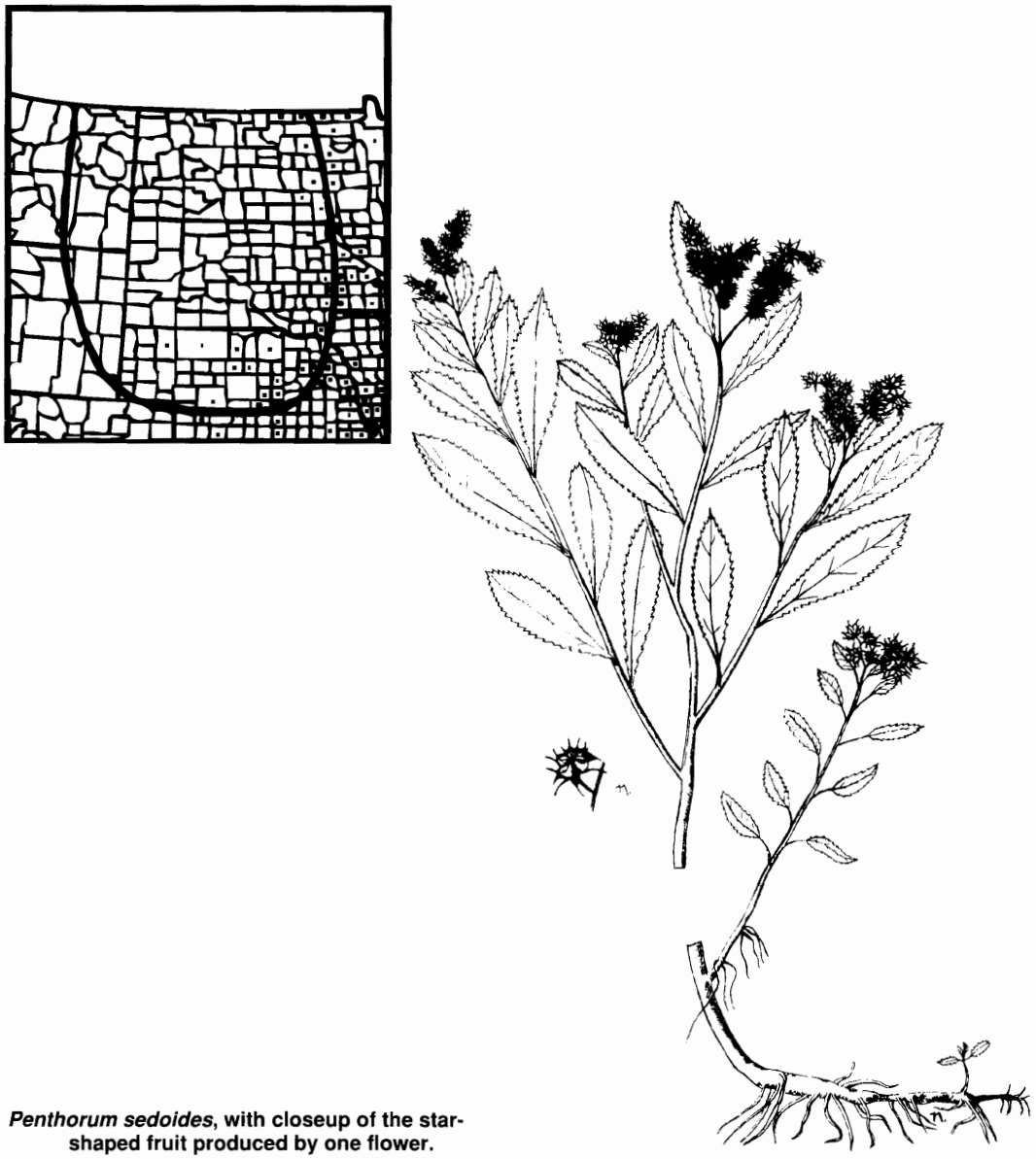
3. *Parnassia parviflora* DC.

Plants with scapes 0.5-3 dm tall. **Leaf blades** elliptic to elliptic-ovate, 0.6-3 cm long, obtuse to rounded at the tip, basally tapered to and decurrent on the petiole; **bract-leaf** not clasping. **Sepals** narrowly lanceolate to oblong, 3-7 mm long, herbaceous throughout, usually 5-nerved; **petals** obovate to elliptic, 4-10 mm long, mostly 1-1.5X longer than the sepals, usually 5(7)-nerved; **staminodes** 5-7(9)-parted at the slightly dilated tip, shorter than the stamens. Jul—Sep. Calcareous fens, wet meadows and stream banks; rare, with records from Bottineau Co., ND, Roberts Co., and the Black Hills, SD; (Labr. to B.C., s to Que., Ont., MI, MN, SD, MT and n ID).



1. *Penthorum sedoides* L.

Erect, rhizomatous, perennial herb 1-6 dm tall, frequently red-tinged, glabrous below, glandular-pubescent in the inflorescence. **Leaves** simple, alternate, sessile or on petioles to 1 cm long; blades elliptic-lanceolate to oblanceolate, 2-10 cm long, 0.5-3 cm wide, acute to acuminate, rather finely serrate, cuneate at the base. **Flowers** in terminal, branched scorpioid racemes; **pedicels** 0.5-3 mm long. **Flowers** star-shaped, perfect, regular, perigynous, 3-4 mm across in flower, 5-7 mm across in fruit; **sepals** 5, green, narrowly triangular, 0.8-2 mm long, fused below to form a short, broad hypanthium; **corolla** none; **stamens** 10; **pistils** 5, simple, fused toward the base and laterally to form a ring, sharing a large, central axile placenta, each pistil maturing into an obliquely circumscissile capsule; **seeds** numerous, tawny to reddish-brown, ellipsoid, ca. 0.5 mm long, minutely papillate. Jul—Sep. Stream banks, shores and ditches where water is fresh; frequent in e ND, e SD, e and c NE; (ME to Man., s to FL and TX).



***Penthorum sedoides*, with closeup of the star-shaped fruit produced by one flower.**

26. **Rosaceae**, the Rose Family

A large, diverse family commonly divided into several distinct subfamilies, many species cultivated for fruit and ornament. Those treated here herbs and shrubs with alternate, simple or compound leaves, the leaves usually stipulate (stipules absent in *Spiraea*). **Flowers** solitary or usually in cymose or paniculate inflorescences, perfect, regular, perigynous; **sepals** 5, sometimes alternating with 5 or more somewhat smaller bractlets, the sepals attached around the rim of a saucerlike, disklike or cupulate hypanthium; **petals** 5, usually yellow, white or pink, frequently small and inconspicuous; **stamens** 15-many, seldom as few as 10, inserted near the rim of the hypanthium; **carpels** 5-many, seldom fewer than 5, separate, the ovaries ripening as an aggregate of achenes or follicles, these often enclosed by the persistent hypanthium.

1 Shrub with simple leaves; flowers white; fruit of 5 or fewer follicles . . . 3. *Spiraea*

1 Herbs with compound leaves; flowers yellow or yellowish to pinkish; fruit an aggregate of many achenes.

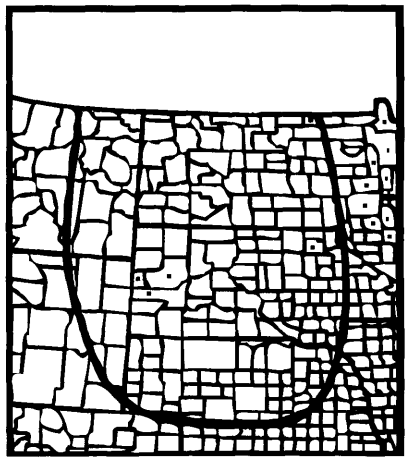
2 Styles inconspicuous, not elongating after flowering, usually deciduous . . . . . 2. *Potentilla*

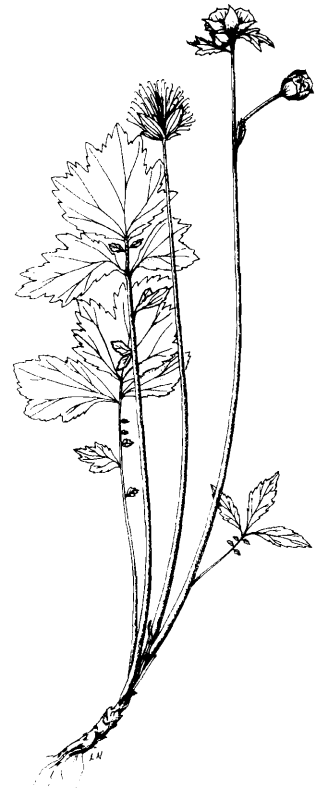
2 Styles conspicuous, elongating after flowering and persistent in fruit, jointed. . . . . 1. *Geum*

1. *Geum rivale* L. — Water or purple avens

Erect perennial herb from a stout rhizome, 3-6(10) dm tall, sparingly hirsute throughout, also puberulent above with some short, glandular hairs. **Principal leaves** basal, pinnately compound, 1-4.5 dm long including the stipular-winged petiole; **leaflets** (5)7-15, the terminal 1-3 much larger than the others, shallowly lobed and coarsely dentate, terminal leaflet broadly cuneate-obovate to subrotund in outline, 2.5-10 cm long, 3-12 cm wide; **cauline leaves** 2-5, much reduced upward, pinnate below to 3-lobed above, stipules foliaceous. **Flowers** 3-9 in a cymose inflorescence, nodding to erect, the pedicels densely glandular-puberulent and hirsute; **sepals** 5, sometimes initially green but always purple in flower, ascending in flower to spreading or reflexed in fruit, triangular, 6-10 mm long, acute to acuminate, alternating with 5 shorter, linear-oblong bractlets; **petals** 5, yellowish to pinkish with purple veins, erect, broadly retuse, tapered to a clawed base, about equaling to a bit shorter than the sepals; **stamens** numerous; **carpels** many, separate, styles long and slender with a hooked joint above the middle, the portion above the joint deciduous, the slender lower portion persistent and curved or deflexed in fruit, 6-10 mm long, hirsute and glandular-puberulent; **receptacle** short-cylindric, on a short stipe; **hypanthium** purple, saucer-shaped, 3-4.5 mm long, hirsute and glandular-puberulent. **Fruit** an aggregate of long-beaked achenes, the fruiting head globose; achene bodies fusiform, 3-4 mm long, hirsute. May—Jul. Swampy and boggy places, fresh wet meadows; rare, with records from Pembina Co., ND, Day Co. and the Black Hills, SD; (Newf. to B.C., s to NJ, IN, MO, SD, NM and WA).

Geum aleppicum Jacq., yellow avens, is a more common species that occurs throughout our region and is sometimes encountered on stream banks, alluvial deposits and in wet meadows, though it is most characteristic of moist woodlands. It differs from *G. rivale* in its typically larger stature, green calyx and distinctly yellow petals.





Geum rivale.

2. ***Potentilla*** L. — Cinquefoil

Annual and perennial herbs (woody at the base in *P. palustris*), erect, decumbent, sprawling or stoloniferous. **Leaves** pinnately or palmately compound, alternate or mostly basal, petiolate to subsessile, stipulate; **leaflets** 3-many, oblong to elliptic or obovate, serrate. **Flowers** perfect, regular, perigynous; **calyx** of 5 persistent sepals, these alternating with several to many, entire to toothed bractlets which are usually narrower and shorter than the sepals, the sepals and bractlets fused at the base to form a saucer-shaped hypanthium; **corolla** of usually 5 yellow (dark red in *P. palustris*) petals which are attached near the summit of the hypanthium; **stamens** many, usually 10-25; **pistils** numerous, simple, styles simple, laterally or nearly basally attached to the ovary, deciduous. **Fruit** an aggregate of many small, smooth to ridged achenes, surrounded by the persistent hypanthium.

1 Petals very dark red; plants woody at the base . . . . . 3. *P. palustris*

1 Petals yellow; plants herbaceous throughout.

2 Plants extensively stoloniferous; leaves white-tomentose beneath . . . . . 1. *P. anserina*

2 Plants lacking stolons; leaves green, glabrous to hirsute beneath.

3 Leaves pinnately compound with 7-11 leaflets . . . . . 4. *P. paradoxa*

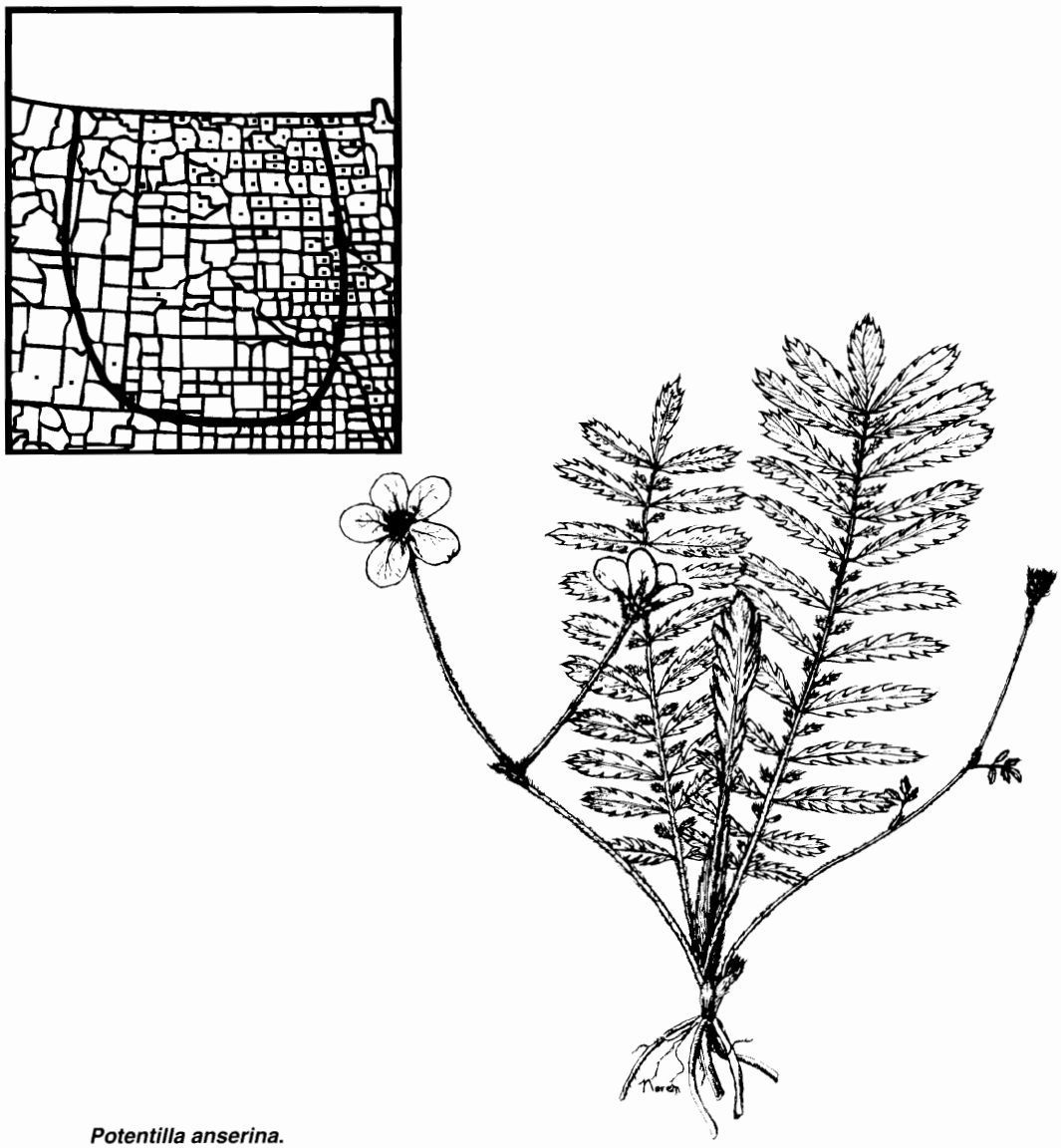
3 Leaves palmately compound with 3-7 leaflets.

4 Achene surface ridged at maturity; petals 2.5-4 mm long, nearly equaling the sepals; leaflets 3 (rarely 5) . . . . . 2. *P. norvegica*

4 Achene surface smooth; petals 1-1.5(2) mm long, much smaller than the sepals; leaflets 3-7 . . . . . 5. *P. rivalis*

1. *Potentilla anserina* L. — Silverweed

Low, extensively stoloniferous perennial from a stout rootstock; **leaves** basal except for a few clustered on the stolons, pinnately compound with numerous leaflets, small leaflets often alternating with larger ones; **blade** oblanceolate in outline, 0.5-3(5) dm long, including the petiole which may be 1/2 the total leaf length, 2-8 cm wide, green and glabrous to grayish-green and sericeous above, densely white-tomentose beneath; **leaflets** elliptic to oblong or obovate, 1.5-5 cm long, 0.5-1.8 cm wide, greatly reduced downward, deeply serrate, the teeth sharply ascending; **stipules** prominent as brownish membranous wings on the basal portion of the petiole. **Flowers** yellow, rather showy, solitary from the leafy nodes of the stolons, on peduncles 4-15(25) cm long; **sepals** ovate, acuminate, white-sericeous on the outside; **petals** elliptic to obovate or nearly rotund, 5-10 mm long; **stamens** 20-25; **pistils** numerous, styles attached laterally on the ovary. **Mature achenes** golden brown, obliquely ovoid, usually corky with ridges or furrows. Jun—Aug. Wet meadows, ditches, shores, stream banks and mud flats; common and often weedy in ND, e MT and e SD, otherwise scattered in w SD, e WY and w NE; (Circumboreal, in N.Amer. s to NY, IN, IA, NE, NM and CA).



Potentilla anserina.

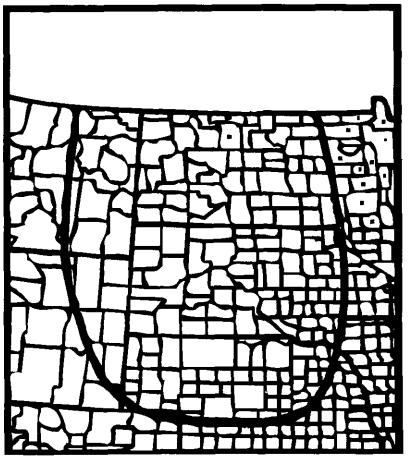
2. *Potentilla norvegica* L. — Strawberryweed

Hirsute, taprooted annual or biennial (1)2-7 dm tall; **stems** erect to decumbent, simple or branching from the base, branched above in the inflorescence. **Leaves** mostly cauline, long-petioled below to subsessile above, palmately compound with 3 (rarely 5) leaflets, the **leaflets** elliptic to oblanceolate or obovate, 1.5-7 cm long, 0.8-4 cm wide, coarsely crenate-serrate; **stipules** foliaceous, ovate, mostly 1-2.5 cm long, entire or usually toothed. **Flowers** usually numerous and crowded in terminal cymes, not showy; **sepals** ovate-lanceolate, 4-6 mm long, the bractlets about as long or longer; **petals** yellow, obovate, 2.5-4 mm long, usually 3/4 to about as long as the sepals; **stamens** ca. 20; **styles** terminal. **Achenes** tan to brown, ovate, 0.6-1 mm long, the surface longitudinally ridged at maturity. Jun—Aug. Wet meadows, stream banks, ditches, shores and a variety of drier habitats; common; (Circumboreal, in N.Amer. s to NC, TX, Mex. and CA).



3. *Potentilla palustris* (L.) Scop. — Bog cinquefoil

Perennial from a long, stout rhizome; **stems** ascending to sprawling or floating, often rooting at the nodes, sparingly branched, woody at the base, 3-8 dm long, glabrous below, pubescent above, the hairs often gland-tipped. **Leaves** cauline, long-petioled below to subsessile above, pinnate to subpalmate, with (3)5-7 leaflets, these oblong to elliptic, 3-10 cm long, 0.8-3.5 cm wide, glaucous beneath, sharply serrate; **stipules** winging the petioles of lower leaves, becoming shorter, broader and foliaceous upward. **Flowers** few to many in open cymes, single or paired from the axils; **sepals** dark red or purplish at least on the inside, ovate to lanceolate, acuminate, 6-20 mm long; **petals** 5(10), very dark red, elliptic to oblanceolate or spatulate, apiculate or cuspidate at the tip, 3-5 mm long; **stamens** ca. 25, dark red; **styles** laterally attached. **Achenes** reddish to golden brown, obliquely ovoid, plump, 1-1.2 mm long, smooth. Jun—Aug. Bogs and swamps; rare, with records from McHenry and Bottineau Counties, ND; (Greenl. and Labr. to AK, s to NJ, OH, IA, ND, WY and CA).



4. *Potentilla paradoxa* Nutt. ex Torr. & Gray — Bushy cinquefoil

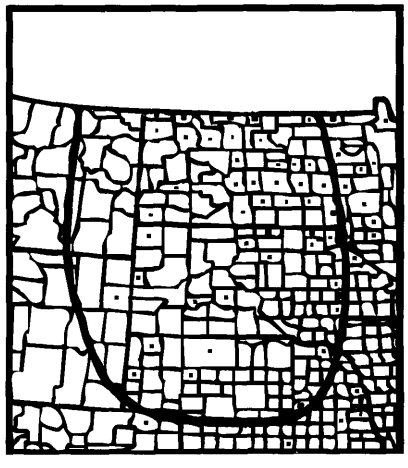
Erect to decumbent, taprooted annual or shortlived perennial 1.5-7 dm tall, glabrous below to hirsute above; **stems** simple or branched from the base, diffusely branched above. **Leaves** mostly cauline, long-petioled below, shorter petioled above, pinnately compound, with 7-11 leaflets, the smaller, sessile bractlike leaves of the inflorescence mostly ternate; **leaflets** elliptic to obovate, 0.8-4 cm long, 0.5-2 cm wide, serrate; **stipules** prominent, ovate, entire to serrate, mostly 0.5-1.5 cm long. **Flowers** usually numerous in open to dense cymes, not showy; **sepals** ovate-triangular, acute to abruptly acuminate, 2.5-4 mm long, the bractlets sometimes longer; **petals** yellow, obovate, 2.5-3.5 mm long, about equaling the sepals; **stamens** (10-15)20; **styles** terminal. **Achenes** brownish, obliquely obovate, ca. 1 mm long, apically ridged, often corky-thickened in the lower half. Jun—Sep. Shores, ditches, floodplains and flats, often where sandy or gravelly; frequent; (Ont. to B.C., s to PA, IL, MO, LA, Mex. and WA).



5. *Potentilla rivalis* Nutt. — Brook cinquefoil

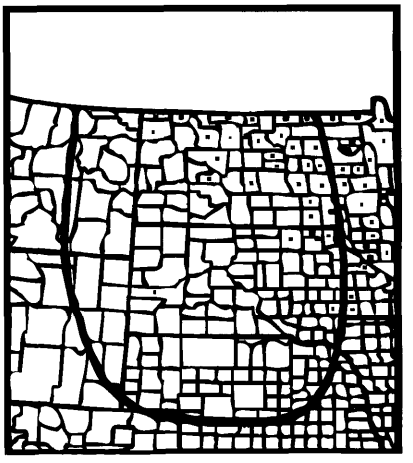
Erect to spreading, hirsute, taprooted annual or biennial 1.5-9 dm tall, simple or branched from the base, branched above. **Leaves** mostly cauline, long-petioled below to subsessile above, palmately compound, with 3-7 leaflets, or the lower leaves closely pinnate, the leaflets obovate to elliptic or oblanceolate, 1.5-5 cm long, 0.5-2.5 cm wide, coarsely serrate; **stipules** ovate, usually toothed, mostly 0.5-1.5 cm long. **Flowers** numerous in leafy, branched cymes, not showy; **sepals** ovate-triangular, 2.5-6 mm long, the bractlets sometimes longer; **petals** yellow, obovate to oblanceolate, 1-1.5(2) mm long, ca. 1/2 or less as long as the sepals; **stamens** 10-15; **styles** terminal. **Achenes** yellowish, ovoid-reniform, 0.6-0.8 mm long, smooth. Jun—Aug. Wet meadows, shores, ditches, stream banks and flats; frequent; (IL and MN to B.C., s to MO, TX, Mex. and CA). *P. millegrana* Engelm.

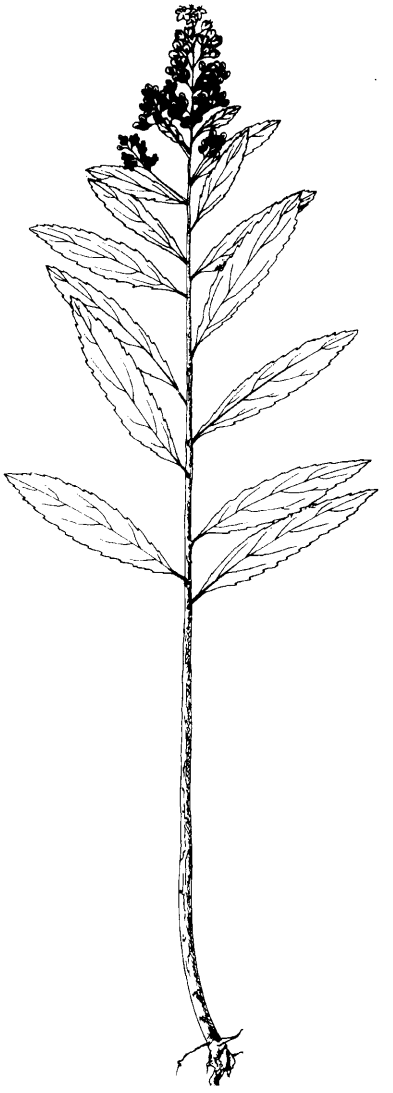
Potentilla biennis Greene is a similar species of moist woodlands and stream banks that has been reported for w SD. It differs from *P. rivalis* as follows: Averaging smaller, (1)3-6 dm tall, the **stems** and **leaves** with fine glandular hairs as well as longer eglandular hairs; **leaves** all 3-foliate; **calyx** mealy-glandular.



1. *Spiraea alba* Du Roi

Small, erect shrub 0.4-1 m tall, often in colonies; **stems** puberulent when young, eventually brown to reddish-brown and glabrous. **Leaves** dark green, alternate, often rather crowded, narrowly elliptic to oblanceolate, 2.5-8 cm long, 0.8-1.5(3) cm wide, glabrous to puberulent, acute to obtuse, serrate with ascending teeth, cuneate to somewhat rounded at the base; petioles short, to 1 cm long; stipules none. **Flowers** numerous in a terminal, oblong to pyramidal panicle 0.5-2.5 dm long, the branches and tiny bracts puberulent. **Sepals** 5, broadly triangular, 1-1.5 mm long, puberulent; **petals** 5, white to slightly pinkish, subrotund, 1.5-3.5 mm long; **stamens** 25-50, the filaments persisting and forming a fringe around the inside of the hypanthium; **carpels** 5, seldom fewer, separate, styles 0.5-1.3 mm long; **hypanthium** cupulate, 1-1.8 mm long. **Fruit** a group of 5 (seldom fewer), 2- to several-seeded follicles, these 2.5-3.5 mm long and extending well above the hypanthium at maturity. Flowering late Jun—Aug, fruiting Aug—Sep. Wet meadows, stream banks, marshes and swamps, often in sandy soils; occasional in e, c and nw ND, e and the Black Hills, SD; (Newf. and n Que. to Alta., s to VA, NC, IN, n MO and e SD).





***Spiraea alba*, flowering branch.**

1. ***Desmanthus*** Willd.

1. *Desmanthus illinoensis* (Michx.) MacM. — Prairie mimosa

Erect perennial 3-10 dm tall; **stems** strongly ribbed, glabrous to hirsutulous. **Leaves** twice pinnate, 3-10 cm long; **pinnae** 6-12 pairs, 1.5-4 cm long; **leaflets** very small, oblong, 2-5 mm long, 0.5-1 mm wide,ciliolate, mucronate; **stipules** setaceous, 5-10 mm long. **Inflorescence** a small globose cluster of minute flowers; **peduncles** 2-6 cm long. **Flowers** whitish to greenish, regular; **calyx** campanulate, 5-toothed; **corolla** of 5 petals, separate or slightly united at the base; **stamens** 5, distinct, long-exserted. **Fruits** in a dense, subglobose head, flat, strongly curved, 1-2.5 cm long, 4-7 mm wide, containing few to several seeds. Late Jul—Sep. Uncommon and confined to sandy or gravelly lake shores in the n part of our region, becoming more common and occupying a variety of habitats in the c and s parts; (OH to ND, s to FL, TX and NM).





Desmanthus illinoensis.

28. **Fabaceae**, the Bean Family

Perennial herbs and shrubs (those included here) with pinnately compound, alternate, usually stipulate leaves; **leaflets** 3-many, the terminal one sometimes modified as a tendril (*Lathyrus*). **Inflorescences** of densely to loosely flowered, simple or branched racemes. **Flowers** perfect, irregular, hypogynous to somewhat perigynous; **calyx** regular to strongly irregular, 5-lobed; **corolla** of 5 separate lobes (only 1 lobe in *Amorpha*), these unequal, the upper median lobe termed the standard, exterior to and larger than the others, the 2 lateral petals termed the wings, exterior to the lowest ones which are called the keel petals, the latter partly coherent to enclose the stamens and style; **stamens** 10, monadelphous or diadelphous in a 9 + 1 arrangement; **pistil** 1, simple, with a single stigma and style, ovary 1-celled, maturing into a **legume** (pod) which is dehiscent by 2 sutures or indehiscent, sometimes constricted between the seeds (*Desmodium*) and ultimately breaking into 1-seeded joints or segments.

1 Shrub; corolla 1-lobed, only the standard present . . . . . 1. *Amorpha*

1 Herbs; corolla 5-lobed.

  2 Plants climbing; leaves with a tendril at the tip; fruits smooth . . . . 4. *Lathyrus*

  2 Plants erect; leaves without tendrils; fruits with hooked hairs or prickles.

    3 Leaflets 3; petals reddish-purple, drying dark blue; fruit with hooked hairs, constricted between the seeds . . . . . 2. *Desmodium*

    3 Leaflets 7-21; petals cream or creamy-white; fruit with stout hooked bristles, not constricted between the seeds . . . . . 3. *Glycyrrhiza*

1. *Amorpha fruticosa* L. — False indigo

Branching shrub mostly 1-3 m tall; twigs tan to gray. **Leaves** once-pinnate, the blade oblong, 6-16 cm long; **leaflets** 9-27, elliptic to obovate, 1-4 cm long, 4-28 mm wide, glabrous above, puberulent and sometimes punctate beneath, on petiolules 1-3 mm long; **petioles** 2-5 cm long; stipules none. **Inflorescence** of 2-several, terminal, dense, spikelike racemes, these 2-15 cm long, the raceme axis and pedicels puberulent; **bracts** lanceolate, shorter than the calyx, pubescent, deciduous; **pedicels** 1-2 mm long. **Flowers** dark purple, irregular; **calyx** campanulate, unequally and shallowly 5-toothed, 1.5-3 mm long, often glandular, the lowest tooth somewhat longer and narrower than the others; **corolla** 1-lobed, only the standard present, folded to enclose the stamens, 3-5 mm long; **stamens** 10, the filaments united near the base. **Fruits** indehiscent, oblong, curved upward, 5-7 mm long, strongly glandular, 1- to 2-seeded. Flowering Jun, fruiting late Jul—Sep. Wet meadows, stream banks, shores, ditches and floodplains; frequent from e and c ND through NE; (PA to Sask., s to AL and n Mex.).





***Amorpha fruticosa*, flowering and vegetative branches.**

2. ***Desmodium*** Desv. — Tickclover

1. *Desmodium canadense* (L.) DC. — Canada tickclover

Erect perennial 6-15 dm tall; **stem** stout, simple or branched, strongly ribbed and hirsute above. **Leaves** pinnately 3-foliate, the leaflets dark green above, pale beneath, ovate-lanceolate to lanceolate or occasionally obovate, 3-9 cm long, 1-3.5 cm wide, puberulent above, more densely so beneath, acute to obtuse, sometimes apiculate; **petioles** 2-20 mm long; stipules linear-subulate, 4-9 mm long, ciliate. **Inflorescence** of 1 terminal raceme or a panicle of several racemes, the terminal one longest, 6-20 cm long, pubescent on the axis; **bracts** brownish, lanceolate, appressed-hairy, deciduous; **pedicels** 4-8 mm long. **Flowers** reddish-purple, drying dark blue, irregular; **calyx** purple, deeply 5-toothed, somewhat irregular, 4-6 mm long, the lowest sepal longest; **corolla** 5-9 mm long; **stamens** diadelphous in a 9 + 1 arrangement. **Fruits** constricted between the 2-several seeds, 1.5-5 cm long, beset with hooked hairs, ultimately breaking apart into 1-seeded segments which are 3-5 mm wide. Jul—Sep. Stream banks, pond margins, ditches, floodplains and swampy places; occasional in e and sc ND, e, c and sw SD and most of NE; (Que. and N.S. to Alta., s to SC, AR and OK).



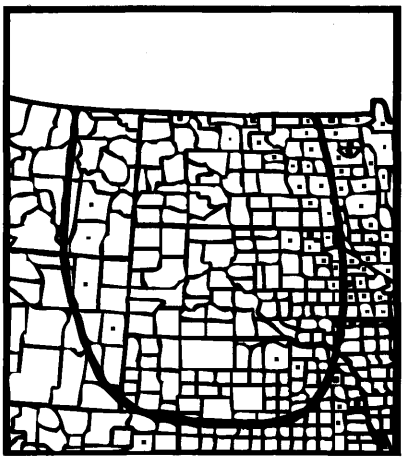
1. *Glycyrrhiza lepidota* Pursh — Wild licorice

Perennial herb 3-10 dm tall, from long creeping rhizomes, often forming patches, puberulent or glabrous, glandular-punctate with yellowish or brownish translucent glands; **stem** simple below, woody at the base, usually with short lateral branches above. **Leaves** pinnate, mostly 8-18 cm long including the rather short petiole; **leaflets** 7-21, lanceolate to oblong-lanceolate or seldom elliptic, 1.5-5 cm long, 5-16 mm wide, often smaller on later developed leaves, apiculate, glandular-punctate on both surfaces; petiolules mostly 1-2 mm long; **stipules** brownish, lanceolate, 3-7 mm long, deciduous. **Racemes** axillary, spikelike, many-flowered, on peduncles 1-7 cm long; **bracts** deciduous, breaking off to leave the cupulate base; **pedicels** 1 mm or less long. **Calyx** tubular-campanulate in the lower half, 5-6 mm long, glandular-stipitate on the outside, the upper 2 lobes united for 1/2 or more of their length; **petals** cream or creamy white, the standard 10-14 mm long, wings and keel shorter; **stamens** 10, diadelphous in a 9 + 1 arrangement. **Fruits** brown, indehiscent, ellipsoid, 1-2 cm long, densely covered with hooked bristles, the style usually persistent as a terminal beak ca. 3 mm long. Flowering Jul—Aug, fruiting late Jul—Sep., the fruits commonly persisting into late fall. Shores, stream banks, wet meadows, floodplains, moist prairies, ditches and drier habitats; common; (MN to Alta. and WA, s to AR, TX and CA).



1. *Lathyrus palustris* L. — Marsh vetchling

Rhizomatous, climbing perennial, clinging to surrounding vegetation by tendrils; **stems** strongly 2-winged, 3-10 dm long. **Leaves** pinnately compound, 5-10 cm long, the terminal leaflet modified as a tendril, otherwise leaflets in 2-4 pairs, linear to lanceolate, occasionally elliptic, 2-7 cm long, 3-25 mm wide, apiculate; **stipules** prominent, semisagittate, 1-3 cm long. **Flowers** in lateral racemes, 2-6 per raceme, reddish-purple, rarely whitish, drying blue to blue-violet; **calyx** irregular, 7-10 mm long, the lowest lobe considerably longer than the others; **corolla** 12-20 mm long; **stamens** diadelphous in a 9 + 1 arrangement; **style** bearded along the inner side. **Fruits** resembling a pea pod, flat, dehiscent, many-seeded, 3.5-5 cm long. Jun—Aug. Wet meadows, stream banks and boggy or swampy places; occasional in e and nc ND, e SD and e NE; (Circumboreal, in N.Amer. s to NJ, OH IN, MO, NE, CO and CA).



29. **Haloragaceae**, the Water Milfoil Family

1. ***Myriophyllum*** L. — Water milfoil

Rooted aquatic or amphibious perennials with flexuous submerged stems and mostly whorled leaves, these pinnately divided into filiform segments. **Flowers** small, sessile in the axils of the upper reduced leaves or bracts, also usually subtended laterally by a pair of minute bracteoles, emersed at anthesis, in terminal, interrupted spikes. **Flowers** imperfect or perfect, the male flowers above the female in the spike, with perfect flowers, if any, in the middle portion of the spike; **calyx** inconspicuous, 4-parted in the male flowers, appressed to the ovary and minutely 4-toothed at the summit in female or perfect flowers, the teeth usually deciduous in fruit; **corolla** of 4 membranous petals, reduced or absent in female flowers; **stamens** 8 or 4; **pistil** 4-carpellary, stigmas 4, sessile or nearly so, papillose-tufted, ovary inferior, 4-celled. **Fruit** nutlike, 4-lobed, eventually splitting into 4 mericarps.

References:

Aiken, S. G. 1981. A conspectus of *Myriophyllum* (Haloragaceae) in North America. Brittonia 33:57-69.

Love, A. 1961. Some notes on *Myriophyllum spicatum*. Rhodora 63:139-145.

Nichols, S. A. 1975. Identification and management of Eurasian water milfoil in Wisconsin. Trans. Wisconsin Acad. Sci. 63:116-128.

Patten, B. C., Jr. 1954. The status of some American species of *Myriophyllum* as revealed by the discovery of intergrade material between *M. exalbescens* Fern. and *M. spicatum* L. in New Jersey. Rhodora 56:213-225.

1 Upper floral bracts entire; lower bracts entire, serrate or pinnatisect, not more than 2X longer than their subtended flowers . . . . . 1. *M. exalbescens*

1 Upper floral bracts entire to serrate or pinnatisect; lower bracts serrate or pinnatisect, usually more than 2X longer than their subtended flowers.

2 Upper bracts shorter than or equaling their subtended flowers, only the lower bracts exceeding their flowers; stamens 8 . . . . . 4. *M. verticillatum*

2 All bracts conspicuously exceeding their subtended flowers; stamens 4.

3 Bracts laminate, mostly oblong-lanceolate to ovate-lanceolate, pectinate below to serrate above in the spike, the lowermost distinctly different from the foliage leaves . . . . . 2. *M. heterophyllum*

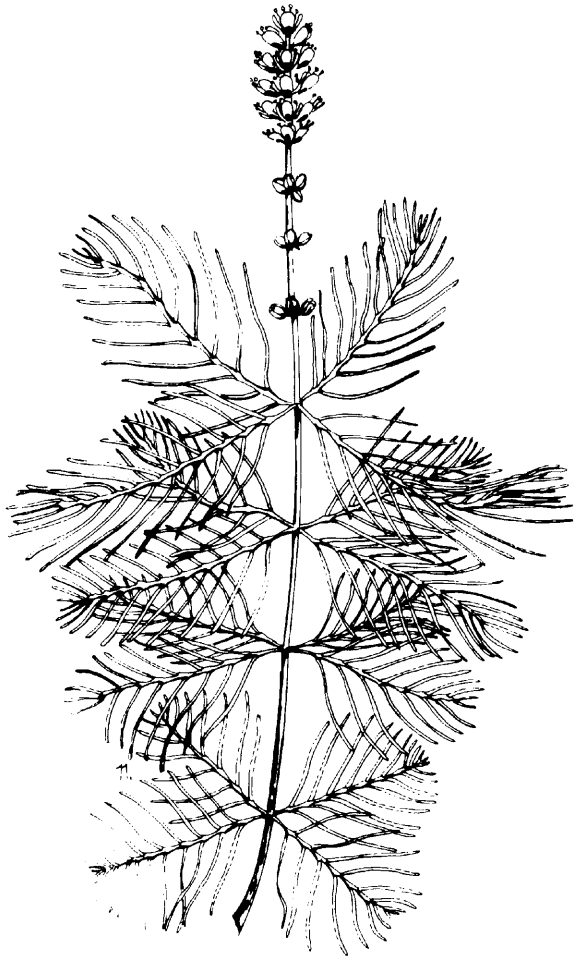
3 Bracts not laminate, mostly linear, finely pinnatisect below to pinnatifid or shallowly toothed to subentire above in the spike, the lowermost similar to the foliage leaves . . . . . 3. *M. pinnatum*

1. *Myriophyllum exalbescens* Fern.

Submersed aquatic with **stems** simple to freely branched, whitened when dried, elongate and flexuous, 2-10(15) dm long; **winter buds** with reduced blackish leaves and shortened internodes often produced from lower nodes in late summer and fall, present through spring. **Leaves** in whorls of 3-4, pinnately dissected, with 5-10(12) filiform segments on each side of the midrib, (0.7)1-3 cm long; lower and middle nodes mostly 1 cm or more apart. **Flowering spikes** red or reddish-purple, clearly distinct from the submersed portion of the stem, 3-10(14) cm long, the **floral bracts** much smaller than the leaves, oblong to obovate, all or at least the upper bracts entire, mostly shorter than the flowers and fruits, only the lower ones sometimes denticulate and slightly longer; **bracteoles** ovate, entire. **Flowers** imperfect, the upper male and the lower female; **petals** present in male flowers, lacking in female flowers, oblong-obovate, concave, 1.5-3 mm long; **stamens** 8, the yellowish-green anthers conspicuous at anthesis. **Fruits** olive, subglobose, 2-4 mm long, the mericarps rounded on the back, smooth or rugulose. Jun—Sep. Shallow to deep water of lakes, ponds, marshes, ditches and sluggish streams; common and often abundant, the numerous reddish spikes often conspicuous on the water surface; (Boreal in N.Amer., s to MD, OH, IN, TX, NM and CA).

The Eurasian *M. spicatum* is introduced and spreading in e U.S. It is very similar to *M. exalbescens* but differs in having leaves more finely divided, with 12-24 filiform segments on each side of the midrib, and larger floral bracts, among other traits. The more aggressive nature of Eurasian milfoil makes it a potential menace in recreational waters. Thus far it has been detected as close to our region as central Minnesota.

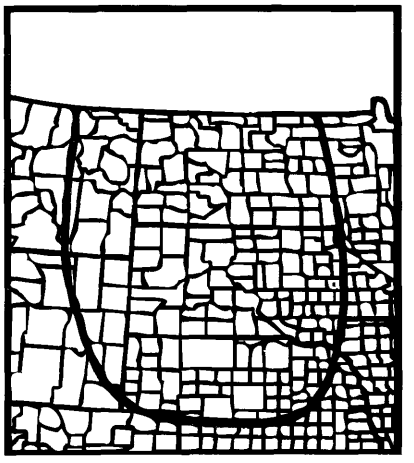




***Myriophyllum exalbescens*, upper stem and inflorescence.**

2. *Myriophyllum heterophyllum* Michx.

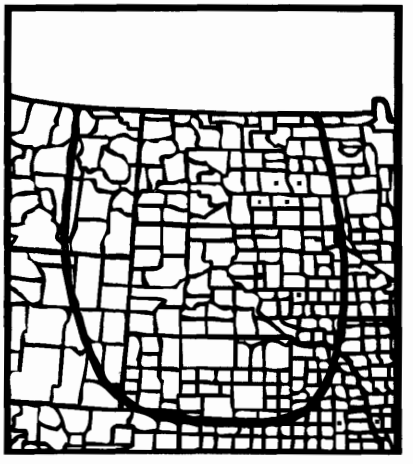
Submersed aquatic with simple or branching, rather robust **stems** to 8 mm thick, usually red-tinged, 3-10 dm or more long; **winter buds** produced at the plant base or from rhizomes, not clavate, green. **Foliage leaves** in whorls of 4-6 or some scattered, 1.5-5 cm long, with 5-14 divisions on each side of the midrib. **Flowering spikes** green to reddish, 5-30(40) cm long; **bracts** in whorls of 4 or some occasionally offset, smaller than the foliage leaves and distinct from them, laminate, oblong-lanceolate to ovate-lanceolate, 3-12 mm long, serrate or the lower ones usually pectinate but with a laminate central portion, with 4-8 ascending teeth or segments, eventually reflexed; **bracteoles** triangular to ovate, spinulose, to 1.2 mm long. **Flowers** perfect and imperfect; **petals** of male and perfect flowers pale, 1-3 mm long; **stamens** 4. **Fruits** olive, subglobose, 1.5-2 mm long, the mericarps rounded or with 2 undulate keels on the dorsal side, otherwise smooth to papillate, conspicuously beaked with the recurved stigma. Jun—Aug. Stream pools and ponds; rare, with collections from Brookings Co., SD; (Que. and ME to SD, s to FL, TX and NM).



3. *Myriophyllum pinnatum* (Walt.) B.S.P.

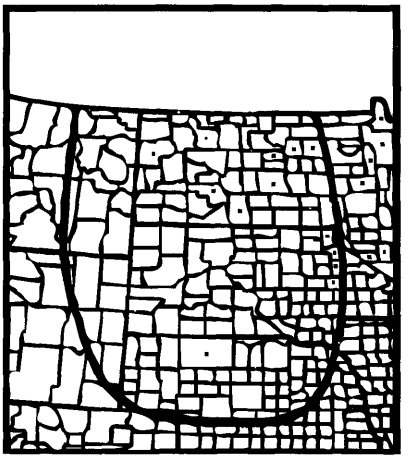
Aquatic or amphibious plant with **stems** freely branching and rooting in mud when stranded or greatly elongating in water. **Foliage leaves** mostly in whorls of 3-5, partly scattered on the stem, mostly 1-3 cm long, with 3-6 remote capillary segments along each side of the midrib; **emersed leaves**, including those subtending flowers, 0.5-2 cm long, much surpassing the flowers and fruits, pinnatifid to shallowly toothed or seldom subentire, usually with 2-4 ascending segments or teeth on each side, the **lowermost floral bracts** grading into the foliage leaves; **bracteoles** bluntly triangular, ca. 1 mm long. **Flowers** perfect or imperfect; **petals** purplish, rounded and short-clawed, 1.5-2 mm long; **stamens** 4. **Fruits** pale, cubic-ovoid, 1.3-1.8 mm long, the mericarps with flat sides and 2 tuberculate dorsal ridges, beaked. Jul—Aug. Shallow water or mud of marshes and shores; rare, with scattered records from se ND, c SD and e NE; (MA to ND, s to FL and TX).

This species was mistaken for *M. heterophyllum* in this region by some previous authors.



4. *Myriophyllum verticillatum* L.

Quite similar to *M. exalbescens*, often more robust with **stems** 5-25 dm long. **Leaves** in whorls of 4-5, with 9-13 filiform segments along each side of the midrib, 1-4.5 cm long; lower and middle nodes mostly less than 1 cm apart; **winter buds** present fall to early spring, clavate, yellow-green. **Flowering spikes** 4-12 cm long, the floral bracts much smaller than the leaves, pectinate, mostly exceeding the flowers; **bracteoles** minute or absent, palmately 7-lobed. **Flowers** perfect or the lower female and the upper male; **petals** reduced in female flowers, otherwise spoon-shaped, obtuse, to ca. 2.5 mm long; **stamens** 8. **Fruits** brownish, subglobose, 2-3 mm long, the mericarps rounded on the back, smooth or somewhat roughened. Jun—Sep. In much the same habitats as *M. exalbescens*, but restricted to fresh water; uncommon, from scattered locations in ND, e SD and nc NE; (Circumboreal, in N.Amer. s to MA, NY, IN, ne TX, NE, UT and B.C.).



30. **Lythraceae**, the Loosestrife Family

Annual or perennial herbs, sometimes woody at the base. **Leaves** simple, entire, opposite or both opposite and alternate or rarely some whorled, sessile or nearly so, exstipulate. **Flowers** single or few clustered in leaf axils or in terminal, bracteate, spikelike inflorescences, subsessile or short-pedicelled, subtended by a pair of small bracteoles on the pedicels, these sometimes deciduous with age. **Flowers** perfect, regular or somewhat irregular, often di- or trimorphic with respect to stamen and style lengths; **calyx** tubular, cylindrical or campanulate to globose, strongly nerved, the calyx lobes 4 or 6, alternating with longer appendages in the sinuses between the lobes; **petals** 4 or 6, separate, pink or purple, crumpled, deciduous; **stamens** numbering as many as or 2X (rarely to 3X) as many as the petals; **stigma** capitate, style simple, slender, ovary superior, free of the calyx tube or cup. **Fruit** a many-seeded capsule.

1 Flowers 4-merous, axillary; calyx tube campanulate to globose; plants annual.

2 Leaves of middle and upper stem attenuate at the base; flowers solitary in the axils ..... 3. *Rotala*

2 Leaves of middle and upper stem auriculate or cordate and clasping at the base; flowers (1)3-many in the axils ..... 1. *Ammannia*

1 Flowers 6-merous, in terminal, bracteate, spikelike inflorescences; calyx tube cylindrical; plants perennial ..... 2. *Lythrum*

1. ***Ammannia*** L. — Toothcup

Usually small, simple to widely branched, glabrous annuals. **Leaves** opposite or an occasional pair subopposite, linear to oblong or oblanceolate, mostly auriculate or cordate and clasping at the base. **Flowers** small, 4-merous, (1)3-many in axillary cymes, these sessile or pedunculate. **Calyx tube** urceolate to campanulate in flower, subglobose in fruit, often strongly 8-ribbed in flower, the 4 **lobes** low and broadly triangular, alternating with 4 short, thickened appendages or these sometimes absent; **petals** normally 4, early deciduous, lavender to rose pink or rose-purple, drying purple; **stamens** 4(-12), exserted; **style** persistent, exserted in fruit. **Capsules** globose, smooth, membranous, irregularly dehiscent; **seeds** numerous, ovoid, ca. 1 mm long.

Reference:
Graham, S. A. 1979. The origin of *Ammannia* X *coccinea* Rottb. Taxon 28:169-178.

1 Plants slender, with axillary cymes borne on filiform peduncles 3-9 mm long; flowers many, with mostly at least 7 per axil; capsules mostly 2.5 mm or less in diameter . . . . . 1. *A. auriculata*

1 Plants robust, with axillary cymes sessile or borne on stout peduncles to 4(-9) mm long; flowers mostly (1)3-5 per axil; capsules mostly 3.5 mm or more in diameter.

2 Inflorescences sessile or nearly so, mostly with 1-3 flowers per axil; petals pale lavender and anthers yellow in fresh flowers; capsules 4-6 mm in diameter . . . . . 3. *A. robusta*

2 Inflorescences on short to prominent peduncles, rarely sessile, mostly with 3-5 flowers per axil; petals deep rose-purple or rose with a deep purple midvein and anthers deep yellow in fresh flowers; capsules mostly 3.5-5 mm in diameter . . . . . 2. *A. coccinea*

1. *Ammannia auriculata* Willd.

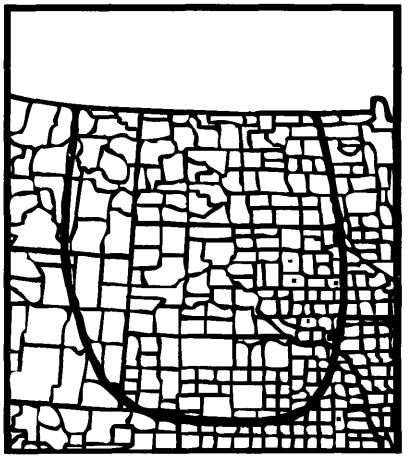
Slender annual 0.5-5(8) dm tall, simple or branched above the base, the branches ascending. **Leaves** linear-lanceolate to linear-oblong, 1-4(6.5) cm long, 1.5-6(10) mm wide, auriculate-clasping at the base. **Inflorescences** of simple to compound, rather open cymes, peduncled from the axils, with (1)3-12(15) flowers per axil, most with at least 7 flowers; **peduncles** filiform, 3-9 mm long; **pedicels** 1-3(6) mm long. **Calyx tube** 1-3 mm long in flower, the **lobes** alternating with short appendages or the appendages absent; **petals** 4, deep rose-purple, ca. 1.5 mm long; **stamens** 4(-8), anthers deep yellow when fresh; **styles** 1-3 mm long in fruit. **Capsules** 1.5-3 mm in diameter, equaling or exceeding the calyx. Jul—Oct. Muddy shores, flats and low spots in fields where water stands temporarily; uncommon, ec SD and s NE; (IN to SD, s to TX and into Mex., C. and S.Amer.; Old World tropics).



2. *Ammannia coccinea* Rottb.

Erect, simple or freely branched annual 0.5-5(10) dm tall, the branches ascending, or basal branches, when present, spreading. **Leaves** linear-lanceolate to linear-oblong or rarely elliptic to spatulate, 2-8 cm long, 2.5-15 mm wide, auriculate or cordate and clasping at the base or cuneate on lowermost leaves. **Inflorescences** of rather compact, axillary cymes, nearly sessile to pedunculate, with (1)3-5(-14) flowers per axil; **peduncles** stout, to 9 mm long; **pedicels** to 2 mm long. **Calyx tube** (2.5)3-5 mm long, the **lobes** alternating with thickened appendages of about the same length; **petals** 4(5), deep rose-purple, sometimes with a deep purple midvein at the base, ca. 2 mm long; **stamens** 4(-7), anthers deep yellow when fresh; **styles** 1.5-3 mm long in fruit. **Capsules** 3.5-5 mm in diameter at maturity, equaling or exceeding the calyx. Jul—Oct. Exposed mud of ponds, marshes and stream banks; uncommon and scattered from ec SD, s into NE; (OH to SD, s to KY and TX; also CA, Mex., C.Amer., n S.Amer. and islands of the Caribbean).

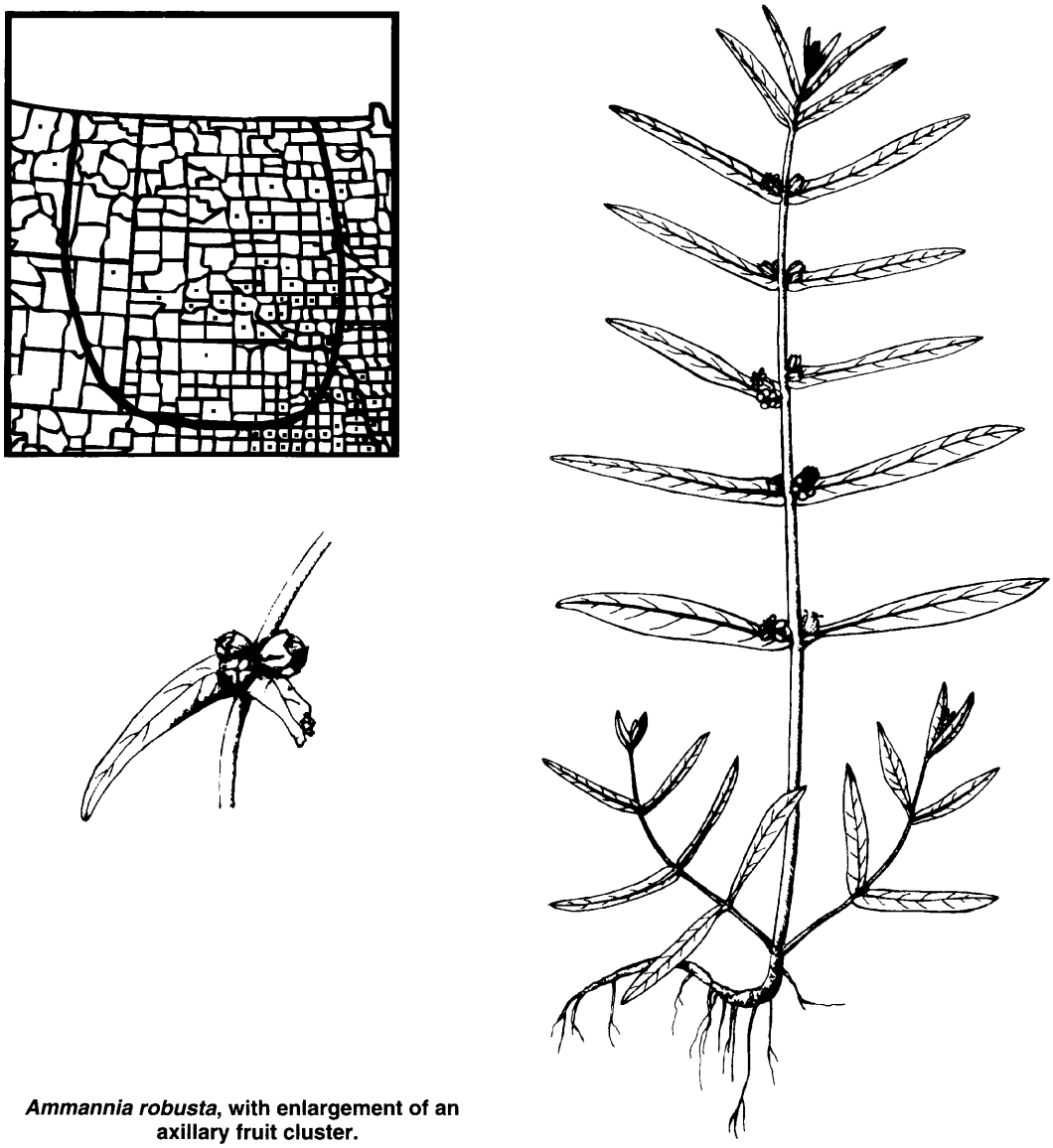
See the discussion under the following.



3. *Ammannia robusta* Heer & Regel

Simple to widely branching annual 0.5-5(10) dm tall, the lower branches, when developed, usually decumbent, often as long as the erect main stem. **Leaves** linear-lanceolate to linear-oblanceolate, rarely elliptic to spatulate, 1.5-8 cm long, 2-15 mm wide, mostly auriculate-clasping at the base, sometimes cuneate on lowermost leaves. **Inflorescences** compact, sessile or essentially so, with 1-3(5) flowers per axil. **Calyx tube** ca. 3.5 mm long in flower, the **lobes** alternating with thickened appendages of about the same length; **petals** 4(-8), pale lavender, sometimes with a deep rose midvein at the base, ca. 2.5 mm long; **stamens** 4(-12), anthers pale yellow to yellow. **Capsules** 4-6 mm in diameter at maturity, enclosed by or equaling the calyx. Jul—Oct. Same habitats as the preceding; frequent, se and sc ND, most of SD and NE, rare in e MT and e WY; (OH to s IA and se ND, s to LA and TX, also CA and NM, otherwise scattered in w states; also Mex.)

The great majority of plants in our region formerly identified as *A. coccinea* are actually *A. robusta*. Graham (op. cit.) has demonstrated that true *A. coccinea* (n = 33) is likely an amphidiploid derived from hybridization between *A. robusta* (n = 17) and *A. auriculata* (n = 15, 16).



***Ammannia robusta*, with enlargement of an axillary fruit cluster.**

2. *Lythrum* L. — Loosestrife

Erect, perennial herbs, sometimes rather woody at the base; **stems** usually with ascending branches above, prominently 4-angled in the upper part. **Leaves** usually mostly opposite below and becoming alternate upward, rarely whorled, sessile, linear-lanceolate to ovate-lanceolate, reduced to bracts in the inflorescence. **Flowers** in showy, terminal, bracteate, spikelike inflorescences, 1-several in the axils of the bracts, regular or somewhat irregular, dimorphic or trimorphic, the stamens and styles of 2 or 3 different lengths. **Calyx tube** cylindrical, green-striate due to the 8-12 strong nerves, the **lobes** alternating with slender appendages; **petals** 6, purple; **stamens** 6 or 12; **ovary** 2-celled. **Capsule** ovoid, firm, septicidal, enclosed by the calyx tube.

Reference:

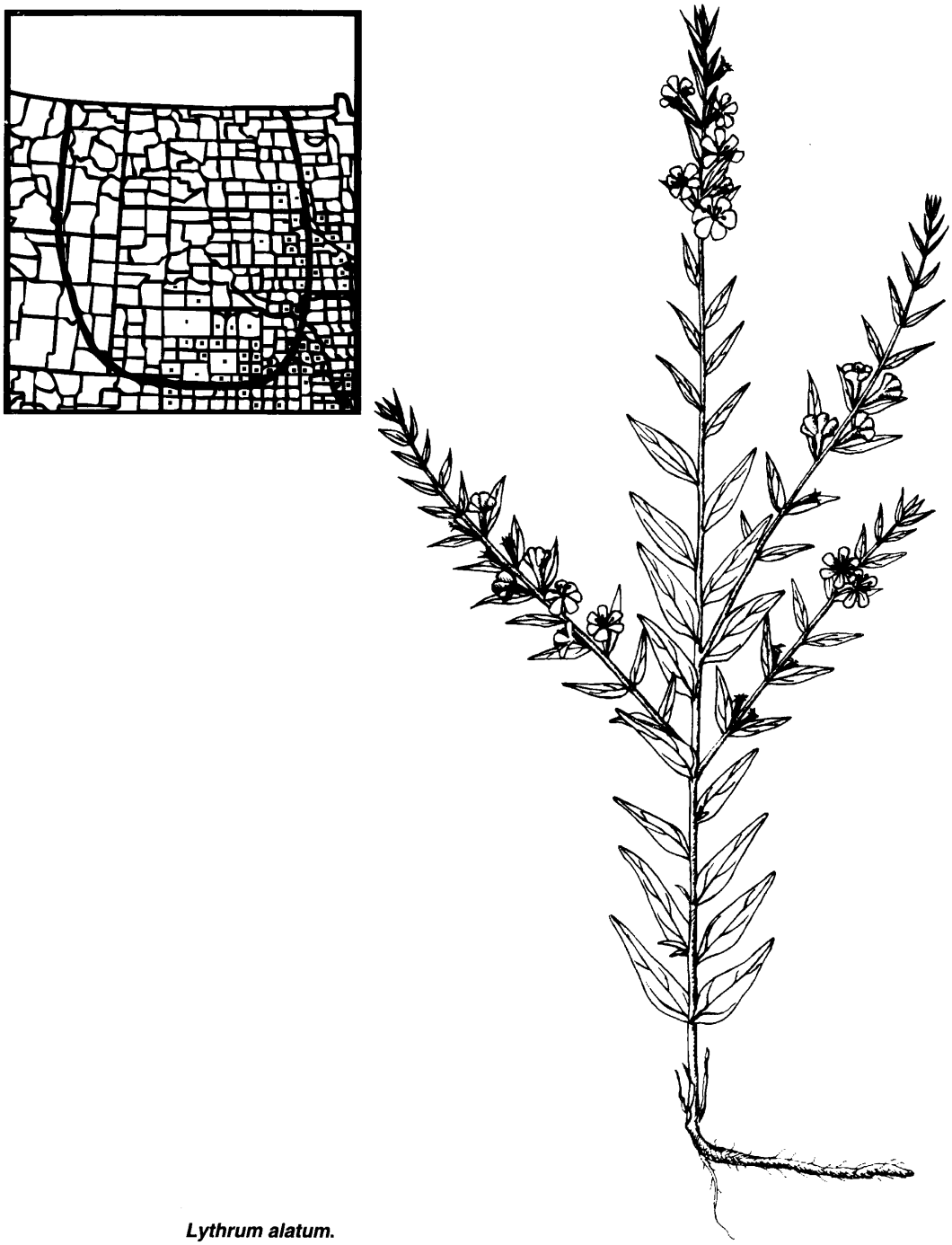
Shinners, L. H. 1953. Synopsis of the United States species of *Lythrum* (Lythraceae). Field and Lab. 21:80-89.

1 Flowers solitary in the axils of the bracts; calyx tube glabrous; stamens usually 6 . . . . . 1. *L. alatum*

1 Flowers mostly 2-several in the axils of the bracts; calyx tube pubescent; stamens usually 12, with 6 exserted and 6 included by the calyx tube . . . . . 2. *L. salicaria*

1. *Lythrum alatum* Pursh

Glabrous, rhizomatous perennial 2-8 dm tall; **stems** simple or usually branched above. **Leaves** usually opposite below and alternate above, ovate-lanceolate to lanceolate, 1-4 cm long, 3-10 mm wide, acute at the tip, rounded at the base. **Flowers** solitary in the axils of the bracts, dimorphic, either the stamens or the style exserted; **calyx tube** 4-6 mm long, glabrous, with appendages ca. 2X as long as the calyx lobes; **petals** 3-7 mm long; **stamens** usually 6. Jul—Aug. Wet meadows and ditches, especially in sandy areas; occasional in se ND, e and s SD, e and c NE; (Ont. to ND and WY, s to GA, AL and OK). *L. dacotanum* Nieuw.

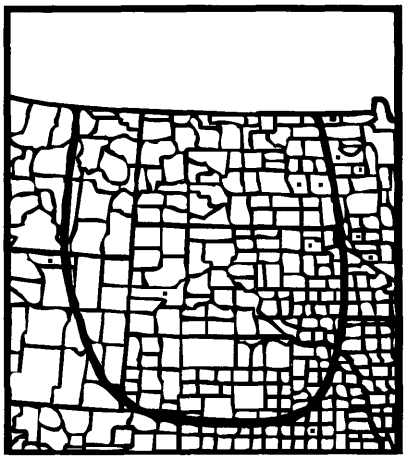


Lythrum alatum.

2. *Lythrum salicaria* L. — Purple loosestrife

Rarely glabrous to usually pubescent perennial 6-12 dm tall; **stems** often much-branched above with the ascending branches terminating in the showy, spikelike inflorescences. **Leaves** opposite to subopposite, rarely whorled, becoming alternate and bractlike in the inflorescence, linear-lanceolate to lanceolate, 3-10 cm long, 0.5-2 cm wide, acute at the tip, obtuse to cordate at the base. **Flowers** mostly 2-several in the axils of the bracts, trimorphic, the stamens and styles of 3 different lengths; **calyx tube** 4-6 mm long, sparsely to densely pubescent, with appendages 2-3X longer than the calyx lobes; **petals** 7-10 mm long; **stamens** usually 12. Jul—Aug. Intro. from Europe, often planted as an ornamental, occasionally escaping to wet ditches, stream banks and floodplains, especially e ND, e and c SD; (Naturalized over much of e and c U.S., s Can. and at a few locations in the w U.S.).

The introduction of purple loosestrife to North America has proven very detrimental to wetlands of the eastern U.S. and Canada. It is an exceedingly aggressive, though attractive, weed of marshes that successfully outcompetes native wetland species. The problem is most acute from central MN eastward to the Atlantic Coast. Unfortunately the plant is of little or no value to wildlife and appears to have no natural enemies here. Purple loosestrife has been widely used as an ornamental in our region, and prospects for the plant increasing in the northern plains are good.



1. *Rotala ramosior* (L.) Koehne

Small, glabrous, simple to freely branched annual to 4 dm tall, the branches spreading to ascending. **Leaves** opposite, linear to oblong or oblanceolate, 1-5 cm long, 2-12 mm wide, attenuate to a subpetiolate base, not clasping. **Flowers** solitary, sessile in the axils, 4(-6)-merous. **Calyx tube** campanulate to subglobose, 2.5-5 mm long, not strongly nerved, the broad lobes alternating with thickened appendages of about equal length; **petals** 4(-6), white to pink, barely exceeding the calyx; **stamens** 4(-6), included or barely exserted; style none or short, not exserted, stigma capitate. **Capsule** globose, 2- to 4-locular, included by the calyx, minutely cross-striate on the outer wall; **seeds** ovoid, 1 mm or less long. Jul—Oct. Muddy or sandy shores, low spots in fields and other temporarily flooded places; uncommon, e SD, e and c NE; (MA to MN and SD, s to FL and TX; also the Pacific Coast states and s into S.Amer. and Carribean islands).



31. **Onagraceae**, the Evening Primrose Family

Perennial and annual herbs (those included here), often flowering in the first year when perennial. **Leaves** simple, alternate, opposite or frequently both on the same plant, entire or toothed, sessile or short-petioled, exstipulate. **Flowers** solitary in the axils of leaves or leaflike bracts, sessile or pedicelled, often arranged in distinct terminal inflorescences (bracteate spikes or racemes), perfect, regular, 4-merous, epigynous, the sepals, petals and stamens arising from the summit of the ovary or from the rim of a short floral tube prolonged beyond the ovary; **sepals** free; **petals** free, white, yellow or pinkish to rose-purple; **stamens** 8 or 4; **stigma** capitate or often 4-lobed, style 1, ovary 4-celled, often 4-angled, sometimes long and slender to appear like a pedicel or an extension thereof. **Fruit** a dehiscent, 4-valved capsule or sometimes weakly dehiscent; **seeds** many, with or without a tuft of hairs (coma).

1 Petals minute or absent, greenish when present; seeds without a coma . . . . . 3. *Ludwigia*

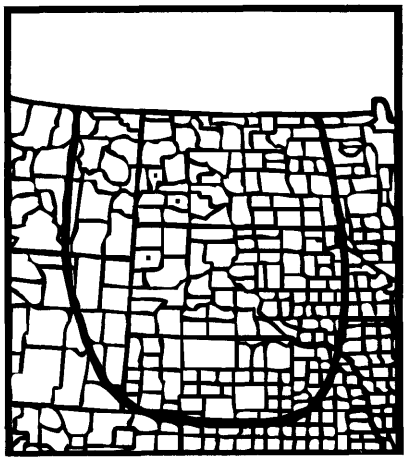
1 Petals white, pinkish or rose-purple; seeds with or without a coma.

  2 Plants annual; seeds without a coma . . . . . 1. *Boisduvalia*

  2 Plants perennial, often flowering the first year; seeds with a coma . . . . . 2. *Epilobium*

1. *Boisduvalia glabella* (Nutt.) Walp.

Low annual 1-3 dm tall, glabrous below, stigulose or villous with white hairs above, usually branched from the base, the **branches** suberect to decumbent, often rooting at the lower nodes. **Lowest leaves** opposite, glabrous, narrowly connate at the base, otherwise leaves alternate, sessile, lanceolate to elliptic-lanceolate, 8-20(30) mm long, 3-6(9) mm wide, sparsely denticulate, loosely villous or strigulose to glabrate, often ciliate. **Flowering terminal portion** of stems erect, the **flowers** solitary and sessile in the axils of leaflike bracts, the flowers and fruits often hidden by the bracts. **Floral tube** prolonged 0.3-1 mm beyond the ovary, short funnelform; **sepals** 4, erect, 0.7-1.8 mm long; **petals** 4, pinkish to rose-purple, 1-3 mm long, deeply bilobed; **stamens** 8, with 4 long ones inserted at the mouth of the floral tube opposite the sepals and 4 shorter ones inserted below the mouth of the tube opposite the petals; **stigma** 4-lobed, ovary 4-celled. **Capsule** elongate, 6-8 mm long, slightly curved, pointed, dehiscent in the upper portion; **seeds** in 1 row of 6-14 per locule, brownish, 1-1.3 mm long. Jun—Jul. Muddy banks and flats of streams and temporary ponds; rare in the w parts of ND, SD and e MT; (Sask. to B.C., s to SD, MT, NV and CA).



2. ***Epilobium*** L. — Willow herb

Fibrous-rooted perennial herbs (those included here), often producing leafy rosettes or subterranean turions from the base late in the growing season, these sessile or on lateral rhizomes or stolons. **Leaves** simple, opposite, alternate or usually opposite below and becoming alternate above, sessile or short-petioled, exstipulate. **Flowers** small, white to pink, solitary in the axils of upper reduced leaves, arranged in simple or branched, terminal racemes. **Floral tube** short or absent; **sepals** 4; **petals** 4, white to pink, notched at the tip; **stamens** 8, in 2 series of 4, the inner 4 stamens much shorter than the outer 4; **stigma** sessile, undivided, ovary linear-elongate, appearing like a continuation of the pedicel, 4-celled, maturing into a linear, 4-valved **capsule**, splitting from the tip to release numerous brown, ellipsoid seeds which bear a terminal tuft of fine hairs (the coma).

References:

Hoch, P. C. *Epilobium, In* The Flora of the Great Plains. The Great Plains Flora Association. Univ. Press of Kansas. 1986.

Hoch, P. C. and P. H. Raven. 1977. New combinations in *Epilobium* (Onagraceae). Ann. Missouri Bot. Gard. 64:136.

Munz, P. A. 1965. *Epilobium. In* North Amer. Flora Ser. II. Part 5. New York Bot. Gard. 198-225.

1 Leaves linear to linear-lanceolate, 1-5(7) mm wide, the margins entire, revolute . . . . . 3. *E. leptophyllum*

1 Leaves lanceolate to ovate-lanceolate, mostly 0.8-3 cm wide, the margins shallowly serrate, not revolute.

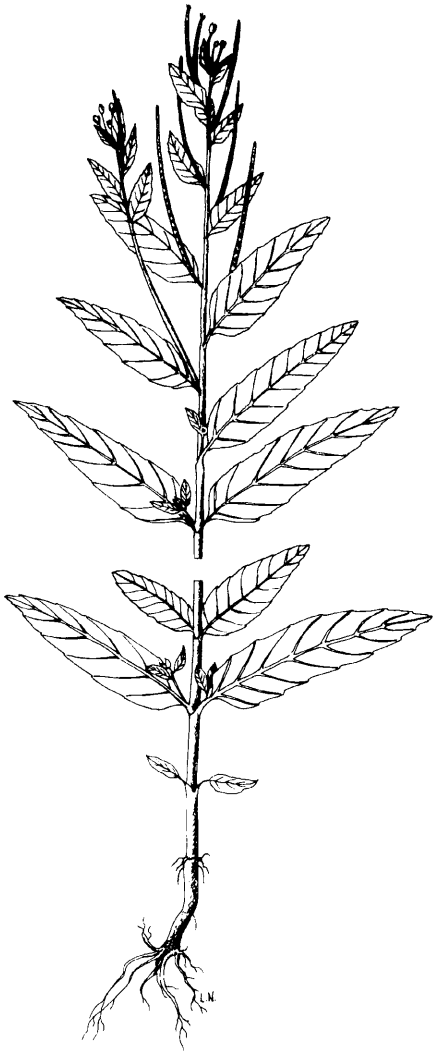
2 Leaves acute or acuminate to a rather blunt tip, each margin with mostly 15-30 teeth or fewer; flower buds obtuse to rounded or slightly pointed at the tip; coma white or nearly so, attached to a short, broad, flattened beak at the tip of the seed . . . . . 1. *E. ciliatum*

2 Leaves long-acuminate to a slender, pointed tip, each margin of the main cauline leaves mostly with 30-75 teeth; flower buds tipped with the 4 projecting or divergent sepal tips; coma cinnamon-colored at maturity, sessile on the beakless rounded tip of the seed . . . . . 2. *E. coloratum*

1. *Epilobium ciliatum* Raf.

Simple and erect to branched and spreading perennial, flowering the first year, producing overwintering above-ground **leafy rosettes** or subterranean **fleshy turions** at the base in autumn, (0.3)1.5-8(12) dm tall; **stems** glabrous below, sparingly to densely pubescent above, with short eglandular hairs intermixed with long glandular hairs, especially pubescent on the decurrent leaf bases and in the inflorescence. **Leaves** opposite below or for much of the length of the stem, usually alternate above, at least in the inflorescence, sessile or with short winged petioles to 6 mm long, the **blades** lanceolate to ovate-lanceolate, 2.5-9(12) cm long, 0.8-3(4.5) cm wide, acute or acuminate to a rather blunt tip, irregularly and shallowly serrate, mostly with 15-30 teeth on each margin, rounded at the base. **Floral tube** 0.5-2.5 mm long; **sepals** ovate, acute, 1.5-5 mm long, not projecting or divergent in bud, the tips forming an obtuse to rounded or slightly pointed bud apex; **petals** whitish to pink, 1.5-10(12) mm long, strongly notched; **pedicels** mostly 3-10 mm long. **Capsules** linear, 3-7(10) cm long, pubescent; **seeds** mostly 0.8-1.6 mm long, longitudinally striate with hyaline crests or ridges, usually not papillate, the coma white or nearly so, attached to a short, broad, flattened beak at the tip of the seed. Jul—Sep. Shores, stream banks, marshes, wet meadows, springs, seepage areas, ditches and other wet places; common; (Newf. and Labr. to AK, s to NC, TN, OH, IA, TX and AZ; also Mex. and C.Amer., Japan and Korea).





Epilobium ciliatum.

Two subspecies occur in the northern Great Plains and they are distinguished as follows:

1a. subsp. *ciliatum*. Plants usually producing above-ground **leafy rosettes** in fall; **cauline leaves** narrowly lanceolate to narrowly ovate; **inflorescence** non-leafy, branched; **petals** white to pink, 1.5-5(8) mm long; **seeds** (0.6)0.8-1.2(1.5) mm long. Occasional in NE and perhaps s SD.

1b. subsp. *glandulosum* (Lehm.) Hoch & Raven. Plants usually producing reddish, subterranean **turions** with fleshy, imbricate leaves in the fall; **cauline leaves** broader; **inflorescence** mostly leafy, unbranched; **petals** pink to rose-purple, rarely white, 3.5-10(12) mm long; **seeds** 1.1-1.6(1.9) mm long. Common throughout. *E. glandulosum* Lehm. var. *adenocaulon* (Hausskn.) Fern., *E. adenocaulon* Hausskn.

Also reported for the Black Hills are three species similar to though apparently much less common than *E. ciliatum*: *E. halleanum* Hausskn., *E. hornemannii* Reichenb. and *E. saximontanum*. They may be distinguished from *E. ciliatum* and each other by the following key:

1 Plants clumped or cespitose, forming short, leafy, above-ground shoots at the base; stem decumbent to ascending at the base; leaves petiolate ..... *E. hornemannii*

1 Plants not clumped or only loosely clumped, forming sessile, leafy rosettes or fleshy turions; stem erect at the base; leaves sessile to occasionally petiolate.

2 Plants 0.3-19 dm tall, forming leafy rosettes or large, subterranean turions; seeds 0.8-1.6(1.9) mm long, longitudinally striate with hyaline crests or ridges but lacking distinct papillae ..... *E. ciliatum*

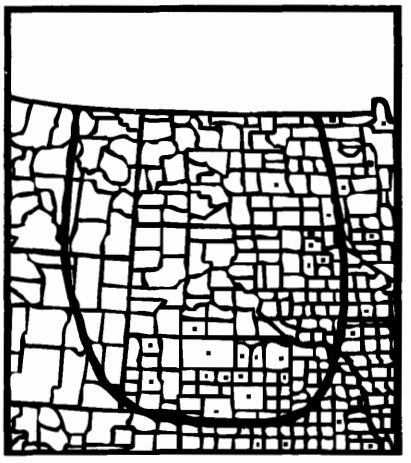
2 Plants 0.2-6 dm tall, lacking rosettes, forming only compact subterranean turions; seeds 1.1-1.6(1.8) mm long, distinctly papillate, the papillae often in longitudinal rows.

3 Leaves sessile, clasping, mostly narrowly ovate, denticulate; turions fleshy, elongate; capsules subsessile, appressed; seed collar conspicuous below the coma ..... *E. saximontanum*

3 Leaves petiolate or subsessile, not clasping, lanceolate or narrower, subentire or denticulate; turions compact, round; capsules on pedicels 0.8-3.8 cm long; seed collar inconspicuous ..... *E. halleanum*

2. *Epilobium coloratum* Biehler — Purple-leaved willow herb

Similar to *E. ciliatum*, averaging larger, mostly 5-10 dm tall, simple below and bushy-branching above in the inflorescence, producing basal, **leafy rosettes** in autumn; **stems** glabrous below, puberulent above with incurved hairs mainly on the decurrent leaf bases. **Leaves** mostly opposite, becoming alternate and reduced in the inflorescence, the main cauline leaves distinctly short-petioled, the **blades** elongate-lanceolate, mostly 4-15 cm long, 0.5-3 cm wide, long-acuminate to a slender, pointed tip, serrulate, with mostly 30-75, low, rather sharp teeth on each margin, rounded at the base. **Floral tube** 0.3-1 mm long; **sepals** ovate to lanceolate, acute to cuspidate, 1.5-3 mm long, projecting or divergent in bud; **petals** pink, 3-5 mm long, strongly notched; **pedicels** to 10 mm long. **Capsules** linear, 3-4.5(6) cm long; **seeds** 1.2-1.7 mm long, papillate on the surface, the coma cinnamon-colored at maturity, sessile on the beakless rounded tip of the seed. Jul—Sep. Shores, springs, swamps and fens; rather scattered from se ND to NE; (ME and Que. to MN and se ND, s to NC, AL, AR, OK and n TX).



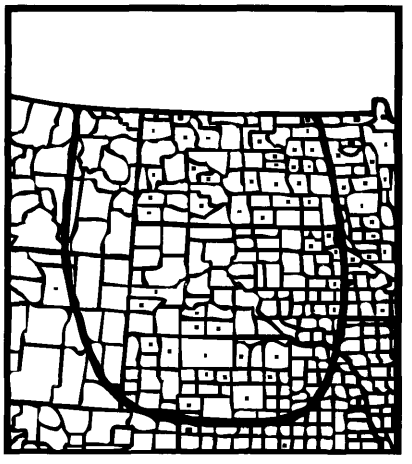
3. *Epilobium leptophyllum* Raf. — Narrow-leaved willow herb

Erect perennial 2-8 dm tall, usually simple from the base, branching above, densely puberulent upward with incurved hairs, producing filiform **stolons** at the base in late summer and autumn, the stolons usually reddish, with remote pairs of minute scales and terminating in ovoid, fleshy **turions**. **Leaves** usually opposite below and alternate above, sessile, linear to linear-lanceolate, gradually reduced upward, 1-6(7.5) cm long, 1-5(7) mm wide, usually densely puberulent with incurved hairs, acute to blunt-tipped, revolute, cuneate at the base. **Floral tube** 0.8-2 mm long; **sepals** ovate-lanceolate, acute, 1.5-4.5 mm long; **petals** white to pinkish, 3-7 mm long, notched; **pedicels** mostly 0.5-2 cm long. **Capsules** linear, 2.5-8 cm long; **seeds** 1-2.2 mm long, the coma white to tawny. Jul—Sep. Shores, stream banks, springs, fens, seepage areas and ditches, often in shallow water; common in the n part, less so s; (Que. to B.C., s to NC, OH, MO, KS, CO and WA). *E. palustre* L., in part.

E. palustre L., which is very similar to *E. leptophyllum*, is reported for Custer and Pennington Counties, SD. The two species are distinguished as follows:

1 Leaves linear to lanceolate or oblong, subglabrous to sparsely strigulose above; inflorescence often nodding in bud, eglandular . . . . . *E. palustre*

1 Leaves linear, rarely wider, densely strigulose above; inflorescence erect or nearly so, often with a mixture of strigulose and glandular hairs . . . . . *E. leptophyllum*



3. *Ludwigia* L. — Seedbox

Perennial, fibrous-rooted herbs with floating, creeping or ascending to erect stems, sometimes stoloniferous. **Leaves** simple, opposite or alternate, entire, subsessile or wing-petioled; **stipules** minute, deciduous. **Flowers** solitary in the axils, sessile or nearly so; **floral tube** not prolonged beyond the ovary; **sepals** 4, green, persistent; **petals** 4 or none, minute and greenish when present; **stamens** 4; **stigma** unlobed, capitate, style short; ovary obconic to cylindric, often 4-angled, usually with 2 bracteoles at or toward the base. **Capsules** 4-celled, many-seeded, dehiscent longitudinally or by a terminal pore, sometimes irregularly dehiscent; **seeds** lacking a coma.

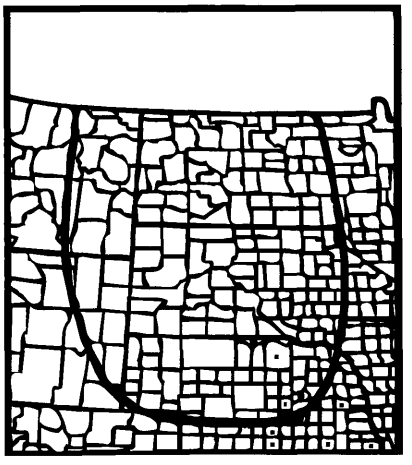
1 Leaves opposite . . . . . 1. *L. palustris*

1 Leaves alternate . . . . . 2. *L. polycarpa*

1. *Ludwigia palustris* (L.) Ell. — Marsh seedbox

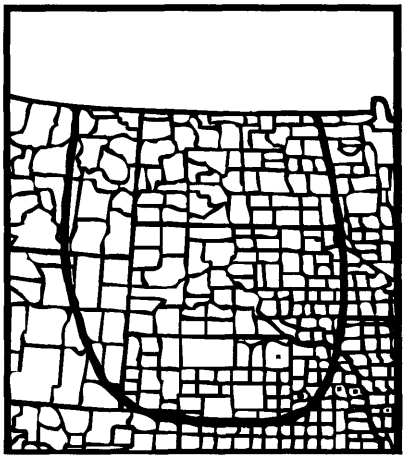
Stems creeping and rooting at the nodes or floating, simple to freely branched, 1-5 dm long, glabrous or with few scattered hairs on younger portions. **Leaves** opposite, the blades elliptic to elliptic-ovate, 3-25(40) mm long, 4-20 mm wide, shiny green or reddish, acute to acuminate, tapered at the base to a winged petiole 3-25 mm long. **Sepals** deltate, 1-2 mm long; **petals** none; **bracteoles** at base of the ovary to 1 mm long or absent. **Capsule** elongate-globose, somewhat 4-angled, with a longitudinal green band on each angle, 2-5 mm long, 2-3 mm thick; **seeds** whitish or yellowish-brown, curved-oblong, 0.5-0.9 mm long. Jun—Sep. Shallow water or mud of ponds, lakes, streams, ditches and around springs; uncommon, n and c NE; (N.S. to B.C., s to FL, TX and CA; also Mex., S.Amer., Eurasia and Africa).

North American plants belong to var. *americana* Fern. & Grisc.



2. *Ludwigia polycarpa* Short & Peter — Many-seed seedbox

Stems erect or ascending, simple to freely branched, usually 4-angled, 1-9 dm tall, glabrous, producing leafy stolons from the base in autumn. **Leaves** alternate, the main cauline leaves with blades lanceolate to oblanceolate, 3-12 cm long, 5-15 mm wide, tapered to an acute tip and a sessile or wing-petioled base, the petiole to 8 mm long. **Sepals** lanceolate-deltate, 2.5-4 mm long; **petals** greenish and minute or absent; **bracteoles** arising from above the base of the ovary, linear-lanceolate, 2-5 mm long. **Capsule** short-cylindric to somewhat obconic, roundly 4-sided or shallowly grooved below each sepal, 4-7 mm long, 3-5 mm thick; **seeds** light yellow, slightly curved, 0.6-0.9 mm long, puncticulate. Jun—Sep. Borders of marshes, lakes, ponds, streams and in wet depressions; rare, e and nc NE; (ME and s Ont. to MN, s to TN, MO and KS, s AL).



1. ***Cornus*** L. — Dogwood

1. *Cornus stolonifera* Michx. — Red osier

Many-stemmed shrub 1.5-3 m tall; **main stems** branched above, the young branches and first-year twigs dark red, older branches yellowish; new growth glabrous to strigulose with 2-branched hairs. **Leaves** opposite, simple, green above, whitish beneath, ovate to broadly lanceolate, mostly 4-15 cm long, 1-7 cm wide; **petioles** 5-25 mm long. **Flowers** crowded in dense, flat-topped, terminal cymes, perfect, regular, ca. 4 mm across; **sepals** 4, minute to 0.5 mm long; **petals** 4, white, 2-3 mm long; **stamens** 4; **carpels** 2, style 1, ovary inferior. **Fruit** a white drupe, 6-9 mm in diameter; **stone** brown with yellow stripes. Late May—Aug. Shores, stream banks, floodplains, moist wooded slopes, springs, fens and other wet or moist habitats; common; (Newf. to AK, s to PA, IL, NE and n Mex.).

Other dogwoods are encountered on the eastern edge of our range but are less often associated with wetland habitats than *C. stolonifera*. These include *C. amomum* P. Mill., pale dogwood; *C. drummondii* C. A. Mey., roughleaved dogwood; and *C. foemina* P. Mill. subsp. *racemosa* (Lam.) J. S. Wils., gray dogwood. All three are found in moist to dry woodlands, often on floodplains, seldom in wetter habitats.





***Cornus stolonifera*, flowering twig and fruit cluster. Photo courtesy U.S. Fish & Wildlife Service.**

33. **Balsaminaceae**, the Touch-me-not Family

1. ***Impatiens*** L. — Touch-me-not

Erect to spreading, glabrous annuals with shallow weak roots and hollow, succulent stems. **Leaves** simple, alternate, exstipulate, the blades shallowly and often remotely serrate. **Flowers** perfect, irregular, yellow to orange-yellow, often reddish-brown spotted, pouchlike and spurred, hanging on the pedicels in few-flowered axillary racemes; **sepals** 3, petaloid, membranous, the upper 2 small, broadly obovate, cuspidate, the lower 1 large, saccate and spurred, broadly funnel-shaped, the spur usually recurved; **petals** 3, the upper petal often broader than long, the 2 lateral petals 2-lobed, each apparently derived by the fusion of a pair of petals; **stamens** 5, the anthers united around the stigma; **ovary** superior, 5-celled, each cell containing several ovules. **Fruit** a 5-valved, fusiform capsule, explosively dehiscent at maturity, scattering the seeds for some distance when jarred or touched.

1 Flowers orange-yellow, usually reddish-brown spotted; spur recurved parallel to the sac and 1/3 to 1/2 its length, the sac conic, longer than wide ..... 1. *I. capensis*

1 Flowers pale yellow, only faintly spotted if at all; spur recurved at a right angle to the sac and 1/5 to 1/4 its length, the sac broadly obtuse, about as wide or wider than long ..... 2. *I. pallida*

1. *Impatiens capensis* Meerb. — Spotted touch-me-not

Plants 4-10 dm tall, usually branched and often spreading above. **Leafblades** ovate to elliptic, 3-9 cm long, 1.5-4 cm wide, acute to obtuse and minutely apiculate at the tip, shallowly and remotely serrate, cuneate to rounded at the base; **petioles** longest on lower leaves, shorter upward, mostly 0.5-6 cm long. **Flowers** orange-yellow, unspotted or usually with reddish-brown spots, 1.5-2.5 cm long, the **spur** recurved parallel to the sac, 1/3 to 1/2 its length, the sac conic, longer than wide. **Capsules** ca. 2 cm long, explosively dehiscent. Jul—Sep. Swamps, springs, stream banks, shores and boggy places, often where wooded; frequent in e and nc ND, e and sw SD and NE; (Newf. and Que. to Sask., s to FL, AL, and TX.). *I. biflora* Walt.

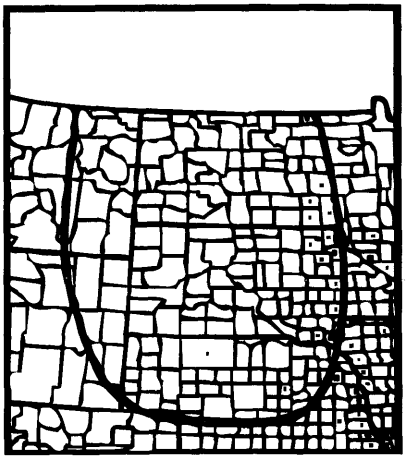




***Impatiens capensis*, with enlarged flower.**

2. *Impatiens pallida* Nutt. — Pale touch-me-not

Very similar to the preceding, averaging larger, the **leaves** with blades to 12 cm long, 8 cm wide, more closely serrate than in *I. capensis*. **Flowers** pale yellow, unspotted or faintly reddish-brown spotted, 2-3(4) cm long, the **spur** recurved at a right angle to the sac, 1/5 to 1/4 its length, the sac broadly obtuse, about as wide or wider than long. **Capsules** as in the preceding. Jul—Sep. Wooded floodplains and stream banks; occasional in the e part, otherwise rare in c NE; (Que. and N.S. to Sask., s to NC, TN, MO and OK).



34. **Apiaceae**, the Parsley Family

Glabrous, biennial to perennial herbs, fibrous or tuberous-rooted, some poisonous; **stems** hollow, sometimes thickened at the base. **Leaves** compound, 1-3X pinnate, alternate, petioled, the leaflets subentire to serrate or incised; **petioles** broadened at the base, with wings sheathing the stem. **Inflorescence** of few to many compound umbels, usually with an involucre of bracts subtending the primary branches (rays) of the umbels and an involucel of bractlets subtending the pedicels of the umbellets. **Flowers** tiny, perfect, regular, 5-merous; **calyx** minutely toothed or obsolete; **petals** white, separate, inflexed at the tip; **stamens** 5; **styles** 2, swollen at the base to form a stylopodium, ovary inferior, 2-celled, maturing into a flattened, corky-ribbed **schizocarp** which ultimately splits along a central commissure into 2, 1-seeded mericarps, the mericarps separating from the base upward to reveal a slender carpophore between them, both mericarps attached to the carpophore at their tips, the carpophore eventually splitting lengthwise as the mericarps separate.

1 Leaves once-pinnate; roots fibrous; primary veins of the leaflets directed toward the teeth of the margin.

  2 Leaflets of upper leaves irregularly incised; fruits with obscure ribs . . . . . 1. *Berula*

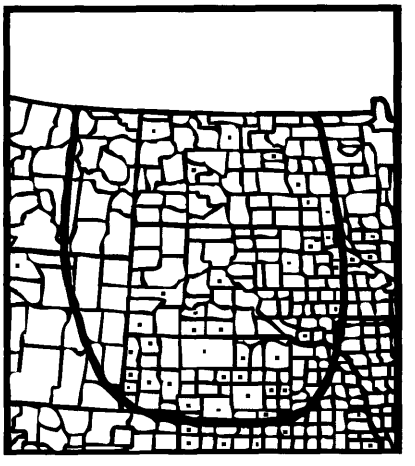
  2 Leaflets of upper leaves regularly serrate; fruits with conspicuous ribs . . . . . 3. *Sium*

1 Leaves 2-3X pinnate; roots usually partly tuberous; primary veins of the leaflets directed toward the sinuses between the teeth of the margin . . . . . 2. *Cicuta*

1. *Berula erecta* (Huds.) Cov.

Fibrous-rooted perennial; **stems** erect to decumbent, 3-8 dm long, often rooting along the prostrate portion, sparsely branched. **Leaves** once-pinnate, basal leaves often present, larger than the cauline leaves, with the leaflets broader and less dissected than those of the cauline leaves; **blades** oblong, 3-20(30) cm long, 2-10 cm wide; **leaflets** lanceolate to ovate or oblong, subentire to toothed or incised. **Umbels** few to many, terminal and lateral, the lateral ones often overtopping the terminal one, 2.5-6 cm across in fruit; **rays** 5-15, 1-3 cm long; **bracts** narrow, entire or toothed; **umbellets** 1-2 cm wide; **pedicels** 2-5 mm long; **bractlets** several, narrow. **Flowers** white, 1-2 mm across; **sepals** minute or obsolete. **Fruit** elliptic or orbicular, somewhat flattened laterally, obscurely ribbed, 1.5-2 mm long, seldom maturing. Jul—Sep. Springs and spring-fed streams; locally common at scattered locations; (NY and Ont. to B.C., s to FL, Mex., C.Amer. and Baja CA; also Europe and the Mediterranean region).

North American plants belong to var. *incisum* (Torr.) Cronq.





Berula erecta.

2. *Cicuta* L. — Water hemlock

Poisonous biennials or perennials, usually with few to many tuberous-thickened roots, the **stem** often thickened and chambered at the base. **Leaves** 2-3X pinnate, the **leaflets** linear to linear-lanceolate or ovate-lanceolate, irregularly incised or regularly serrate, the primary veins directed toward the sinuses rather than the teeth. **Umbels** few to many, terminal and lateral, on stout peduncles; **rays** many, spreading-ascending; **involucre** usually lacking; **pedicels** spreading; **involucel** comprised of several bractlets or rarely absent. **Flowers** white or greenish, 1-2 mm across; **sepals** evident, triangular. **Mature fruits** oval or orbicular, constricted or not constricted at the commissure, the ribs alternating with darker intervals.

These plants are highly poisonous to man and livestock. The tuberous roots, stem base and young shoots are especially toxic. Livestock poisoning from *Cicuta* is more common in the arid w and sw U.S., where grazing animals are attracted to low areas for green forage during dry spells.

References:

Mathias, M. E. and L. Constance. 1942. A synopsis of the American species of *Cicuta*. Madrono 6:145-151.

Mulligan, G. A. 1980. The genus *Cicuta* in North America. Can. J. Bot. 58:1755-1767.

1 Leaflets linear, seldom to 5 mm wide; axils of at least the reduced upper leaves bearing bulbils . . . . . 1. *C. bulbifera*

1 Leaflets linear-lanceolate to ovate-lanceolate, mostly 5-35 mm wide; axils not bearing bulbils . . . . . 2. *C. maculata*

1. *Cicuta bulbifera* L. — Bulbous water hemlock

Erect biennial or perennial 3-10 dm tall, fibrous-rooted or with a few tuberous-thickened roots; **stems** slender, not thickened at the base. **Leaves** all cauline, the **blades** to 15 cm long, to 10 cm wide, with linear or very narrowly lanceolate **leaflets** mostly 2-9 cm long, 0.5-5 mm wide, sparsely and irregularly dentate to incised or subentire, the **upper leaves** much reduced, with few segments or undivided, many bearing 1-few axillary, ovoid **bulbils** 1-3 mm long. **Umbels** often not produced, seldom to 5 cm wide; **rays** 1-2.5 cm long; **bracts** none or few, narrow and inconspicuous; **umbellets** 1-1.5 cm wide at maturity, the **pedicels** 2-5 mm long; **bractlets** several or rarely none, narrow. **Fruits** seldom maturing, orbicular, 1.5-2 mm in diameter, the lateral ribs separated by a constriction on the commissure. Aug—Sep. Pond margins, springs and stream banks; scattered and local, mainly in the e part; (Newf. to B.C., s to VA, IN, IA, NE and OR).



2. *Cicuta maculata* L. — Common water hemlock

Stout biennial or perennial from sterile offshoots produced from the dying main plant, 5-20 dm tall; **stems** solitary or few together from a tuberous-thickened and chambered base, conspicuously hollow above the base, the roots partly tuberous also. **Leaves** basal and cauline, the **basal leaves** larger and longer-petioled than cauline leaves, the **blades** oblong to ovate in general outline, mostly 8-25(35) cm long, 5-15(20) cm wide; **leaflets** linear-lanceolate to ovate-lanceolate, mostly 3-10 cm long, 5-35 mm wide, serrate. **Umbels** several to many, 6-12 cm wide in fruit, on stout **peduncles** 5-15 cm long; **rays** 2-6 cm long; **bracts** none or few to several, narrow; **umbellets** 1-2 cm wide at maturity, the **pedicels** 3-10 mm long; **bractlets** ovate-lanceolate to linear, scarious-margined, 2-15 mm long. **Fruits** rotund-ovate to orbicular, 2-4.5 mm long, glabrous, constricted or not constricted at the commissure, with prominent dorsal and lateral corky ribs. Jul—Sep. Wet meadows, marshes, shores, stream banks, springs and other wet places; common; (Que. to AK, s to FL, TX, NM, AZ, CA and into n Mex.). *C. douglasii* (DC.) Coult. & Rose.

Two varieties of *C. maculata* occur in our region. *C. maculata* var. *angustifolia* Hook. has **styles** usually less than 1 mm long; **fruits** constricted at the commissure, the **lateral ribs** (those bordering the commissure) separated by the groove of the constriction, about equaling the dorsal ribs in width; **principal stem leaflets** more than 5X longer than wide. Var. *angustifolia* is the prevalent form in the w part of our region. This variety has been recognized as a distinct species by many authors who have referred to it as C. *douglasii* (DC.) Coult. & Rose.

C. maculata var. *maculata* differs in having **styles** usually more than 1 mm long; **fruits** not constricted at the commissure, the **lateral ribs** contiguous, each considerably broader than the dorsal ribs; **principal stem leaflets** less than 5X longer than wide. This variety is most common in the e part.

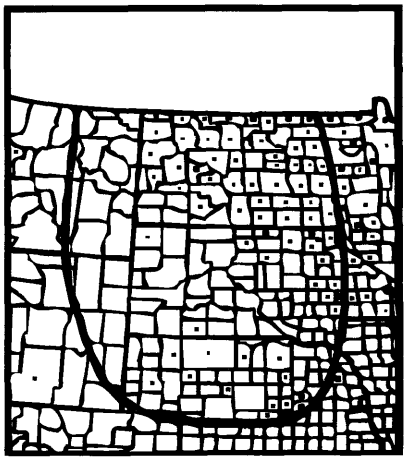




***Cicuta maculata*, lower stem with tuberous roots and terminal flowering portion.**

1. *Sium suave* Walt.

Stout, fibrous-rooted perennial 4-20 dm tall, from a short erect crown; **stems** solitary, strongly ribbed upward, thickened and hollow with cross-partitions at the base, partitioned at the nodes above. **Leaves** once-pinnate, the **blades** oblong to ovate in outline, 5-25(35) cm long, 6-20(30) cm wide; **leaflets** usually 7-17 per leaf, linear to lanceolate, 3-15 cm long, 3-15 mm wide, sharply serrate; **petioles** long below, shorter upward, hollow, septate-nodulose; **submersed leaves** often present early in the season, finely bipinnately dissected. **Umbels** terminal and lateral, few to many, 4-12 cm wide in fruit, on **peduncles** 3-10 cm long; **rays** 1.5-4 cm long; **bracts** 6-10, narrowly lanceolate, entire or incised, reflexed; **umbellets** 7-12 mm wide, the **pedicels** 3-5 mm long; **bractlets** 4-8, smaller than the bracts, entire. **Flowers** white or greenish-white, 1.5-2 mm across; **sepals** minute or none. **Fruits** oval to orbicular, 2-3 mm long, slightly constricted on the commissure, the ribs prominent and corky, subequal. Jul—Sep. Marshes, swamps, springs, ditches and margins of streams, ponds and lakes, often emergent; common; (Newf. to B.C., s to FL, TX and CA).



35. **Gentianaceae**, the Gentian Family

Late summer and fall-flowering annual and perennial herbs. **Leaves** opposite, entire, sessile, exstipulate. **Flowers** 1-many, clustered and sessile or terminal and solitary on long peduncles, blue to bluish-purple, often greenish or whitish on the outside, rather large and showy, perfect, regular, 4- or 5-merous; **calyx** tubular, obconic or funnelform, the lobes often unequal; **corolla** tubular, obconic, funnelform or campanulate, sometimes plicate between the lobes, convolute in bud, the plicate membrane erose to toothed or lacerate at the summit; **stamens** 4 or 5, epipetalous, alternate with the corolla lobes; **stigma** 2-lobed, style short, ovary superior, 1-celled, ellipsoid to cylindric. **Fruit** a 2-valved, many-seeded capsule enclosed by the marcescent corolla.

1 Flowers 5-merous, appearing axillary and clustered in the upper part of the plant; plants perennial . . . . . 1. *Gentiana*

1 Flowers (or flower) 4-merous, terminal, long-peduncled; plants annual . . . . . 2. *Gentianopsis*

1. ***Gentiana*** L. — Gentian

Perennials with thick, fibrous roots. **Flowers** large, lavender to bluish-purple, usually greenish or yellowish-green and blue on the outside, clustered in the upper part of the plant, appearing axillary, each subtended by a pair of small bractlike leaves, 5-merous; **calyx** obconic to funnelform, the lobes unequal; **corolla** tubular to obconic, shallowly lobed, plicate between the lobes, the plicate membrane erose to toothed or lacerate at the summit, less than to slightly exceeding the lobes; **stamens** 5, the anthers sometimes fused around the ovary. **Seeds** flattened and winged with a pale margin.

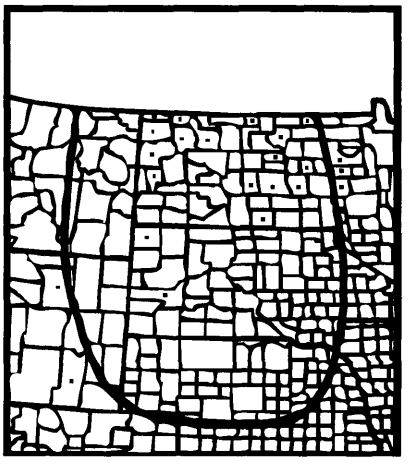
1 Corolla lobes distinct, 2.5-6 mm long, the plicate membrane between the lobes toothed at the summit; stems puberulent on the decurrent leaf bases . . . . . 1. *G. affinis*

1 Corolla lobes low and indistinct, continuous with the erose plicate membrane; stems glabrous . . . . . 2. *G. andrewsii*

1. *Gentiana affinis* Griseb.

Stems 1-several from the base, 1-4 dm tall, simple or with short, erect branches above in the inflorescence, puberulent on the decurrent leaf bases especially in the upper part. **Leaves** lanceolate to elliptic-lanceolate, or the lower ones sometimes ovate to elliptic, 1-4 cm long, 0.3-1.5 cm wide, thick-textured and roughened, bluntly acute to obtuse at the tip, rounded and not clasping at the base. **Flowers** (1) few to many, 2-3.5 cm long; **calyx tube** funnelform, 4-8 mm long, the lobes unequal, erect to ascending, linear-lanceolate, less than 1/2 to nearly as long as the tube; **corolla** tubular to obconic, the lobes distinct, acute to rounded, 2.5-6 mm long, the plicate membrane between the lobes toothed at the summit; **anthers** free, not fused around the ovary. **Seeds** roughly oval to elliptic, 1-1.5 mm long. Aug—Sep. Wet meadows, shores, springs, seepage areas and low prairie; ND, MT, n and w SD, WY; (Man. to Yuk., s to SD, CO and CA).

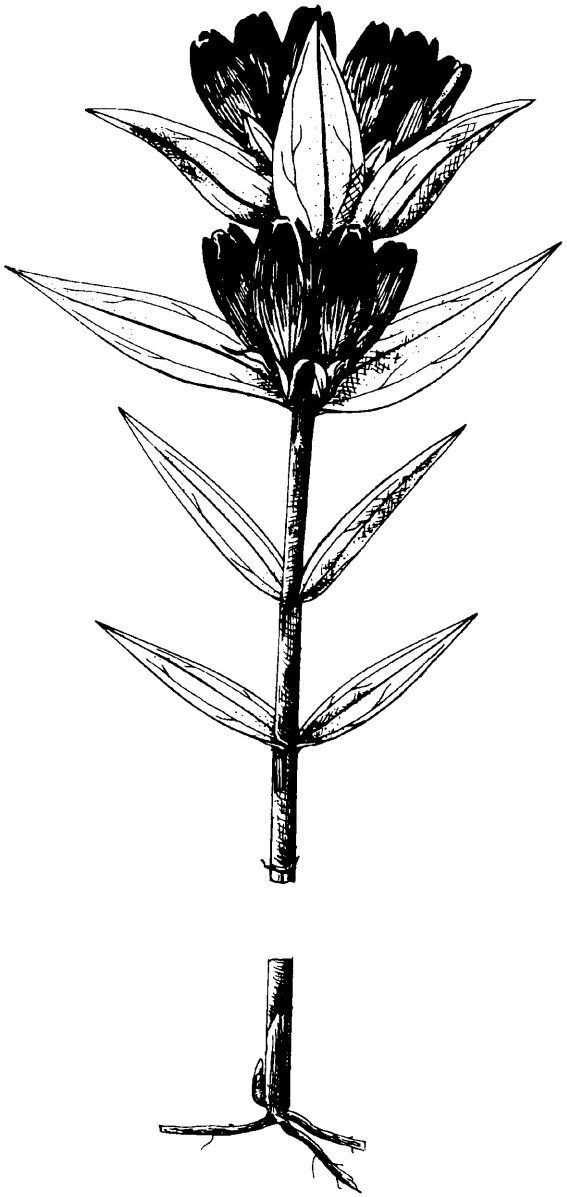
G. puberulenta Pringle (*G. puberula* of many authors), which is similar to *G. affinis*, typically grows in drier situations. A few collections, however, have come from low prairie. *G. puberulenta* is distinguished from *G. affinis* by its larger flowers (3.5-5 cm long), longer calyx tube (ca. 1 cm long), subequal calyx lobes and longer corolla lobes (4-8 mm long).



2. *Gentiana andrewsii* Griseb. — Closed gentian

Stems erect, single or few together, 1.5-6 dm tall, simple, glabrous. **Leaves** lanceolate to broadly elliptic-lanceolate, 4-9 cm long, 0.6-3 cm wide, smooth, acute at the tip, rounded to acute at the base. **Flowers** (1) few to many, clustered in upper leaf axils, 2.5-4.5 cm long; **calyx tube** obconic, 10-14 mm long, the lobes unequal, variable in shape, mostly lanceolate to ovate-lanceolate, less than 1/2 to as long as the tube; **corolla** tubular, remaining closed, the lobes low and indistinct, rounded, continuous with and slightly shorter than to about equaling the erose-margined, plicate membrane; **anthers** fused around the ovary at anthesis. **Seeds** as in the preceding except larger, 1.5-2 mm long. Aug—Sep. Wet meadows, low prairie and ditches; uncommon in the e part, rare in the c and w parts; (Que. to Man., s to NJ, NC, OH, MO and NE).





Gentiana andrewsii.

2. *Gentianopsis* Ma — Fringed Gentian

Slender annuals with a small taproot. **Flowers** 1-several (many), often large, purple to bluish-purple, sometimes tinged with white on the outside, long-peduncled, terminal on the main axis and branches, 4-merous; **calyx** obconic to funnelform, with 2 opposite lobes longer and more slender than the other 2 opposite lobes; **corolla** tubular to campanulate, deeply lobed, lacking a plicate membrane between the lobes, the **lobes** erose or fringed at the tips and sometimes down the sides; **stamens** 4, the anthers free. **Seeds** somewhat flattened, densely covered with irregular vesicles.

Reference:

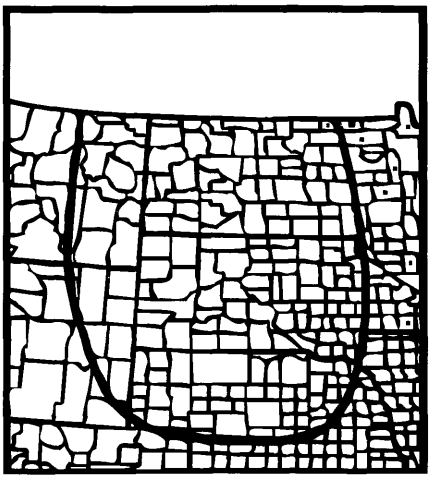
Iltis, H. H. 1965. The genus *Gentianopsis* (Gentianaceae). Transfers and phytogeographic comments. Sida 2:129-154.

1 Leaves ovate to ovate-lanceolate, 2-5X longer than wide; corolla lobes fringed across the tip with linear fringe-segments which are 2-6 mm long ..... 1. *G. crinita*

1 Leaves linear to linear-lanceolate, 10-15X longer than wide; corolla lobes erose-toothed across the tips, often fringed on the sides ..... 2. *G. procera*

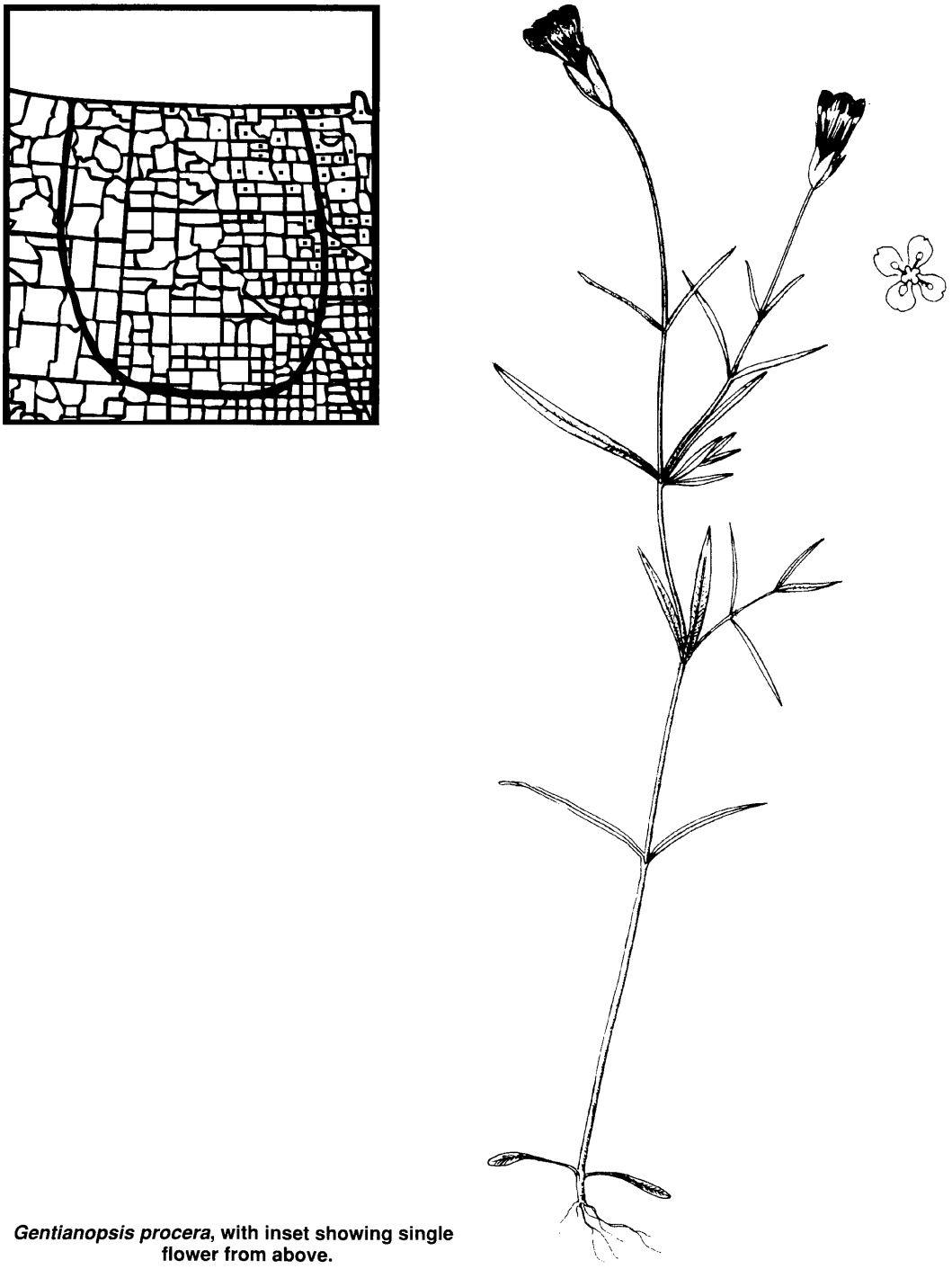
1. *Gentianopsis crinita* (Froel.) Ma

Plants erect, 1-5 dm tall, usually branched above. **Basal leaves**, when persistent, smaller than the cauline leaves, spatulate to oblanceolate; **cauline leaves** ovate to ovate-lanceolate, 2-5 cm long, 0.5-2.5 cm wide, 2-5X longer than wide, acute at the tip, rounded to subcordate at the base, usually clasping. **Flowers** 3.5-6 cm long; **calyx tube** funnelform, 12-20 mm long, the broader pair of lobes oblong to ovate, hyaline-margined, the narrower pair usually longer and lance-attenuate; **corolla** funnelform to campanulate, the **lobes** fringed across the tip (and often down the sides) with linear fringe-segments 2-6 mm long. Aug—Sep. Wet meadows, stream banks, wet woods and boggy places; rare and barely entering our range in e ND and e SD; (ME to Man., s to MD, NC, OH, IA and SD). *Gentiana crinita* Froel.



2. *Gentianopsis procera* (Holm.) Ma

Quite similar to the preceding, differing mainly as follows: **Leaves** linear to linear-lanceolate, (1.5)2-6 cm long, (1)2-7 mm wide, 10-15X longer than wide, bluntly acute, tapered slightly to a nonclasping base. **Flowers** (1.5)2.5-5 cm long; **calyx tube** obconic, 6-15 mm long; **corolla** tubular to obconic, the **lobes** erose-toothed across the tips, often fringed on the sides. Aug—Sep. Calcareous springs and fens; occasional in e, c and nw ND, ne and nc SD; (NY and Ont. to Alta., s to OH, IL, IA, ND and MT). *Gentiana procera* Froel.

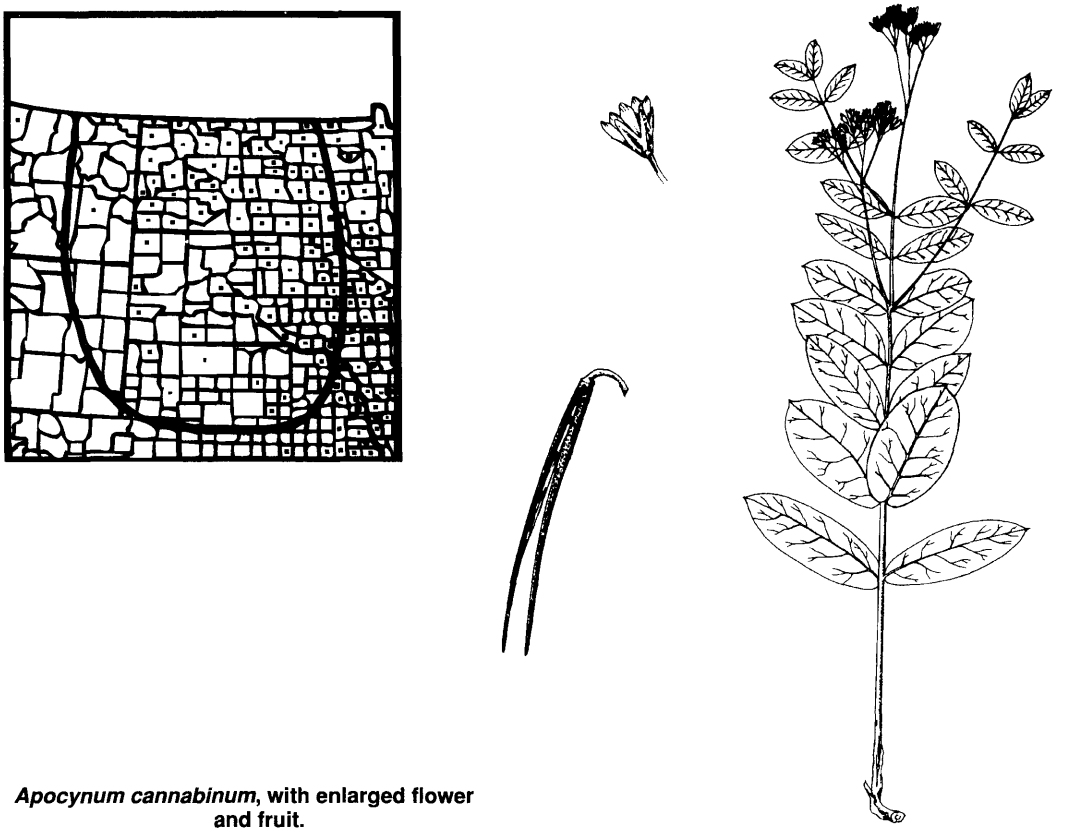


***Gentianopsis procera*, with inset showing single flower from above.**

1. ***Apocynum*** L. — Dogbane

1. *Apocynum cannabinum* L. — Prairie dogbane, Indian hemp

Erect, milky-juiced herb 3-10 dm tall, perennial from spreading rhizomes, weedy and often forming large patches, glabrous or nearly so; **stem** simple below, dichotomously branched mainly in the upper half. **Leaves** simple, opposite, sessile and clasping the stem to short-petiolate and not clasping, the lower leaves tending more to be sessile or shorter-petioled than the upper ones; **blades** ovate to oblong or lanceolate, 3-14 cm long, 0.7-4.5(7) cm wide, acute to rounded and apiculate at the tip, acute to rounded or cordate at the base. **Inflorescence** of 1 or more dense, terminal cymes; **bracts** linear to lanceolate, mostly inconspicuous, the lower ones sometimes rather leaflike and conspicuous. **Flowers** small, white or greenish-white, erect to drooping, perfect, regular; **calyx** 5-parted to near the base, the lobes linear to lanceolate, 1.2-3(3.5) mm long; **corolla** 5-lobed, narrowly campanulate to urceolate or short-cylindric, 2.6-4.7 mm long, the lobes triangular, 1/2 or less the length of the corolla tube; **stamens** 5, inserted near the base of the corolla tube, anthers triangular, slightly adherent to the stigma and converging to form a cone above it; **carpels** 2, separate below, each with its own ovary, united above and sharing a sessile stigma, ovaries superior, subtended by 5 nectaries that alternate with the stamens. **Fruit** of 2 or (by abortion) 1, many-seeded follicles, these divergent to pendulous, linear-cylindric, 7-20 cm long; **seeds** narrowly fusiform, 3-6 mm long, with a coma of white to tawny, silky hairs at the tip. Flowering Jun—Aug, fruiting Aug—Oct. Borders of marshes, lakes and streams and other wet to moist places, often where disturbed; common; (N.S. and N.B. to B.C., s to FL, TX, CA and into n Mex.). *A. sibiricum* Jacq.



***Apocynum cannabinum*, with enlarged flower and fruit.**

1. ***Asclepias*** L. — Milkweed

1. *Asclepias incarnata* L. — Swamp milkweed

Tall, stout, milky-juiced perennial 6-15 dm tall, from a thick rootstock, glabrous except for short, appressed or curved pubescence in the uppermost part. **Leaves** simple, opposite, short-petioled, the blades linear-lanceolate to lanceolate or seldom ovate-lanceolate, 6-15 cm long, 1-5 cm wide, acute-tipped, entire, cuneate to rounded at the base. **Flowers** usually numerous in terminal and axillary umbels, deep pink to purplish-red, perfect, regular, 5-merous, 4-6 mm wide; **calyx** spreading to eventually reflexed, the sepals 1.5-2.5 mm long, often hidden beneath the reflexed **petals** which are 3-6 mm long; **corolla** with a petaloid corona above the petals, the **corona** comprised of 5 hoods which are 2-3 mm long, each with a subulate, incurved horn projecting from the orifice; **stamens** 5, the anthers united around the gynoecium, adherent to the stigma to form a structure called the **gynostegium**, the pollen of each anther sac contained in a waxy mass termed the **pollinium**, the pollinium of each anther sac connected to the pollinium in the sac of the adjacent anther by a translator, these double pollinia released intact at pollination; **carpels** 2, enclosed by the gynostegium, the ovaries separate but the styles and stigmas fused. **Fruit** produced by only a few of the flowers, usually 1 of the 2 carpels maturing, the fruit a large fusiform follicle containing many seeds which bear a fluffy white coma. Jul—Aug. Swamps, marshes, ditches, stream banks, springs and fens, where water is fairly fresh; frequent in e and c ND, e and s SD and most of NE; (N.S. to Sask., s to FL, TX and NM).





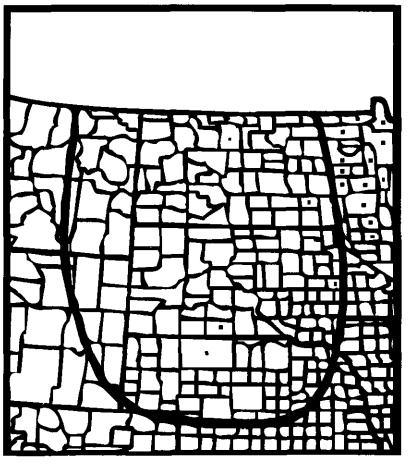
Asclepias incarnata.

38. **Menyanthaceae**, the Buckbean Family

1. ***Menyanthes*** L. — Buckbean

1. *Menyanthes trifoliata* L.

Glabrous, rhizomatous perennial with flowering scapes 1.5-3.5 dm tall; rhizome thick, covered with old leaf bases. **Leaves** all basal, with the sheathing petiole bases arranged alternately on the rhizomes, the blades palmately 3-foliate, the **leaflets** elliptic to oblong or oblanceolate to obovate, 3-10 cm long, 1-5 cm wide, entire or sometimes coarsely undulate-dentate. **Inflorescence** a scapose, bracteate raceme, surpassing the leaves; **bracts** mostly 3-5 mm long; **pedicels** 4-20 mm long. **Flowers** perfect, regular, 5(4-6)-merous, often dimorphic, some flowers with exserted stamens and included style, others with exserted style and included stamens; **calyx** deeply divided, the oblong-ovate lobes 1.5-3 mm long; **corolla** whitish or pinkish, salverform, lobed to near or below the middle, 8-12 mm long, the lobes eventually recurved, conspicuously fringed on the inner surface; **stamens** usually 5, epipetalous; **stigma** 2-lobed, style elongate, ovary ca. 1/3 inferior, 1-celled. **Fruit** a globose, corky-walled capsule 6-10 mm in diameter, rupturing irregularly, containing many shiny, yellowish-brown seeds. Jun—Aug. Fens and old bogs; rare, with scattered records from ND, SD and n NE; (Circumboreal, s in N.Amer. to DE, VA, OH, MO, SD, CO and CA).



39. **Boraginaceae**, the Borage Family

Annual or perennial herbs (those included here), often widely branching, with mostly alternate, simple, entire leaves and 1-sided scorpioid spikes or racemes of flowers. **Flowers** perfect, regular, 5-merous; **calyx** deeply lobed; **corolla** white, bluish or blue, conspicuous or not, lobed to near the middle or less, the lobes spreading, sometimes with 5 appendages (fornices) opposite the lobes, these more or less closing the throat of the corolla tube; **stamens** 5, epipetalous, included; **pistil** 2-carpellary, stigma sessile or on a short, terminal or gynobasic style, ovary superior, 4-celled, often 4-lobed. **Fruit** 4-lobed, splitting into 4 nutlets at maturity.

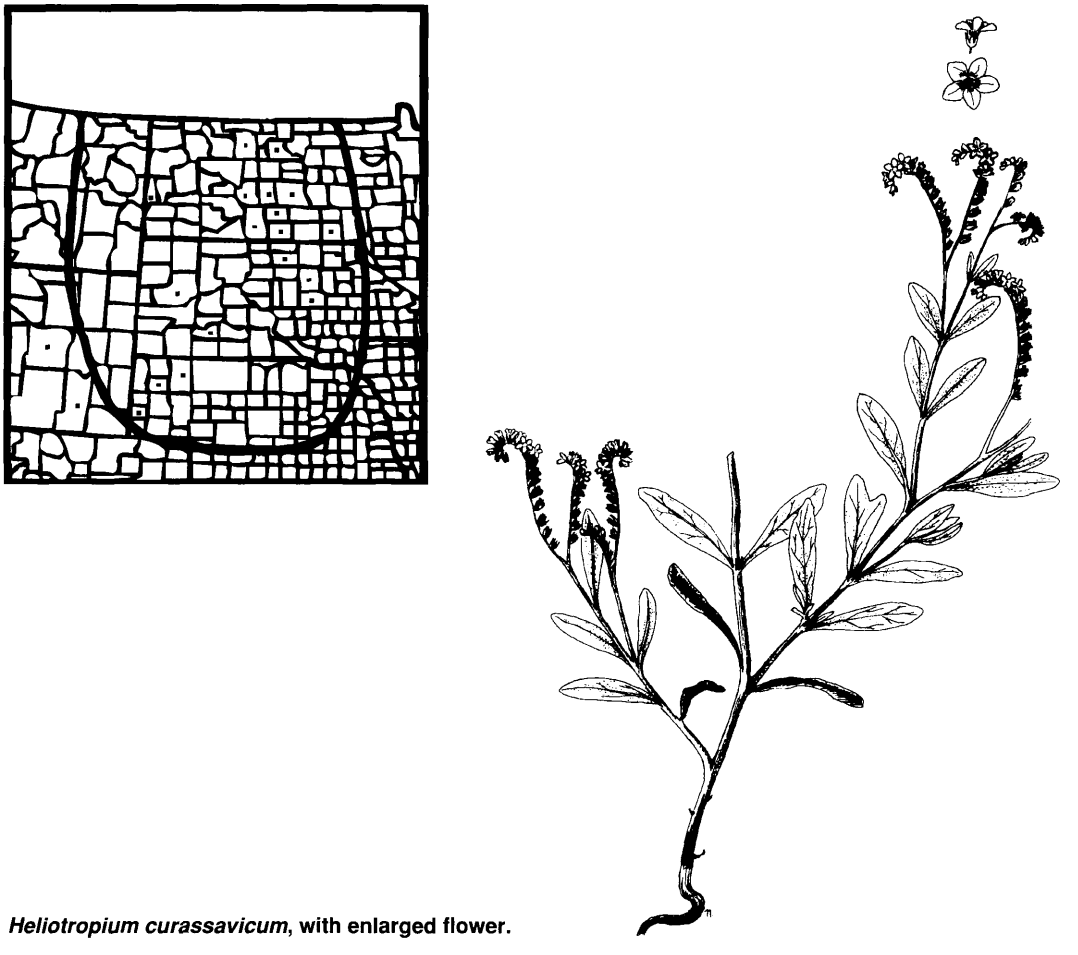
1 Leaves oblanceolate to obovate, glabrous; flowers showy, white or bluish, 5-10 mm across . . . . . 1. *Heliotropium*

1 Leaves linear, strigose; flowers inconspicuous, white, 1-2 mm across . . . . . 2. *Plagiobothrys*

1. *Heliotropium curassavicum* L. — Seaside heliotrope

Succulent, glabrous, taprooted annual or shortlived perennial 1-4 dm tall, decumbent to prostrate with spreading-ascending branches. **Leaves** alternate or an occasional pair subopposite, the blades oblanceolate to obovate, 2-6 cm long, 0.6-2(3) cm wide, obtuse to rounded at the tip, tapered to a subsessile to short-petioled base. **Flowers** closely spaced and secund on the 1-several branches of the **scorpioid spikes or racemes**, sessile or on pedicels to ca. 1 mm long; branches of the inflorescences usually less than 5 cm long but up to 10 cm long. **Flowers** showy, white or bluish with a yellow throat, 5-10 mm across, fornices lacking; **calyx** 2-4 mm long; **corolla** salverform, the spreading lobes about equaling or shorter than the tube; **stigma** as broad as the ovary, sessile or on a short terminal style. **Fruit** splitting into 4 nutlets at maturity, these 1.5-3 mm long, sometimes with corky ridges on the back. Jul—Sep. Saline or alkaline shores, flats and stream banks; occasional in ND, MT, SD, w NE and WY; (Intro. from tropical Amer., n to s Can.).

In the Black Hills, *Myosotis scorpioides* L., forget-me-not, is of frequent occurrence around springs and cold streams. The attractive blue flowers with yellow centers are of about the same dimensions as those of *Heliotropium curassavicum*, but the plant is nonsucculent, with sparsely strigose foliage, decumbent or creeping stems that root at lower nodes and more open scorpioid cymes. This plant is an escaped ornamental from Eurasia and has become widely established in other parts of North America.



***Heliotropium curassavicum*, with enlarged flower.**

2. ***Plagiobothrys*** F. & M. — Popcorn-flower

1. *Plagiobothrys scouleri* (H. & A.) I. M. Johnst.

Low, strigose annual 0.5-3 dm tall, with several to many prostrate to ascending or suberect stems, or single-stemmed and erect. **Leaves** alternate or only the lowest 1-few pairs opposite, sessile, linear, 0.5-3 cm long, 1-3 mm wide, strigose to short-hispid, acute-tipped. **Flowers** very small, remotely spaced in irregularly bracteate false spikes or racemes which often run nearly the entire length of the stems; **calyx** deeply lobed, 2-4 mm long; **corolla** inconspicuous, white, slightly surpassing the calyx, 1-2 mm across, fornices minute but well-developed. **Nutlets** usually 4 (or 1-3 by abortion), ovate-lanceolate, 1.5-2 mm long, rugose on the back and also commonly tuberculate, sometimes with minute bristles. Jun—Aug. Shores, stream banks, ditches and dried flats of temporary ponds and marshes, usually in heavy gumbo soils; occasional in c and w ND and SD, e MT and WY and probably w NE; (Man. to B.C., s to SD, NM and CA). *P. scopulorum* (Greene) I. M. Johnst.



40. **Verbenaceae**, the Vervain Family

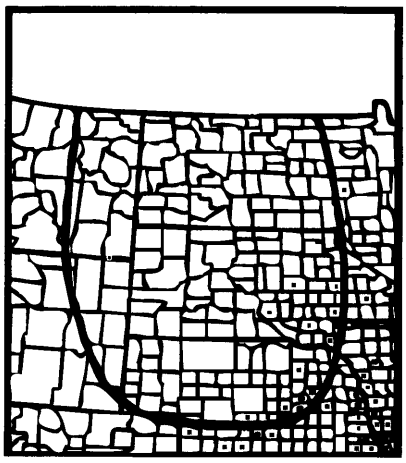
Perennial herbs with 4-angled, erect or mostly prostrate stems and simple, opposite, serrate leaves. **Inflorescence** of dense, terminal or axillary, bracteate spikes, these elongate or globose to short-cylindric, elongating as flowering progresses upward from the base. **Flowers** small and numerous, perfect, slightly to obviously irregular; **calyx** 5-toothed or deeply 2-parted; **corolla** 5- or 4-lobed, bilabiate or slightly so, blue-violet or white to bluish or purple-tinged; **stamens** 4, didynamous, epipetalous, included by the corolla or slightly exserted; **pistil** 2-carpellary, style terminal (not gynobasic as in Lamiaceae), ovary superior, 4- or 2-celled. **Fruit** developing inside the calyx, splitting lengthwise into 4 or 2 nutlets at maturity, each nutlet containing a seed.

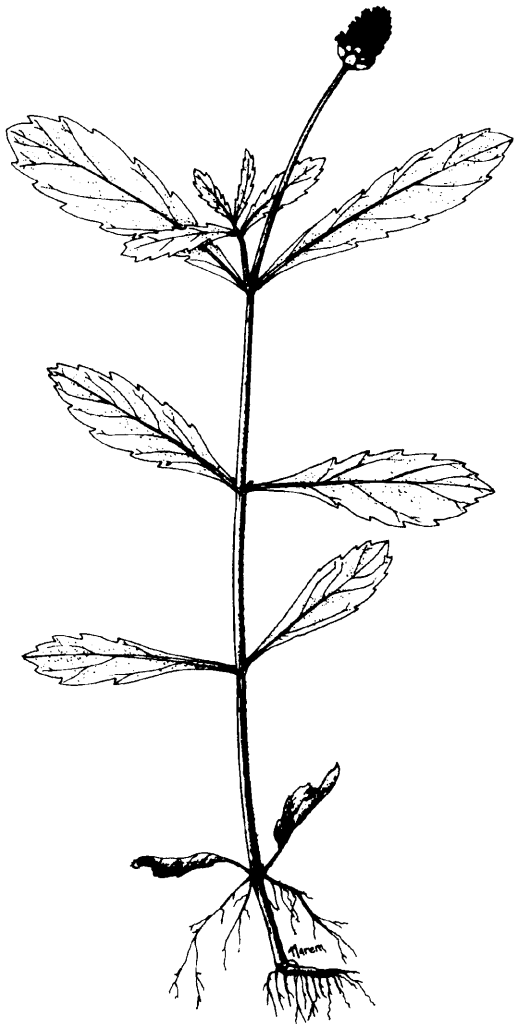
1 Flowers white to bluish or purplish, in globose to short-cylindric spikes from the axils . . . . . 1. *Lippia*

1 Flowers blue-violet, in elongate, terminal spikes . . . . . 2. *Verbena*

1. *Lippia lanceolata* Michx. — Northern fog-fruit

Perennial from a branched base, with prostrate to ascending 4-angled stems, usually rooting at the nodes, sometimes forming mats, the stem tips and lateral branches ascending to erect; **foliage** strigose with malpighiaceous hairs. **Leaves** opposite, the blades bright green, elliptic to ovate, oblong, ovate-lanceolate or oblong-lanceolate, 1.5-7.5 cm long, 0.5-3 cm wide, acute or subacute at the tip, coarsely serrate to below the middle, cuneate at the short-petioled base. **Flowers** tiny and densely crowded in spikes from the axils, the **spikes** usually single at the nodes, initially globose, elongating to become short-cylindric, 5-35 mm long, 5-7 mm thick, on slender **peduncles** 1.5-9 cm long; **bractlets** ovate to obovate, 2-3 mm long, often rose-pink on the margins. **Calyx** deeply 2-parted and compressed, membranous, about equaling the corolla tube; **corolla** pale blue, purplish or white, marcescent and fading, 3-4 mm long, 4-lobed and bilabiate, the lower lip larger than the upper; **stamens** included or slightly exsert; **ovary** 2-celled, each cell containing 1 ovule; stigma thickened, oblique or recurved. **Fruit** included in the calyx, dry, separating into 2 yellowish or olivaceous nutlets 0.9-1.3 mm long. Jun—Sep. Margins of lakes, ponds, streams, ditches and in swales and wet woodlands; e and sc SD, e and c NE; (Ont. to MN and SD, s to FL, TX, NM, CA and n Mex.) *Phyla lanceolata* (Michx.) Greene.

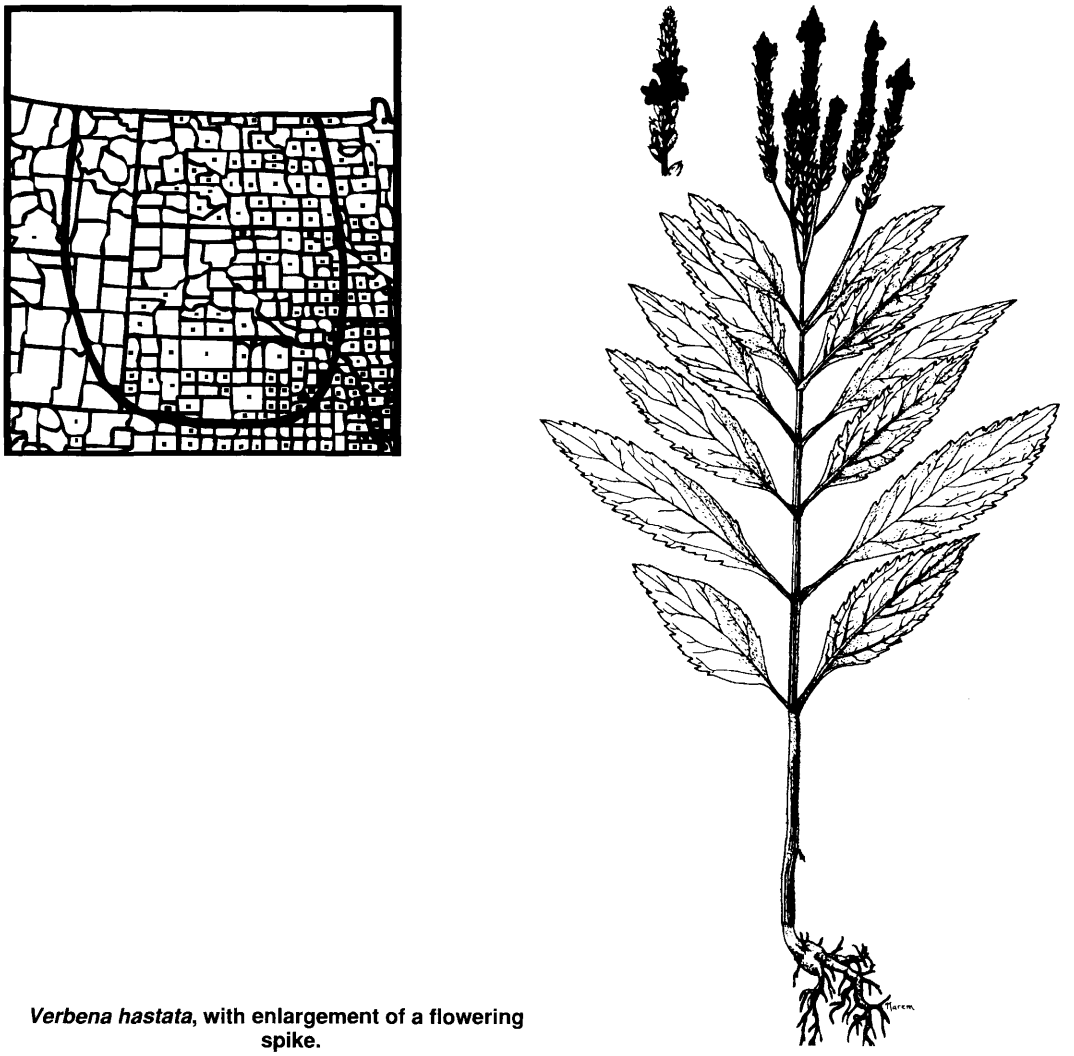




Lippia lanceolata.

1. *Verbena hastata* L. — Blue vervain

Stout, erect, perennial herb 4-12 dm tall from a thick rootstock; **stem** simple from the base, sometimes branched above, 4-angled, hispid to strigose. **Leaves** simple, opposite, short-petioled, the blades lanceolate to ovate-lanceolate or elliptic-lanceolate, 4-12 cm long, 1-5 cm wide, scabrous with stiff appressed hairs, acute to attenuate at the tip, coarsely serrate, occasionally lobed near the base, cuneate to rounded at the base and decurrent on the petiole. **Inflorescence** of (1) few to many, dense, bracteate spikes terminating the main stem and branches; **spikes** mostly 2-10 cm long, elongating as flowering progresses upward from the base; **bracts** lance-subulate, mostly 2-3 mm long. **Flowers** numerous, small, dark blue to purple, slightly irregular; **calyx** tubular, unequally 5-toothed, 1.5-3 mm long, stigulose; **corolla** 5-lobed, salverform, weakly bilabiate, surpassing the calyx by 2-5 mm, the limb 2-4 mm across, the tube strigulose; **stamens** included; **style** slender, exserted from the calyx after flowering, 2-lobed at the tip, ovary superior, 4-celled, shallowly 4-lobed. **Fruit** oblong, 4-angled, splitting lengthwise into 4 nutlets, these ca. 2 mm long. Jul—Sep. Wet meadows, shores, stream banks, ditches and springs, where water is fairly fresh; common in all but extreme w ND, e MT, nw SD and e WY; (N.S. to B.C., s to FL and AZ).



***Verbena hastata*, with enlargement of a flowering spike.**

41. **Lamiaceae**, the Mint Family

Perennial herbs, some aromatic, with square stems and simple, opposite, serrate or incised-toothed leaves. **Flowers** axillary or in terminal heads or spikes, often appearing verticillate, perfect, nearly regular to irregular; **calyx** 5-toothed or sometimes bilabiate, the lobes equal to unequal; **corolla** white, pink, blue or purple, sometimes spotted, often bilabiate, 5-lobed or 4-lobed by fusion, the lobes very unequal to subequal; **stamens** 4 or 2, epipetalous; **pistil** 2-carpellary, style slender, gynobasic, 2-cleft at the tip, ovary superior, 4-celled and 4-lobed, splitting into **4, 1-seeded nutlets** at maturity.

1 Corolla regular or nearly so, the lobes subequal.

2 Stamens 2; plants not strongly aromatic ..... 1. *Lycopus*

2 Stamens 4; plants strongly mint-scented ..... 2. *Mentha*

1 Corolla distinctly irregular, the lobes unequal.

3 Upper lip of the corolla lacking, the lower lip prominent, the other 4 corolla lobes positioned on its lateral margins ..... 7. *Teucrium*

3 Both upper and lower lips of the corolla well-developed.

4 Calyx with a rounded protuberance on the upper side, 2-lipped, not toothed ..... 5. *Scutellaria*

4 Calyx without a dorsal protuberance, toothed, 2-lipped or not.

5 Flowers short-pedicelled, borne singly in the axils of short bracts, the inflorescence comprised of 1-several, terminal and lateral racemes ..... 3. *Physostegia*

5 Flowers sessile and whorled, in a continuous or interrupted terminal spike.

6 Calyx strongly 2-lipped, unequally 5-toothed; spike dense, continuous ..... 4. *Prunella*

6 Calyx not strongly 2-lipped, with 5 equal or subequal teeth; spike interrupted ..... 6. *Stachys*

1. *Lycopus* L. — Bugleweed

Erect to decumbent perennials, nonaromatic or only faintly aromatic, often stoloniferous and/or tuberiferous. **Leaves** sessile or short-petioled, coarsely serrate or incised-toothed, reduced upward, usually punctate. **Flowers** small, not showy, clustered in the axils of middle and upper leaves, often appearing verticillate, white to pinkish, the calyx and corolla often punctate on the outside; **calyx** regular, 5-toothed; **corolla** nearly regular, 4-lobed, the tube short, hairy internally at the throat, the upper lobe formed by the fusion of 2 lobes, tending to be broader than the other 3 lobes, often emarginate; **functional stamens** 2, exserted, the upper pair absent or reduced to staminodes. **Nutlets** broadened upward to a truncate or rounded crest, sometimes undulate or slightly tuberculate on the crest, nearly flat on the outer surface, with a corky ridge on each margin and often across the top, the inner surface convex and punctate with yellowish-viscid glands.

References:
Henderson, N. C. 1962. A taxonomic revision of the genus *Lycopus*. Amer. Midl. Naturalist 68:95-138.
Hermann, F. J. 1936. Diagnostic characteristics in *Lycopus*. Rhodora 38:373-375.

1 Calyx lobes slender, firm, sharply pointed, 1-3 mm long, surpassing the nutlets.

2 Nutlets rounded apically on the outer margin, mostly 1-1.5 mm long; leaves short-petioled to subsessile, the blades irregularly incised-toothed to subpinnatifid . . . . . 1. *L. americanus*

2 Nutlets truncate apically on the outer margin, mostly 1.5-2 mm long; leaves sessile, the blades rather regularly and coarsely serrate . . . . . 2. *L. asper*

1 Calyx lobes broad, triangular to ovate, soft, obtuse to bluntly acute, 0.5-1 mm long, shorter than to about equaling the nutlets . . . . . 3. *L. uniflorus*

1. *Lycopus americanus* Muhl. ex Bart. — American bugleweed

Simple or more often branched perennial 2-8 dm tall, from nontuberiferous rhizomes, glabrous or strigulose in the upper part. **Leaves** short-petioled to subsessile, the blades coarsely and irregularly incised-toothed to subpinnatifid with the lowest teeth largest, lanceolate to linear-lanceolate in outline, 3-8 cm long, 1-4 cm wide, acute at the tip, cuneate at the base. **Calyx lobes** slender, firm, sharply pointed, 1-2 mm long, distinctly surpassing the nutlets at maturity; **corolla** white, sometimes pink to purple-dotted, weakly surpassing the calyx. **Nutlets** rounded apically on the outer margin, mostly 1-1.5 mm long, the corky ridge continuous over the rounded apex. Jul—Sep. Marshes, wet meadows, shores, stream banks, ditches, springs and other wet places; common; (Newf. to B.C., s to FL, TX and CA).



2. *Lycopus asper* Greene — Rough bugleweed

Rhizomatous and usually stoloniferous perennial 2-8 dm tall, arising from thick tubers on the rhizomes, simple or branched, short-pubescent at least above. **Leaves** sessile, elliptic-lanceolate to oblong-lanceolate or linear-lanceolate, 3-9(11) cm long, 0.5-3(4) cm wide, acute-tipped, coarsely and rather regularly serrate with ascending teeth, tapered to a broad or rarely narrow base. **Calyx lobes** as in the preceding, 1-3 mm long; **corolla** as in the preceding. **Nutlets** truncate apically on the outer margin, sometimes somewhat toothed apically, mostly 1.5-2 mm long, the corky ridge often rather indistinct, mainly lateral. Jul—Sep. In the same habitats as *L. americanus* and often found growing with it; common; (Ont. and MI to B.C., s to IA, KS, NM and CA).





Lycopus asper.

3. *Lycopus uniflorus* Michx.

Similar to *L. asper* in habit, 1-5 dm tall, puberulent at least above. **Leaf blades** ovate-lanceolate to oblong-lanceolate, 4-10 cm long, 1.5-4 cm wide, acute to short-acuminate, irregularly and coarsely dentate, cuneate to the short-petioled or subsessile base. **Calyx lobes** broad, triangular to ovate, soft, obtuse to bluntly acute, 0.5-1 mm long, shorter than to about equaling the nutlets; **corolla** white or pinkish, 2.5-3.5 mm long, clearly surpassing the calyx. **Nutlets** mostly 1.2-1.5 mm long, the outer apical margin subtruncate and shallowly toothed. Jul—Sep. Swamps, stream banks and springs, where water is fresh; occasional in e and c ND, e SD and the Black Hills, e and c NE; (Newf. to AK, s to NC, OH, IL, OK, MT and OR).



1. *Mentha arvensis* L. — Common mint

Erect to decumbent rhizomatous perennial 2-10 dm tall, frequently stoloniferous, strongly mint-scented; **stems** simple or more often branched and spreading, strigose at least on the angles, villous at the nodes. **Leaves** short-petioled, the blades ovate to lanceolate or elliptic-lanceolate, 2-6(9) cm long, 0.6-2.5(4) cm wide, glabrous to strigulose on the nerves, strongly punctate, acute to acuminate at the tip, serrate, cuneate to rounded at the base. **Flowers** small, light pink to lavender, crowded in bracteate, verticillate clusters in middle and upper leaf axils, the **bracts** linear-subulate to linear-lanceolate; **pedicels** 1-3 mm long. **Calyx** regular, 5-toothed, 2-3 mm long, strigulose and glandular; **corolla** nearly regular to slightly bilabiate, 4-6 mm long, glandular on the outside, 4- or 5-lobed, the upper 2 lobes partly to completely fused; **stamens** 4, strongly exserted; **style** exserted. **Nutlets** obovoid to ellipsoid, 0.7-1 mm long, smooth, enclosed by the persistent calyx. Jul—Sep. Wet meadows, marshes, ditches, stream banks, springs and other wet places; very common; (Circumboreal, in N.Amer. s to VA, MO, n TX, NM and CA).





Mentha arvensis.

3. ***Physostegia*** Benth. — Obedient plant

Stout, erect, perennial herbs; **stems** arising singly from slender rhizomes or from a slender caudex, simple throughout or branched at the base of the inflorescence. **Leaves** sessile or the lowermost sometimes short-petioled, elliptic to lanceolate or oblanceolate, mostly serrate. **Flowers** showy, pinkish-lavender to purple-lavender, short-pedicelled and borne singly in the axils of short bracts, arranged in 1-several terminal and lateral, spikelike racemes. **Calyx** regular or nearly so, tubular-campanulate, 5-toothed, the teeth much shorter than the tube; **corolla** bilabiate, much longer than the calyx, the upper lip hoodlike, entire to emarginate, the lower lip about equaling or shorter than the upper, shallowly 3-lobed; **stamens** 4, included or slightly exserted under the upper corolla lip; **stigma** 2-lobed, style about equaling the stamens. **Nutlets** ovoid, unequally trigonous, smooth.

References:

Cantino, P. D. 1981. Change of status for *Physostegia virginiana* var. *ledinghamii* (Labiatae) and evidence for a hybrid origin. Rhodora 83:111-118.

Lundell, C. L. 1959. Studies in *Physostegia* I. New species and observations on others. Wrightia 2:4-12.

1 Upper leaves clasping the stem, some of them usually broadest near the base of the blade; corolla usually with some stipitate glands (often lacking in *P. ledinghamii*); rare species in our area.

  2 Corolla 14-23 mm long, often lacking stipitate glands; nutlets 2.8-4 mm long . . . . . 1. *P. ledinghamii*

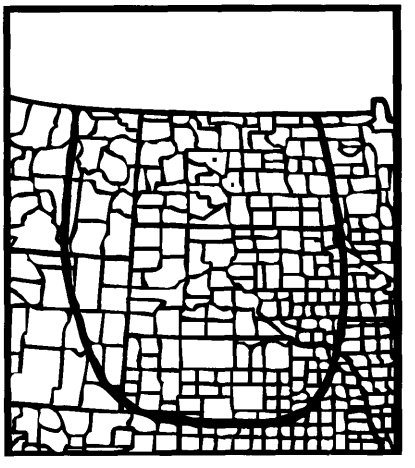
  2 Corolla 9-16 mm long, usually with stipitate glands; nutlets 2.1-3.3 mm long . . . . . 2. *P. parviflora*

1 Upper leaves not clasping the stem, broadest at the middle or above; corolla glabrous or sparsely puberulent but lacking stipitate glands; common species . . . . . 3. *P. virginiana*

1. *Physostegia ledinghamii* (Boivin) Cantino

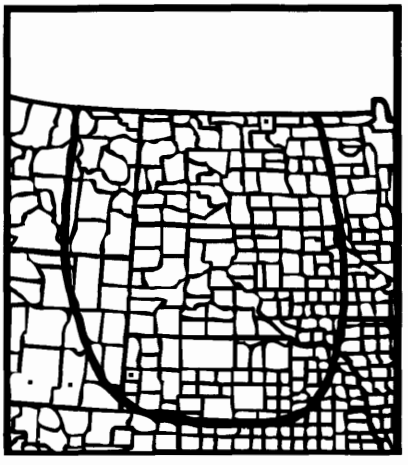
Similar to and in most respects intermediate between the following two species, distinguished only by a combination of characters: **Leaves** serrate, the upper ones clasping the stem. **Corolla** 14-23 mm long, puberulent and usually lacking stipitate glands. **Nutlets** 2.8-4 mm long. Jul—Aug. River and stream banks, shores, floodplains and ditches; rare, with records from Burleigh and McLean Cos., ND; (Man. and w ND to Alta.).

Cantino (op. cit.) has determined that this entity, formerly recognized as *P. virginiana* var. *ledinghamii* Boivin, is probably an allotetraploid derivative of a cross between *P. virginiana* and *P. parviflora.* The intermediate nature of *P. ledinghamii* and its doubled chromosome number lend credence to this view. Because it is essentially reproductively isolated from *P. virginiana* and *P. parviflora*, recognizing *P. ledinghamii* as a distinct species is well justified despite morphological overlaps with the former two species.



2. *Physostegia parviflora* Nutt. ex A. Gray

Stems 2-8 dm tall, from a slender caudex or short rhizome. **Leaves** lanceolate to oblong-lanceolate, rarely ovate, 4-12 cm long, 0.7-2 cm wide, acute to obtuse at the tip, remotely serrate or dentate to subentire, rounded to subcordate and clasping at the base. **Racemes** 5-10 cm long; **bracts** ovate to lanceolate or elliptic-lanceolate, to about 1/2 as long as the calyx. **Calyx** 3-5(6) mm long in flower, to 7 mm long in fruit, sparsely stipitate glandular, the teeth triangular, 1-1.5 mm long; **corolla** lavender to purple-lavender, 9-16 mm long, puberulent and usually with stipitate glands. **Nutlets** 2.1-3.3 mm long. Jul—Aug. Wet meadows, shores and stream banks; rare, with records from nc ND and w NE; (sw Man., n ND, s Sask.; also w NE, WY and w MT to n OR, WA and B.C.).



3. *Physostegia virginiana* (L.) Benth.

Stems 4-15 dm tall, from buds along slender rhizomes. **Leaves** elliptic-lanceolate to oblong or oblanceolate, 4-15(18) cm long, 1-4(5) cm wide, acute to acuminate at the tip, serrate on the margins, tapered to slightly widened to a sessile base, not clasping. **Racemes** 5-20 cm long; **bracts** ovate to ovate-lanceolate, about 1/2 as long as the calyx. **Calyx** 4-8 mm long in flower, to 10 mm long in fruit, often with some stipitate glands, the teeth triangular, 1-2 mm long; **corolla** deep lavender to white with purple spots, (13)17-25 mm long, puberulent to glabrous, lacking stipitate glands. **Nutlets** 2.5-3.2 mm long. Jul—Sep. Wet meadows, shores, fens, floodplains and wet woodlands; frequent, e and nc ND, e SD and e NE; (Que. to Man., s to VA, TN, IL, MO and ne KS).

This plant is sometimes cultivated in gardens for its attractive flowers.

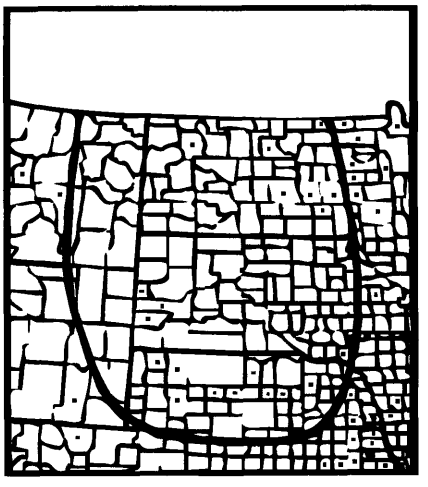




***Physostegia virginiana*, occurring with common mint and river bulrush.**

1. *Prunella vulgaris* L.

Rather low perennial 0.5-4 dm tall from a small caudex or short rhizome; **stems** erect to decumbent, simple or branched, glabrous or sparingly villous below to more densely villous above, especially on the angles. **Leaves** principally cauline, smaller basal leaves commonly present; **blades** of cauline leaves lanceolate to ovate-lanceolate, mostly 3-5 cm long, 0.8-2.2 cm wide, bluntly acute to obtuse, entire to obscurely serrate; smaller basal leaf blades ovate, subcordate to rounded at the base; **petioles** mostly 1-3 cm long, villous. **Flowers** rather small, crowded in a short-cylindric bracteate spike 1.5-6 cm long, ca. 1.5 cm thick; **bracts** reniform with a cuspidate to caudate tip, mostly shorter than the subtended calyces, ciliate. **Calyx** green or purple, bilabiate, 7-10 mm long, pubescent mainly on lobe margins, the upper lip broad, shallowly 3-lobed, the lower lip slender, cleft into 2 narrow teeth, slightly shorter than the upper lip; **corolla** blue-violet, seldom pink or white, bilabiate, the tube about equaling the calyx, the upper lip hoodlike, arched over the stamens, extending 4-8 mm beyond the calyx, the lower lip shorter, with 2 small lateral lobes and a larger, erose middle lobe; **stamens** 4, barely exserted, the filaments bifid at the tip; **style** exserted. **Nutlets** flattened-obovoid, 1.5-2 mm long. Jul—Sep. Moist or wet places around springs, streams, seepage areas or fens; also in various drier habitats; uncommon in e and c ND, more common in s SD and NE, locally common in the Black Hills; (Nearly cosmopolitan).



5. ***Scutellaria*** L. — Skullcap

Erect to spreading, rhizomatous and sometimes stoloniferous perennials. **Leaves** subsessile or petioled, the blades ovate to lanceolate or elliptic, nearly entire to serrate, thin-textured. **Flowers** blue or blue with white markings, rarely pink or white, borne singly (paired at the nodes) in the axils of middle and upper leaves or borne in axillary racemes, short-pedicelled; **calyx** 2-lipped, not toothed, with a rounded protuberance or pouch on the upper side, the 2 calyx lips separating at maturity to release the enclosed nutlets; **corolla** 2-lipped, pubescent on the outer surface, the upper lip concave and hoodlike, the lower lip nearly flat, 3-lobed, the tube straight or curved upward; **stamens** 4, ascending into the upper corolla lip. **Nutlets** ovoid, golden-brown, verrucose, raised on a gynophore.

References:
Epling, C. 1942. The American species of *Scutellaria*. Univ. Calif. Publ. Bot. 20:1-146.
Leonard, E. C. 1927. The North American species of *Scutellaria*. Contr. U. S. Natl. Herb. 22:703-748.

1 Flowers paired at the nodes, borne in the axils of normal leaves; corolla 15-24 mm long . . . . . 1. *S. galericulata*

1 Flowers in elongate, bracteate racemes which are axillary or at the tips of axillary branches; corolla 5-8 mm long . . . . . 2. *S. lateriflora*

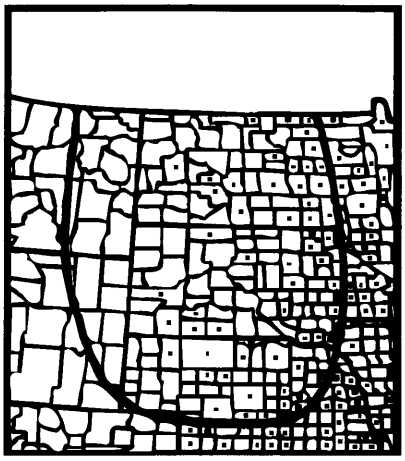
1. *Scutellaria galericulata* L. — Marsh skullcap

Plants 1-6(9) dm tall from slender rhizomes; **stems** simple or branched, erect or spreading, puberulent at least on the angles in the upper part. **Leaves** scarcely petioled, the blades lanceolate to ovate-lanceolate or elliptic, 2-6.5 cm long, 0.6-2.5 cm wide, glabrous or nearly so above, densely puberulent below, bluntly acute, nearly entire to irregularly crenate-serrate, rounded to cordate at the base. **Flowers** paired at the nodes, borne singly in the axils of normal leaves; **pedicels** 1-3 mm long; **calyx** 3-6 mm long; **corolla** blue marked with white, 15-24 mm long, the tube gently curved. Jun—Aug. Shores, stream banks, marshes, wet meadows, ditches, springs and other wet places; common throughout most of the region, except in the drier w and c portions; (Circumboreal, in N.Amer. s to DE, OH, IL, MO, n TX, AZ and CA).



2. *Scutellaria lateriflora* L. — Blue skullcap

Plants 1.5-6 dm tall, usually branched and spreading, the **stems** glabrous or puberulent on the angles above. **Leaf blades** ovate to ovate-lanceolate, 3-8 cm long, 1.5-5 cm wide, glabrous or nearly so, acute to acuminate at the tip, crenate-serrate to serrate on the margins, cuneate to subcordate at the base; **petioles** 0.5-3 cm long. **Flowers** in elongate, bracteate racemes which are axillary or at the tips of axillary branches; **pedicels** mostly less than 1 mm long; **calyx** 1.5-2.5 mm long in flower, to 4 mm long in fruit; **corolla** blue, rarely pink or white, 5-8 mm long, the tube straight. Jul—Aug. Shores, stream banks, springs, meadows, swampy places and moist woods; frequent in the e part, less so in the c portion; (Newf. to B.C., s to GA, TX and CA).



6. *Stachys* L. — Hedge-nettle

Stout, erect, rhizomatous perennials. **Leaves** sessile or short-petioled, the blades ovate-lanceolate to elliptic or oblong-lanceolate, crenate-serrate, reduced to bracts in the inflorescence. **Flowers** somewhat showy, pink to lavender, in terminal, interrupted spikes, appearing whorled in rather evenly spaced clusters; **calyx** nearly regular, with 5 equal or subequal, lance-triangular to lance-subulate teeth, the teeth ca. 1/3 to 1/2 the length of the calyx; **corolla** whitish to pink with purplish spots or mottling, distinctly 2-lipped, the upper lip concave, entire to emarginate, the lower lip spreading or deflexed, 3-lobed; **stamens** 4, ascending under the upper lip. **Nutlets** dark brown, ovoid, ca. 2 mm long, loosely enclosed by the persistent calyx.

Reference:

Epling, C. 1934. Preliminary revision of American *Stachys*. Feddes Repert. Spec. Nov. Regni Veg. Bxeih. 80:1-75.

1 Stems pubescent on the sides as well as on the angles . . . . . 1. *S. palustris*

1 Stems glabrous or pubescent with retrorse bristles only on the angles . . . . . 2. *S. tenuifolia*

1. *Stachys palustris* L.

Plants (2)3-8 dm tall; **stems** simple or branched, hairy on the angles and short-pubescent on the sides, the short hairs glandular in the inflorescence. **Leaves** sessile or short-petioled, the blades ovate-lanceolate to lanceolate or elliptic, 4-13 cm long, 2-5 cm wide, softly pubescent on both surfaces, acute to acuminate, finely crenate-serrate, rounded to truncate or subcordate at the base. **Calyx** 5-8 mm long, covered with stout eglandular hairs and shorter glandular ones; **corolla** 9-13 mm long. Jun—Jul. Marshes, wet meadows, ditches, shores, stream banks, and other wet or moist places; common; (Circumboreal, s in N.Amer. to NY, IL, MO, OK, NM and AZ).

American plants belong to subsp. *pilosa* (Nutt.) Epling.



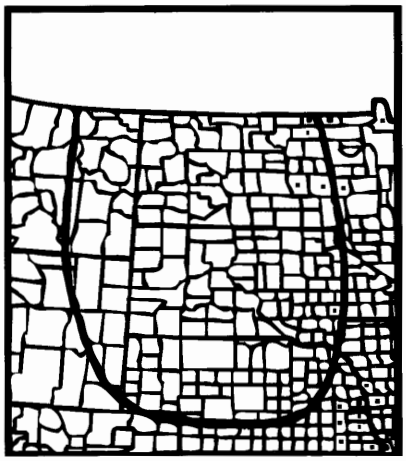


***Stachys palustris*, inflorescence. Photo courtesy U.S. Fish & Wildlife Service.**

2. *Stachys tenuifolia* Willd.

Similar to the preceding, 4-10 dm tall; **stems** glabrous or retrorsely bristled on the angles, the sides glabrous, bearded at the nodes. **Leaves** sessile or on petioles to 2 cm long, the **blades** ovate-lanceolate to oblong-lanceolate, 6-14 cm long, 2-6 cm wide, glabrous or with a few scattered hairs, acute to acuminate, serrate on the margins, rounded to cordate at the base. **Calyx** 5-7 mm long, usually with eglandular hairs only; **corolla** as in the preceding. Jun—Sep. Alluvial woods and stream banks; occasional from e ND to e NE; (NY to Man., s to SC, TN, LA and TX).

Some plants from e ND appear to have characteristics of *S. palustris* var. *pilosa*, i.e., having some glandular hairs intermixed with eglandular hairs on the calyces. Further studies on *Stachys* in e ND and w MN are needed to determine the true relationships of these populations.



7. ***Teucrium*** L. — Germander

1. *Teucrium canadense* L. — American germander

Rhizomatous, sometimes stoloniferous perennial 3-10 dm tall; **stems** simple or branched, spreading pilose to decurved pubescent. **Leaves** with petioles mostly 5-15 mm long, the blades ovate-lanceolate to lanceolate or oblong-lanceolate, 4-12(16) cm long, 1.5-4(6) cm wide, finely pubescent especially beneath, acute-tipped, finely serrate, cuneate to rounded at the base. **Inflorescence** of 1-many continuous, terminal, bracteate racemes; bracts narrowly lanceolate, mostly surpassing the calyces; pedicels 2-4 mm long. **Flowers** purple to lavender or pink, rarely white; **calyx** nearly regular, purple or green, 4.5-7 mm long, covered with long silky hairs and very short glandular ones, the lobes triangular, acute to acuminate, 1/3 to 1/2 the length of the calyx; **corolla** irregular, 10-13 mm long, very finely glandular-pubescent, upper lip absent, lower lip prominent, the other 4 corolla lobes positioned on its lateral margins; **stamens** 4, arched over the corolla. **Nutlets** golden, ovoid, 1.5-2.4 mm long, glandular. Jul—Sep. Marshes, wet meadows, ditches, shores, stream banks and other wet or moist places; common; (Circumboreal, in N.Amer. across s Can., throughout the U.S. and into Mex.).

Plants of this region are var. *boreale* (Bicknell) Shinners, formerly known as var. *occidentale* (A. Gray) McCl. & Epl. The var. *canadense* is reported from Union Co., SD, and otherwise occurs from e and s NE southward into KS. It differs in having the calyx appressed pubescent or canescent, sometimes with scattered long hairs, eglandular or with sessile glands, the calyx teeth broadly ovate to triangular, usually obtuse.

References:
McClintock, E. and C. Epling. 1946. A revision of *Teucrium* in the New World. Brittonia 5:491-510.
Shinners, L. H. 1963. The varieties of *Teucrium canadense* (Labiatae). Sida 1:182-183.





***Teucrium canadense*, inflorescence. Photo courtesy U.S. Fish & Wildlife Service.**

1. ***Hippuris*** L. — Mare's-tail

1. *Hippuris vulgaris* L.

Aquatic or amphibious perennial from stout, spongy rhizomes, 1-5 dm tall above the mud or water surface; **stems** simple, erect or sometimes curved and recurved, densely clothed by the closely spaced whorls of leaves. **Leaves** in whorls of 6-12, sessile, the emersed ones linear to linear-oblong, 0.8-2.5 cm long, 0.5-3 mm wide, blunt-tipped; submersed leaves, when present, thin and flaccid, mostly more elongate than the emersed leaves. **Flowers** perfect, minute, sessile and solitary in the upper axils, often not produced; **calyx** and **corolla** lacking; **stamen** 1, attached at the summit of a hypanthium; **style** 1, filiform, appearing alongside the stamen, ovary inferior, completely enclosed by the hypanthium, 1-celled, 1-ovuled. **Fruit** nutlike, ellipsoid, 1.5-2 mm long, 0.8-1 mm thick. Jun—Sep. Shallow water or mud of marshes, lakes, streams and ditches; frequent in most of ND, ne and the Black Hills, SD, otherwise rare; (Circumboreal, in N.Amer. s to ME, NY, IN, IA, NE, NM and AZ).





***Hippuris vulgaris*, emergent in an aquatic bed of *Myriophyllum exalbescens*.**

43. **Callitrichaceae**, the Water Starwort Family

1. ***Callitriche*** L. — Water starwort

Rather small and delicate, perennial aquatics with weak, filiform, leafy stems and fibrous roots, seldom growing on mud. **Leaves** small, all submersed or the upper ones floating, simple, opposite; **submersed leaves** sessile, clasping or connate by a narrow ridge or wing, linear, 1-nerved, entire except for the shallowly bidentate apex; **floating leaves**, when present, clustered in terminal rosettes or partly in separate pairs, obovate to oblanceolate or spatulate, 3- to 5-nerved, rounded, tapered at the base to a flat petiole. **Flowers** minute, inconspicuous, sessile and solitary in middle and upper leaf axils, naked or subtended by a pair of hyaline bracts, usually imperfect (the plants polygamo-monoecious), each consisting of 1 stamen or 1 pistil or both; **pistil** 2-carpellary, styles 2, deciduous, ovary flattened, oval to orbicular, 4-celled, furrowed down the middle of each face and partitioned from each edge toward the middle, separating at maturity into **4 flattened, 1-seeded nutlets**.

Reference:

Fassett, N. C. 1951. *Callitriche* in the New World. Rhodora 53:137-155, 161-182, 185-194, 209-222.

1 Plants with linear submersed leaves only, these clasping, not connected at their bases; flowers not subtended by a pair of hyaline bracts . . . 1. *C. hermaphroditica*

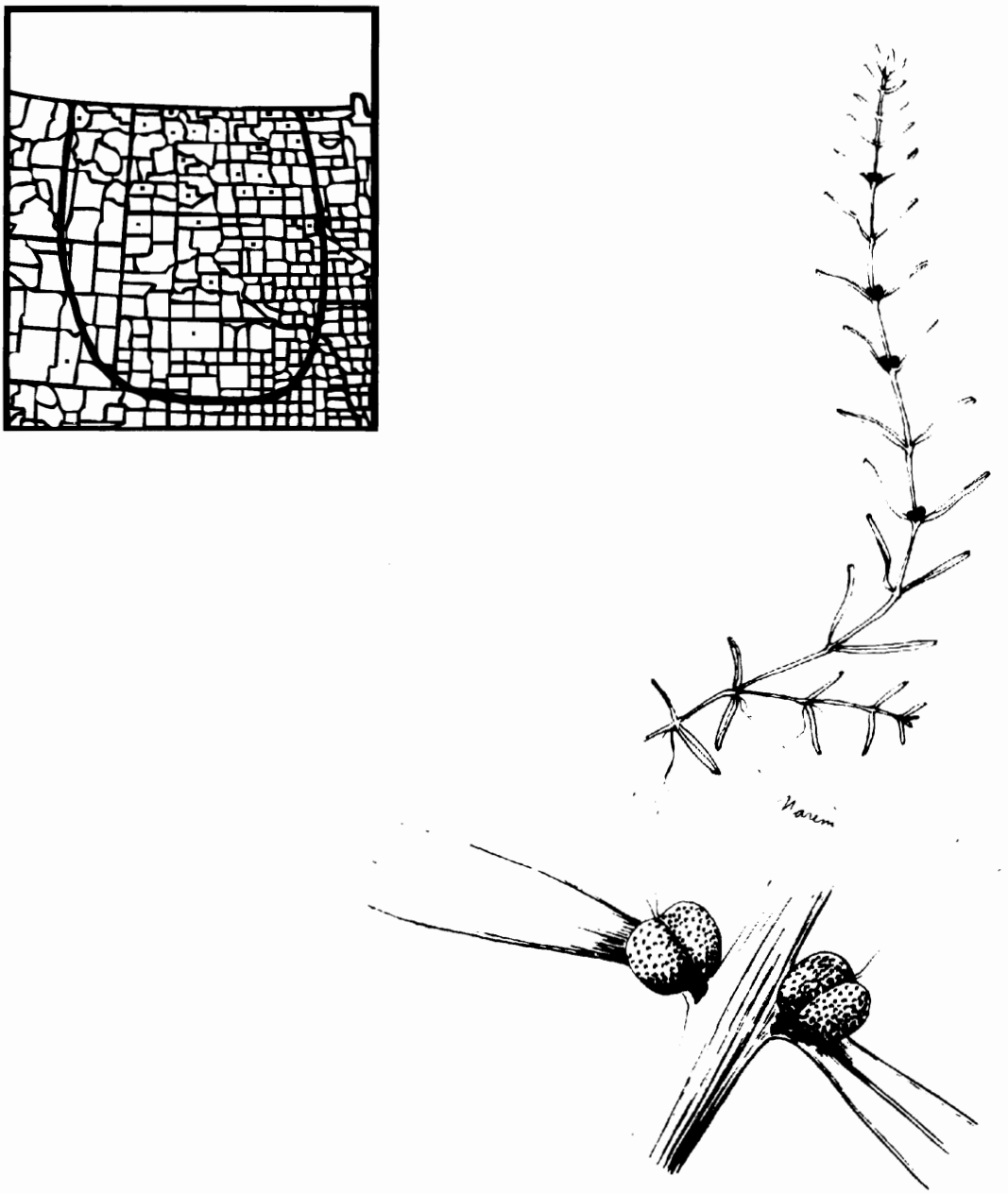
1 Plants often with some obovate to spatulate floating leaves; submersed leaves connected at their bases by a ridge or narrow wing; flowers subtended by a pair of hyaline bracts.

2 Fruit longer than broad, its segments narrowly wing-margined at least toward the summit, pitted in rows . . . . . 3. *C. verna*

2 Fruit about as broad as long, its segments rounded on the back, not wing-margined, irregularly pitted . . . . . 2. *C. heterophylla*

1. *Callitriche hermaphroditica* L.

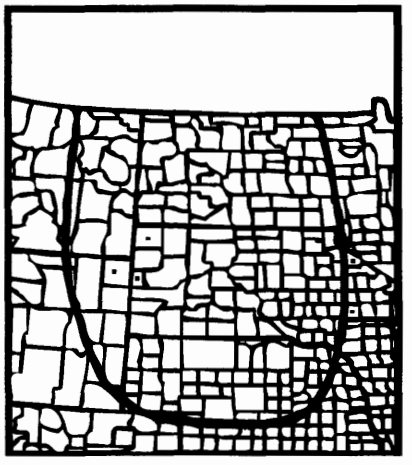
Submersed aquatic with stems 0.5-3 dm long. **Leaves** all submersed, linear, 3-12 mm long, 0.5-1.3 mm wide, 1-nerved, shallowly bidentate at the tip, clasping at the base, opposite leaf bases not connected. **Flowers** naked, not subtended by hyaline bracts. **Fruits** as wide or wider than high, 1-1.3 mm high, 1-1.5 mm across. Jun—Sep. Shallow to moderately deep water of lakes, ponds, marshes, ditches and sluggish streams; occasional in ND and n SD, less common s and w; (Circumboreal, in N.Amer. s to ME, NY, MI, MN, n NE, NM and CA).



***Callitriche hermaphroditica*, with closeup of fruits.**

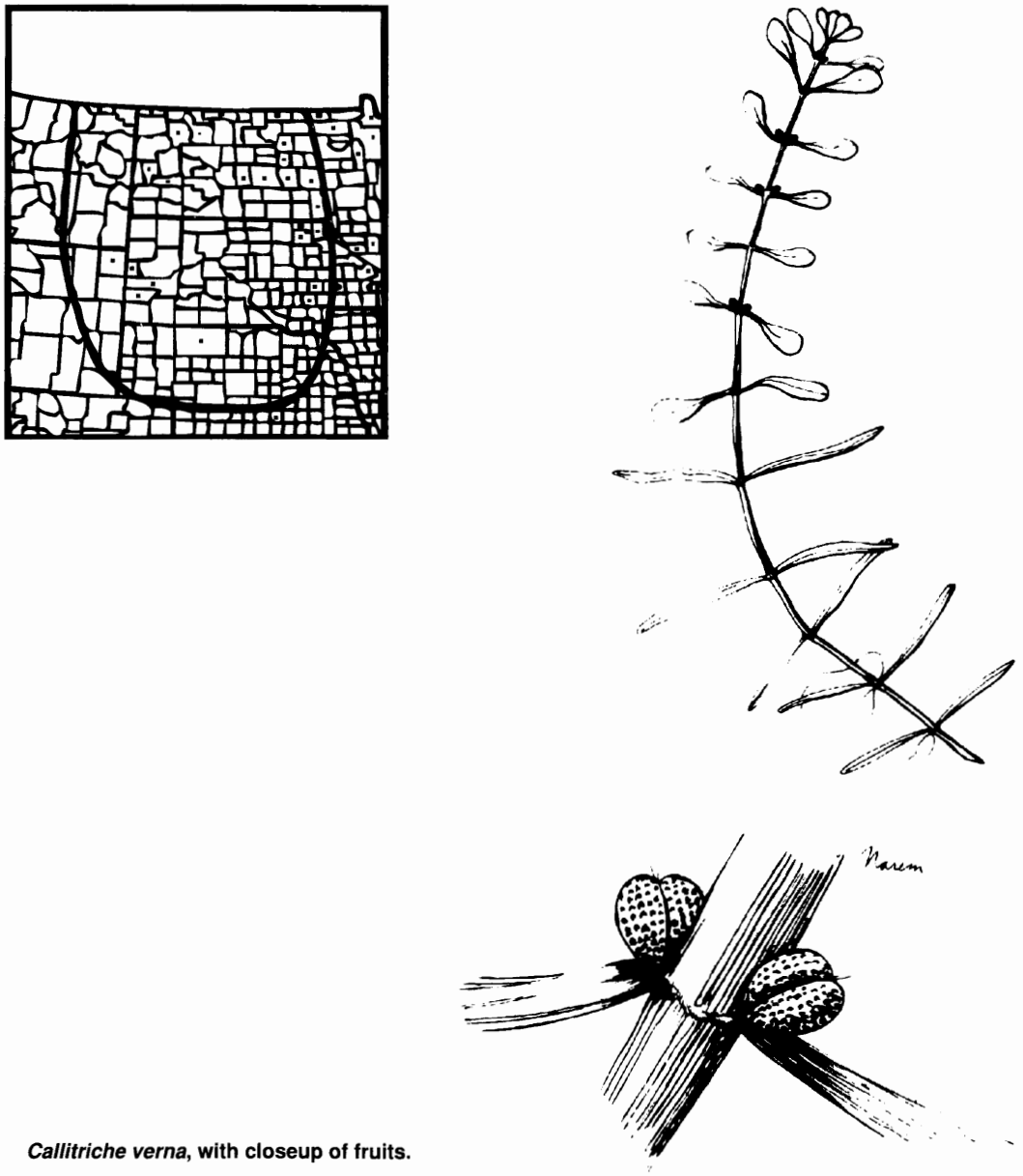
2. *Callitriche heterophylla* Pursh

Submersed aquatic or seldom stranded on mud, with stems 0.5-2 dm long. **Leaves** usually of 2 basic types, with linear, submersed leaves below on the stems and obovate to spatulate floating leaves upward, the leaves seldom all of one type; **submersed leaves** 10-20 mm long, 0.5-1.2 mm wide, 1-nerved, bidentate at the tip, the pairs connected at their bases by a ridge or narrow wing; floating leaves in terminal rosettes or partly scattered along the stem, 6-15 mm long, 3-7 mm wide, 3- to 5-nerved, rounded at the tip, attenuate to the base, connected at their bases like the linear leaves, the transition from submersed to floating leaf types gradual. **Flowers** subtended by a pair of hyaline bracts, these deciduous. **Fruits** 0.6-1.2 mm long, about as wide, slightly broader toward the tip than the base, the segments convex on the face and rounded on the back, not wing-margined, irregularly pitted on the surface. Jun—Sep. Shallow water or mud of springs and stream pools; rare, with collections from Lawrence and Harding Cos., SD, also w MN; (N.S. to s MN and w SD, s to FL and TX; also w MT to WA, s to CA and C.Amer.).



3. *Callitriche verna* L.

Submersed or occasionally amphibious aquatic, sometimes growing on mud, with stems 0.5-2 dm long. **Leaves** typically of 2 types; **submersed leaves** mostly linear, 5-20 mm long, 0.3-1 mm wide, shallowly bidentate at the tip, clasping at the base with a ridge or narrow, membranous wing connecting the leaf bases; **floating leaves** seldom absent, mostly in terminal rosettes, obovate to oblanceolate or spatulate, 3-10 mm long, 1.5-5 mm wide, 3- to 5-nerved, rounded at the tip, tapered to a flat petiole and connected by a ridge at their bases; leaves transitional between the submersed and floating leaves usually present. **Flowers** subtended by a pair of hyaline bracts, these soon deciduous. **Fruits** higher than wide, 0.8-1.7 mm long, 0.6-1.4 mm wide, narrowly wing-margined at least toward the summit, pitted in longitudinal rows. Jun—Sep. In the same habitats as *C. hermaphroditica*, sometimes stranded and persisting on mud; occasional in ND, e and the Black Hills in SD, rare in c NE; (Circumboreal, in N.Amer. s to WV, OH, IL, IA, KS, NM and CA). *C. palustris* L.



***Callitriche verna*, with closeup of fruits.**

44. **Plantaginaceae**, the Plantain Family

1. ***Plantago*** L. — Plantain

Low, acaulescent, perennial herbs (those included here) with simple, petiolate leaves in basal rosettes and numerous small flowers in long, scapose, bracteate spikes. **Flowers** greenish to stramineous, perfect, 4-merous, regular, or the calyx slightly irregular; **sepals** scarious-margined; **corolla** salverform, membranous, persistent, the tube enclosing the top of the capsule, the lobes spreading to reflexed; **stamens** 4, epipetalous, exserted; **style** strongly exserted, stigmatic for most of its length, ovary superior. **Fruit** a circumscissile capsule containing 2-many seeds.

1 Bracts subtending the flowers rounded on the back; corolla lobes 1 mm or more long; seeds 2-4 per capsule, 2-3 mm long . . . . . 1. *P. eriopoda*

1 Bracts subtending the flowers keeled on the back; corolla lobes less than 1 mm long; seeds 6-30 per capsule, 0.8-1.5 mm long . . . . . 2. *P. major*

1. *Plantago eriopoda* Torr. — Alkali plantain

Plants with 1-several stout tap roots and scapes 1-4 dm tall. **Leaf blades** narrowly elliptic or elongate, tapered at both ends, 8-18 cm long, 0.5-3.5 cm wide, coriaceous; **petioles** mostly 1/2 to as long as the blade, tufted with coppery hairs at the base. **Spikes** 5-20 cm long, the axis pubescent; **bracts** and **sepals** scarious-margined, rounded on the back, 2-2.5 mm long, the sepals elliptic, concave; **corolla lobes** 1 mm or more long. **Capsule** ellipsoid, 3-4 mm long; **seeds** 2-4 per capsule, elliptic, flattened, 2-3 mm long. Jun—Jul. Alkaline and saline meadows, flats, ditches and stream banks; frequent in the n part, less common s; (N.S. to Que.; also MN to Yuk., s to n Mex.).



2. *Plantago major* L. — Common plantain

Fibrous-rooted plants with scapes 1-4 dm tall. **Leaf blades** narrowly to broadly ovate, 4-22 cm long, 3-12 cm wide, pubescent when young, remaining pubescent on the principal veins or becoming glabrous at maturity, obtuse to rounded at the tip, entire or irregularly and shallowly toothed, sometimes slightly crisped, abruptly tapered to the petiole; **petioles** shorter to longer than the blades. **Spikes** mostly 5-30 cm long, the scape sparsely pubescent; **bracts** and **sepals** keeled on the back, the bracts shorter than the sepals; sepals obovate, 1.5-2 mm long, widely scarious-margined; **corolla lobes** less than 1 mm long. **Capsule** ovoid, 2.5-3.5 mm long; **seeds** 6-30 per capsule, oblong-angular, 0.8-1.5 mm long. Jul—Sep. Shores, stream banks, flats and ditches, also in disturbed places, lawns and gardens; common; (Intro. from Europe and established as a weed throughout the U.S., most of Can. and elsewhere).





Plantago major.

45. **Scrophulariaceae**, the Figwort Family

Annual and perennial herbs of various habits; **stems** usually terete (noticeably 4-angled in *Mimulus alatus* and *M. ringens*), or plants acaulescent (*Limosella*). **Leaves** simple, opposite or seldom alternate, or the leaves all basal (*Limosella*), sessile or petioled, exstipulate. **Flowers** perfect, nearly regular to highly irregular, 5-merous or apparently 4-merous, showy or not, variously colored, borne singly or few together in leaf axils, or the flowers numerous in terminal or axillary, bracteate racemes or spikes; **calyx** cylindric to campanulate or hemispheric, sometimes 2-lipped, or the sepals distinct, similar or unequal; **corolla** 4- or 5-lobed, tubular and often bilabiate to rotate and nearly regular, sometimes inconspicuous; **stamens** usually 4, epipetalous, often didynamous, sometimes 1 pair reduced to antherless staminodes or totally absent so that only 2 functional stamens are present; **pistil** 2-carpellary, style simple, stigma entire or 2-lobed, or stigmas 2, ovary superior, many-ovuled, with axile placentation. **Fruit** a septicidal or loculicidal, many-seeded capsule, usually partly enclosed by the persistent calyx.

1 Leaves all basal, tufted . . . . . 5. *Limosella*

1 Leaves all or partly cauline.

2 Leaves pinnatifid.

3 Plants annual; flowers axillary . . . . . 4. *Leucospora*

3 Plants perennial; flowers in terminal spikes . . . . . 8. *Pedicularis*

2 Leaves entire to serrate or undulate, but not pinnatifid.

4 Functional stamens 4.

5 Leaves linear, 1-3 mm wide . . . . . 1. *Agalinis*

5 Leaves not linear, wider than 3 mm.

6 Calyx tubular, the lobes shorter than the tubular portion . . . . . 7. *Mimulus*

6 Calyx not tubular, the sepals distinct and imbricate . . . 2. *Bacopa*

4 Functional stamens 2 (a pair of antherless staminodes may also be present).

7 Flowers in axillary or terminal racemes; calyx lobes 4 . . . 9. *Veronica*

7 Flowers single and pedicelled in leaf axils; calyx lobes 5.

8 Corolla white to yellow; pair of staminodes absent or very minute; plants glandular-pubescent at least above . . . . . 3. *Gratiola*

8 Corolla blue-violet; pair of staminodes present; plants glabrous throughout . . . . . 6. *Lindernia*

1. ***Agalinis*** Raf. — Gerardia

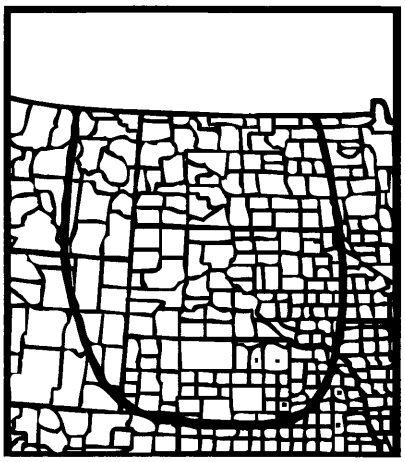
Shallowly fibrous-rooted annuals, often hemiparasitic; **foliage** dark green and tending to blacken upon drying; **stems** slender, erect, branched, 4-angled. **Leaves** opposite or subopposite, sessile, often with fascicles of smaller leaves in the axils, linear to linear-lanceolate, sparingly to conspicuously scabrous on the upper surface. **Flowers** solitary from the axils of upper leaves, on slender pedicels; **calyx** nearly regular, 5-lobed, campanulate in flower to hemispheric in fruit, somewhat accrescent, lobes broadly triangular at the base with an acuminate tip; **corolla** 5-lobed and weakly bilabiate, reddish to pinkish-purple, obliquely campanulate, the lobes shorter than the tubular portion, finely fringed with cilia; **stamens** 4, the lower pair longer; **style** simple. **Capsule** globose or nearly so, surpassing the calyx; **seeds** numerous, dark brown to blackish, triangular to trapezoidal, reticulate.

1 Pedicels 2-5 mm long, shorter than to as long as the calyx; corolla (17)20-32 mm long ..... 1. *A. purpurea*

1 Pedicels 8-20 mm long, longer than the calyx; corolla 8-15 mm long ..... 2. *A. tenuifolia*

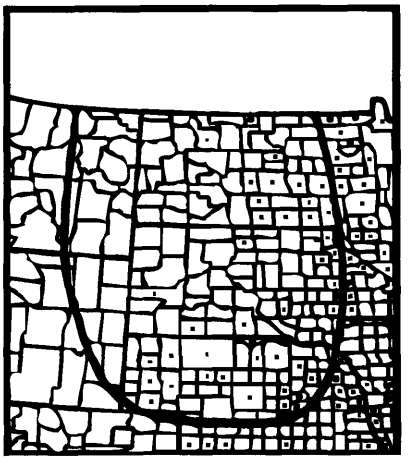
1. *Agalinis purpurea* (L.) Penn.

Plant 1.5-8(12) dm tall, glabrous to sparsely scaberulous, usually much branched and spreading above. **Leaves** spreading to upcurved or curled, linear, 1-4(5.5) cm long, 0.8-2(3) mm wide, acute; fascicles of smaller leaves often present. **Pedicels** spreading, 2-5 mm long, shorter than to equaling the calyx. **Calyx** 4-5.5(6) mm long, the lobes 1-2.2 mm long; **corolla** (17)20-32 mm long, the lobes spreading, 5-9 mm long. **Capsule** subglobose, 4-6 mm in diameter; **seeds** 0.7-1.2 mm long. Aug—Sep. Wet meadows, shores and ditches, usually where sandy; uncommon in n and e NE; (ME to MN and NE, s to FL and TX). *Gerardia purpurea* L.



2. *Agalinis tenuifolia* (Vahl) Raf.

Slender, erect plant (0.5)1-5 dm tall, usually branched. **Leaves** spreading to arched-ascending, linear, 1-5 cm long, 1-3 mm wide, acute, scaberulous on the upper surface; fascicles of smaller leaves present or not. **Pedicels** ascending to spreading, filiform, 8-20 mm long, longer than the calyx. **Calyx** 3.5-5.5 mm long, the lobes 1-2 mm long; **corolla** 8-15 mm long, the lobes 3-5 mm long. **Capsule** globose, 4-6 mm in diameter; **seeds** 0.7-0.9 mm long. Aug—Sep. Wet meadows, low prairie, shores, stream banks and ditches, usually where sandy; frequent from e and c ND, s to NE (and reportedly e WY); (ME to Man., s to FL, TX and e CO). *Gerardia tenuifolia* Vahl.



2. ***Bacopa*** Aubl. — Water hyssop

1. *Bacopa rotundifolia* (Michx.) Wettst.

Small, amphibious perennial with **stems** 0.5-4 dm long, floating in shallow water or sprawling on mud and rooting at the nodes, emersed or ascending at the tips, pubescent on emersed portions. **Leaves** opposite, sessile, rotund-ovate to rotund-obovate, 1-3.5 cm long, 0.7-2.5 cm wide, conspicuously palmate-veined with 7-13 nerves, rounded at the apex, clasping at the base. **Flowers** axillary, 1-several per axil, on stout, pubescent, ultimately recurved pedicels 4-15 mm long; **calyx** of 5 unequal, distinct and imbricate sepals 4-5 mm long; **corolla** white with a yellow throat, nearly regular, narrowly campanulate, 6-10 mm long, the 5 lobes shorter than the tube; **stamens** 4. **Capsule** globose to subglobose, about equaling the calyx. Jul—Sep. Mud flats and shallow water of ponds and marshes; occasional mainly in the e and c parts; (IN to MT, s to MS, TX and AZ). *Hydranthelium rotundifolium* (Michx.) Pennell.





Bacopa rotundifolia.

3. ***Gratiola*** L. — Hedge hyssop

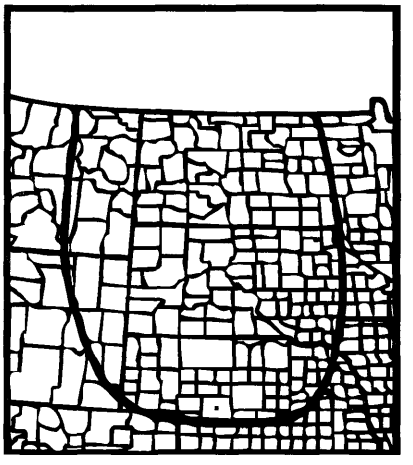
1. *Gratiola neglecta* Torr.

Small, erect to decumbent annual 0.3-2.5 dm tall, usually widely branched, glandular-pubescent at least in the upper part. **Leaves** opposite, sessile, variable in shape, linear to lanceolate or oblanceolate, 5-25 mm long, 1-12 mm wide, acute-tipped, entire to sinuate-toothed, clasping at the base. **Flowers** solitary in the leaf axils, subtended by a pair of narrow bractlets which equal or surpass the calyx, borne on slender, divergent, glandular-pubescent pedicels 9-20 mm long; **calyx** of 5 unequal, distinct sepals, these elongate, accrescent, 3-6 mm long; **corolla** white to yellow, tubular, obscurely bilabiate, shallowly lobed, 6-10 mm long; **stamens** 2, a pair of very minute staminodes also sometimes present. **Capsule** broadly ovoid, 4-valved, with both septicidal and loculicidal dehiscence, 3-5 mm in diameter. Jul—Sep. Mud flats and shores of temporary ponds and marshes; occasional mainly in the n part; (ME and Que. to B.C., s to GA, TX and AZ).



1. *Leucospora multifida* (Michx.) Nutt.

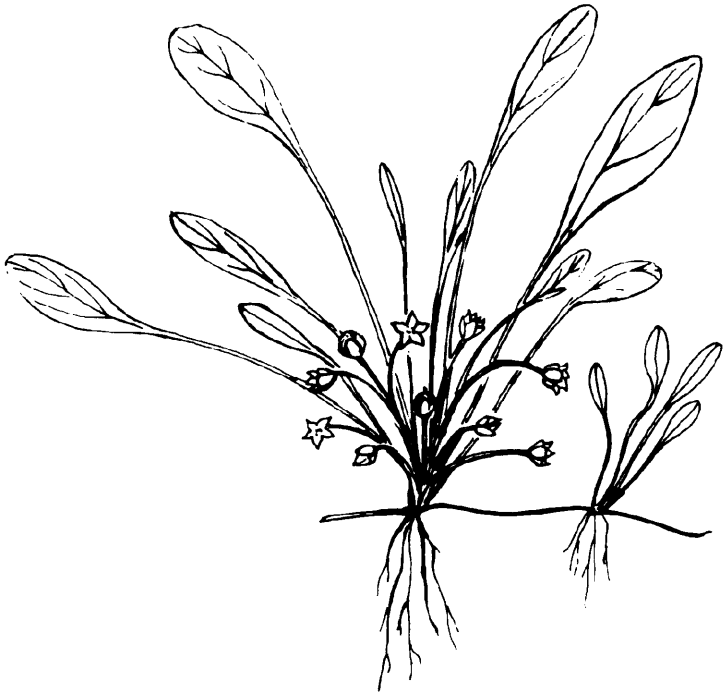
Small, taprooted annual mostly 1-2 dm tall, diffusely branched and spreading, glandular-pubescent throughout. **Leaves** opposite, pinnatifid to weakly bipinnatifid, with 1-3 pairs of narrow lateral lobes or teeth, 1-2.5 cm long. **Flowers** axillary, 1-2 per axil, on slender pedicels 3-7 mm long; **calyx** 5-parted nearly to the base, the lobes linear-subulate, 2.5-4 mm long in flower, to 5.5 mm long in fruit; **corolla** tubular, shallowly 5-lobed, pink or lavender with a greenish-yellow tube and throat, 2.5-5 mm long; **stamens** 4, didynamous, included; **style** exserted, stigma 2-lobed. **Capsule** oblong-ovoid, 4-valved, 3-5 mm long; **seeds** numerous, greenish-yellow, ovoid, 0.2-0.4 mm long, longutidinally ridged and grooved, faintly reticulate. Jun—Sep. Shores and stream banks, often where sandy; uncommon in c and e NE; (s Ont. and OH to NE, s to GA, AL, MS, LA and e TX).



1. *Limosella aquatica* L.

Very small amphibious annual 3-10 cm tall, with the leaves and flowers arising from the tufted base, often extensively stoloniferous. **Leaves** linear, usually dilated at the tip to form an emersed or floating blade, these elliptic to obovate or oblanceolate, 8-25 mm long, 2-8 mm wide, rounded to acute at the tip, tapered to the elongate petiole, some or rarely all the leaves linear throughout, without blades. **Flowers** small, not showy, regular, borne singly on peduncles arising from the plant base, the peduncles shorter than the leaves; **calyx** campanulate, 1.5-3 mm long, the lobes about equal, triangular, mostly 1/2 to equaling the length of the calyx tube; **corolla** minute, inconspicuous, white or pinkish, campanulate, membranous, slightly exceeding the calyx; **stamens** 4. **Capsule** ovoid, 2-2.5 mm long. Jun—Sep. Stream banks, shores and mud flats of temporary ponds and marshes; occasional in the n part, rare s; (Interruptedly circumboreal, throughout most of N.Amer. except the se U.S.).





Limosella aquatica.

6. ***Lindernia*** All. — False pimpernel

1. *Lindernia dubia* (L.) Pennell

Small, usually widely branched annual 0.5-2 dm tall, similar to *Gratiola neglecta* in overall appearance and sometimes confused with it. **Leaves** simple, opposite, sessile, ovate to elliptic or obovate, 5-30 mm long, 2-10 mm wide, entire to denticulate, narrowed to rounded or cordate at the base. **Flowers** borne singly in the axils of the leaves, on slender pedicels 0.5-2.5 cm long; **calyx** regular, comprised of 5 distinct, linear to linear-lanceolate sepals 3-5 mm long; **corolla** light blue-violet, tubular-campanulate, 4-10 mm long, bilabiate, the upper lip erect, shallowly 2-lobed, the lower lip somewhat deflexed, shallowly 3-lobed, much wider than the upper lip; **stamens** 2, with a lower pair of filament-like staminodes also present, these inserted at the middle of the corolla tube. **Capsule** ovoid to ellipsoid, 3.5-6 mm long, membranous. Aug—Sep. Mud flats and shores of temporary ponds and marshes; rare in se ND to occasional in e and c NE; (NH and Que. to ND, s to FL and TX; also on the Pacific Coast, s to S.Amer.). Including *L. anagallidea* (Michx.) Pennell.



7. ***Mimulus*** L. — Monkey-flower

Rhizomatous and sometimes stoloniferous perennials (or annual, in part, in *M. guttatus*) of various growth habits. **Leaves** opposite, sessile or petiolate, subentire to shallowly serrate. **Flowers** solitary on pedicels from the leaf axils or in terminal, leafy-bracteate racemes, often rather large and showy; **calyx** tubular, regular to irregular, the lobes shorter than the tube; **corolla** slightly to strongly bilabiate, yellow or blue-violet, lobes of the upper lip erect to reflexed, lobes of the lower lip spreading or deflexed, the lower lip often arched or ridged in the throat so that the orifice is mostly or completely closed; **stamens** 4, in 2 pairs of differing lengths; **stigmas** 2, distinct. **Capsule** cylindric, loculicidal.

Reference:

Grant, A. L. 1924. A monograph of the genus *Mimulus*. Ann. Missouri Bot. Gard. 11:99-389.

1 Flowers blue-violet to lavender.

2 Leaves sessile; pedicels longer than the calyx . . . . . 4. *M. ringens*

2 Leaves petiolate; pedicels shorter than the calyx. . . . . 1. *M. alatus*

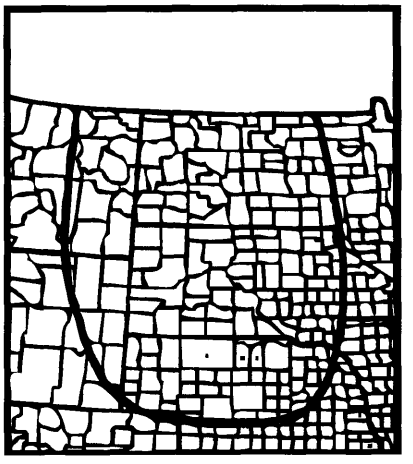
1 Flowers yellow.

3 Stems weak, spreading or creeping; corolla 9-15 mm long . . . . 2. *M. glabratus*

3 Stems stout, erect; corolla 25-45 mm long . . . . . 3. *M. guttatus*

1. *Mimulus alatus* Ait. — Sharpwing monkey-flower.

Erect to ascending, glabrous perennial 3-7 dm tall, stoloniferous at the base; **stem** simple or branched above, 4-angled and winged. **Leaves** petiolate, reduced upward, the blades broadly lanceolate to ovate, 5-12 cm long, 2.5-4 cm wide, acute to acuminate, serrate, tapered to a narrowly winged petiole 1-2 cm long. **Flowers** blue-violet to lavender, on pedicels 2-8 mm long, to 14 mm long in fruit, shorter than the calyx; **calyx** regular, 11-18 mm long, the lobes narrow and subulate, 0.8-2.6 mm long; **corolla** strongly bilabiate, 20-28 mm long, nearly closed at the throat, the upper lip erect to reflexed, the lower lip longer and spreading. **Capsule** oblong-ovoid, 8-11 mm long. Jul—Sep. Stream banks and floodplains, often where shaded; uncommon in n and e NE; (CT, NY and Ont. to NE, s to n FL and e TX).



2. *Mimulus glabratus* H.B.K. — Roundleaf monkey-flower

Low, branching and spreading perennial, the **stems** rather succulent, mostly prostrate and rooting at the nodes, ascending at the tips, 0.5-5 dm long, often forming extensive mats. **Leaves** sessile or the lower ones with winged petioles, the blades subrotund to rotund-ovate or reniform, 0.8-3 cm across, weakly to distinctly dentate, pubescent when young, glabrous with age. **Flowers** yellow, on pedicels 10-40 cm long; **calyx** accrescent, irregular, somewhat bilabiate or oblique, 5-9 mm long, the upper lobe much enlarged, the lateral and lower lobes very low or lacking; **corolla** obscurely bilabiate, 9-15 mm long, the throat open and bearded. **Capsule** ovoid, 5-6 mm long. Jul—Aug. Cold springs, seepage areas and banks of spring-fed streams; occasional from e and c ND to NE; (MI to Man. and MT, s to TX, AZ, NV and into Mex. and S.Amer.).

Plants of this region belong to the northern var. *fremontii* (Benth.) Grant.



3. *Mimulus guttatus* DC. — Common yellow monkey-flower

Annual or perennial 0.5-6 dm tall, with stolons or rhizomes, the main stem simple or branched, glabrous or glandular-puberulent above. **Leaves** petioled below to sessile and clasping above, reduced to bracts in the inflorescence, the blades variable in shape, subrotund or broadly ovate to obovate, sometimes broadly elliptic, 2-8 cm long, 1-4 cm wide, glabrous or pubescent, irregularly dentate. **Flowers** yellow, showy, in leafy-bracteate, loosely flowered, terminal racemes; **pedicels** 1-2.5 cm long; **calyx** accrescent, irregular, 10-17 mm long, the upper lobe largest, the lower lobes projected upward in fruit; **corolla** often spotted with reddish-brown, strongly bilabiate, 25-45 mm long, bearded at the throat. **Capsule** flattened, ovate, about equaling the calyx tube. Jul—Sep. Margins of springs and spring-fed streams in the Black Hills and sparingly eastward where probably introduced; (Rocky Mts., from AK to Mex., sparingly intro. as an ornamental and escaped in the e U.S.).

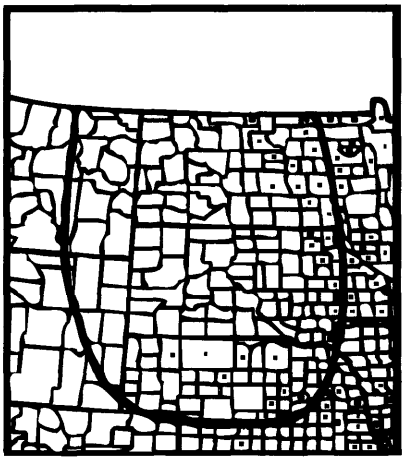




Mimulus guttatus.

4. *Mimulus ringens* L. — Allegheny monkey-flower

Erect or occasionally decumbent perennial 3-8 dm tall, from stout rhizomes, sometimes stoloniferous at the base, glabrous throughout; **stem** simple or branched, 4-angled, sometimes narrowly winged on the angles. **Leaves** sessile, reduced and sometimes bractlike above in the inflorescence, oblong to lanceolate or oblanceolate, 4-12 cm long, 1-3.5 cm wide, acute to acuminate at the tip, shallowly serrate, auriculate-clasping at the base. **Flowers** blue-violet to lavender, on slender pedicels 1.5-4.5 cm long, longer than the calyx; **calyx** regular, angular, 10-18 mm long, the lobes slender, subulate, 3-5 mm long; **corolla** strongly bilabiate, 20-30 mm long, nearly closed at the throat, the upper lip erect and reflexed, the lower lip longer, deflexed. **Capsule** broadly oblong, about equaling the calyx tube. Jun—Aug. Stream banks, oxbow marshes and wooded floodplains; e ND, e SD, n and e NE; (Que. and N.S. to Sask., s to FL, LA and OK).



8. ***Pedicularis*** L. — Lousewort

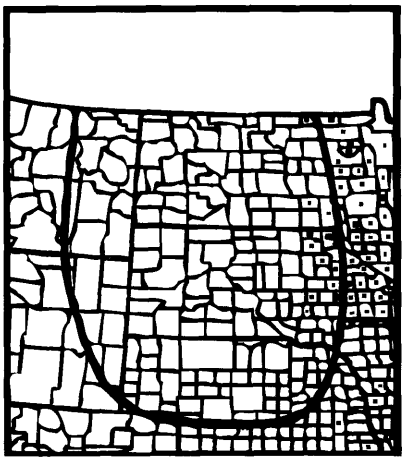
Erect perennials with opposite or alternate pinnatifid leaves and terminal, bracteate spikes or spikelike racemes of yellow flowers. **Calyx** tubular or campanulate, oblique, obscurely lobed or with 2 prominent lateral lobes; **corolla** pale yellow, strongly irregular, bilabiate, the upper lip strongly concave or arched, entire, sometimes with a pair of lateral teeth near the tip, lower lip about equal to or shorter than the upper, with 2 longitudinal folds; **stamens** 4, didynamous, included by the upper lip. **Capsule** ovate to oblong, laterally flattened, loculicidally dehiscent, splitting only or mainly along the upper side.

1 Calyx entire or nearly so; upper lip of the corolla with 2 lateral teeth near the tip . . . . . 1. *P. canadensis*

1 Calyx with 2 crenate, lateral lobes; upper lip of the corolla entire . . . . . 2. *P. lanceolata*

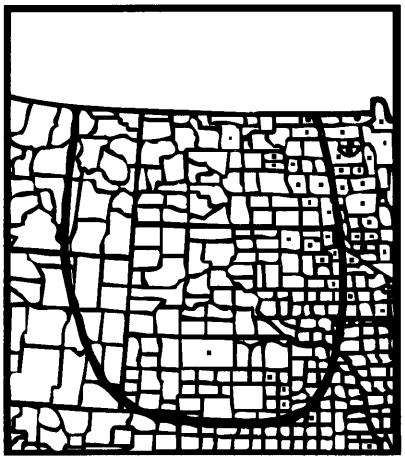
1. *Pedicularis canadensis* L.

Plants loosely tufted with clustered **stems** 1-3 dm tall. **Leaves** basal and cauline, alternate, the basal and lower leaves longer-petioled and more prominent than the upper ones, the **blades** oblanceolate in outline, 3-6 cm long, 0.8-2.5 cm wide, rounded at the tip, pinnatifid with the lobes crenate-margined, divided more than halfway to the midrib, tapered to the petiole. **Flowers** sessile or subsessile, in dense spikes 2-15 cm long, the spike axis densely pubescent; **bracts** obovate to oblanceolate, deciduous; **calyx** very oblique, entire or nearly so, 6-9 mm long; **corolla** 17-25 mm long, the upper lip with 2 lateral teeth near the tip. **Capsule** oblong, ca. 2X the length of the calyx. Late May—Jun. Wet meadows and low prairie, often where sandy; e ND and e SD; (Que. and ME to Man., s to FL, TX, CO and into n Mex.).



2. *Pedicularis lanceolata* Michx.

Stems simple or few-branched, 3-6 dm tall, glabrous or ciliate on the margins of the leaf bases and onto the stem. **Leaves** mostly opposite, sessile or subsessile, oblanceolate to oblong or linear-lanceolate, 4-9 cm long, 1-2 cm wide, bluntly acute at the tip, pinnatifid and finely crenate, tapered to rounded at the base. **Flowers** sessile to subsessile in terminal and sometimes upper axillary spikes 2-10 cm long; **bracts** 3- to 5-lobed and crenate, the terminal lobe largest; **calyx** oblique, 9-12 mm long, including the 2 lateral crenate lobes which are 2-3 mm long; **corolla** 18-23 mm long, the upper lip entire. **Capsule** obliquely ovoid, mostly included by the calyx. Jul—Sep. Wet meadows, fens and springs, where water is fresh; n and e ND, e SD, n and e NE; (MA to ND, s to NC, MO and NE).



9. *Veronica* L. — Speedwell

Annuals or perennials with entire to serrate, opposite leaves, or the leaves becoming alternate in the inflorescence. **Flowers** usually numerous in axillary or terminal racemes; **calyx** accrescent, deeply 4-parted, the sepals often variable in shape; **corolla** white, pink, blue or violet, 4-lobed, slightly bilabiate, rotate, the tube much shorter than the limb; **stamens** 2; **styles** exsert, persistent in fruit, stigma capitate. **Capsule** somewhat to strongly flattened, loculicidal, often lobed or notched at the tip.

Reference:
Pennell, F. W. 1921. "*Veronica*" in North and South America. Rhodora 23:1-22, 29-41.

1 Racemes terminal; pedicels 2 mm or less long . . . . . 4. *V. peregrina*

1 Racemes axillary; pedicels longer than 2 mm.

2 Leaves short-petioled . . . . . 1. *V. americana*

2 Leaves sessile, often clasping.

3 Capsules turgid, slightly notched at the tip; seeds numerous, 0.5 mm or less long; leaves 1.5-5X longer than wide.

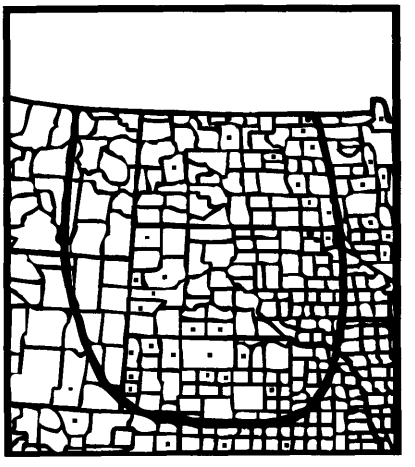
4 Leaves 1.5-3X longer than wide; corolla blue or violet; capsules about as wide as long . . . . . 2. *V. anagallis-aquatica*

4 Leaves (2.5)3-5X longer than wide; corolla white, pink or pale bluish; capsules wider than long . . . . . 3. *V. catenata*

3 Capsules strongly flattened, conspicuously notched at the tip; seeds 5-9 per locule, 1.2-1.8 mm long; leaves (3)4-20X longer than wide . . . . . 5. *V. scutellata*

1. *Veronica americana* (Raf.) Schwein. ex Benth. — Brooklime

Glabrous, rhizomatous perennial from shallow rhizomes; **stems** erect to procumbent, 1-6 dm long. **Leaves** opposite, short-petiolate, the blades ovate-lanceolate to lanceolate, or the lower ones elliptic, 1.5-8 cm long, 0.6-3 cm wide, bluntly acute at the tip or the lower ones rounded, subentire to serrate, rounded to subcordate at the base. **Racemes** axillary, mostly 10- to 25-flowered; **pedicels** divaricate, 4-10 mm long; **corolla** blue, 5-10 mm across. **Capsule** suborbicular, rounded to slightly notched at the apex, 2.5-4 mm long, about as wide or slightly wider, the style 2.5-3.5 mm long; **seeds** numerous, ca. 0.5 mm long. Jun—Aug. Springs and fresh streams; scattered, but most common in the ne and sw parts of the region; (Newf. to AK, s to NC, TX, CA and into Mex.; also ne Asia).



2. *Veronica anagallis-aquatica* L. — Water speedwell

Erect to spreading, fibrous-rooted biennial or shortlived perennial 1-5 dm tall, glabrous or nearly so. **Leaves** sessile, opposite, elliptic to elliptic-obovate or elliptic-oblong, 2-10 cm long, 0.6-5 cm wide, 1.5-3X longer than wide, bluntly acute to obtuse at the tip, entire to serrate, mostly clasping. **Racemes** axillary, many-flowered; **pedicels** ascending or upcurved, 3-8 mm long; **corolla** light blue or violet, ca. 5 mm across. **Capsule** orbicular, turgid, rounded or scarcely notched at the tip, 2.5-4 mm long, about as wide, the style 1.5-2.5 mm long; **seeds** numerous, 0.5 mm or less long. Jun—Sep. Stream margins and low areas on floodplains, often emergent in shallow water; scattered from e ND to NE; (Intro. from Eurasia and naturalized throughout most of N.Amer.).

Many records of this species in ND were based on misidentified *V. catenata.*



3. *Veronica catenata* Pennell

Quite similar to the preceding, differing mainly as follows: Glandular-puberulent mainly in the upper part. **Leaves** elliptic-lanceolate to lanceolate, 2-7(10) cm long, 0.4-1.5(3) cm wide, (2.5)3-5X longer than wide, acute at the tip. **Pedicels** divaricately spreading; **corolla** white, pink or pale bluish. **Capsule** obcordate, usually prominently notched at the tip, 2-3 mm long, 3-4 mm wide. Jun—Sep. Same habitats as the preceding; frequent in e ND, e and sw SD and c NE; (MA and Ont. to Sask. and WA, s to PA, TN, KS, AZ and CA). *V. connata.*

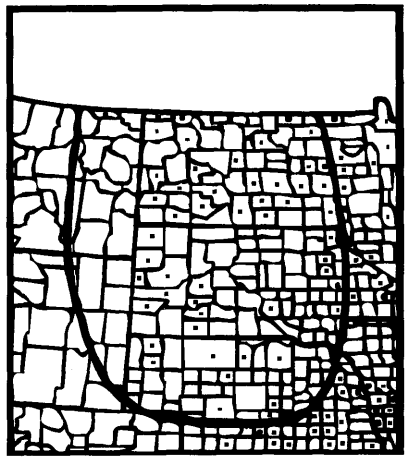
Sterile plants representing hybrids between this species and the preceding one, have been reported from along the Platte River in Nebraska (Brooks, R. E. Rhodora 78:773-775. 1976.) and others have been noted in the Black Hills.



4. *Veronica peregrina* L. — Purslane speedwell

Small, simple to diffusely branched annual 0.5-3 dm tall, erect or curved at the base, conspicuously glandular-pubescent, especially above. **Leaves** sessile, opposite near the base, becoming alternate in the inflorescence, oblong to linear-oblong or oblanceolate, 5-25 mm long, 1-5(9) mm wide, rounded at the tip, entire to irregularly toothed. **Flowers** subsessile in terminal, lax racemes which comprise most of the plant, the leaflike bracts gradually reduced upward; **pedicels** to 1-2 mm long in fruit; **calyx** 2-5 mm long; **corolla** inconspicuous, white or whitish, ca. 2 mm across. **Capsule** obcordate, notched at the tip, 2.5-4 mm long, 3.5-5 mm wide. Jun—Aug. Mud flats, shores, ditches, temporary ponds and swales; common; (Temperate N. and S. Amer. and intro. in Europe).

The prevalent phase of *V. peregrina* in our area has short glandular hairs and is called var. *xalapensis* (H.B.K.) St. John & Warren. The glabrous var. *peregrina* is rare, entering our range in e NE.



5. *Veronica scutellata* L. — Marsh speedwell

Erect to reclining, rhizomatous perennial, glabrous throughout (in our region), the stems rather weak, 1-4 dm long. **Leaves** sessile, opposite, linear to lanceolate, 3-8 cm long, 2-18 mm wide, (3)4-20X longer than wide, acute to attenuate, entire or obscurely and remotely denticulate, tapered to the sessile base. **Racemes** axillary, mostly 5- to 20-flowered; **pedicels** divaricate to recurved, 5-17 mm long; **calyx** 1.5-2 mm long; **corolla** bluish, 6-10 mm across. **Capsule** flattened, conspicuously notched, appearing 2-lobed, 2.5-4 mm long, 4-5 mm wide. Jun—Aug. Marshes, springs, stream banks and swales, where water is fresh; uncommon in n ND and ne MT; (Newf. and Labr. to Yuk., s to VA, IA, ND, CO and CA; also Eurasia).



46. **Lentibulariaceae**, the Bladderwort Family

1. ***Utricularia*** L. — Bladderwort

Free-floating aquatics with elongate, lax **stems** clothed in alternate, submersed **leaves** which are finely dissected into many linear segments, some or all of these bearing **bladders** which trap tiny aquatic invertebrates; **stem apices** commonly producing free-floating winter buds in late summer and autumn. **Flowers** 2-many in scapose, bracteate racemes held above the water surface, perfect, irregular; **calyx** 2-parted nearly to the base into an upper and lower segment, the upper one somewhat broader; **corolla** yellow, bilabiate, the upper lip erect, subentire or slightly 2-lobed, the lower lip entire or slightly 3-lobed, prominently arched toward the base to form a conspicuous or inconspicuous palate, the tube prolonged backward into a spur; **stamens** 2, inserted near the base of the tube; **stigma** unevenly 2-lobed, style short or obsolete, ovary superior, maturing into a many-seeded **capsule**.

Reference:
Rossbach, C. B. 1939. Aquatic utricularias. Rhodora 41:113-128.

1 Ultimate leaf segments flat, nearly to fully as wide as the primary ones, with a distinct midvein; lower lip of the corolla about 2X as long as the upper.

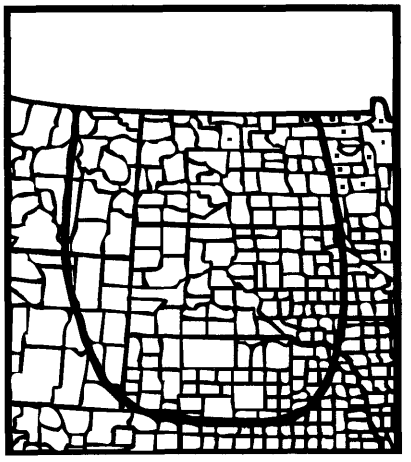
  2 Bladders borne on specialized branches distinct from the dissected leaves; leaf segments spinulose-toothed . . . . . 1. *U. intermedia*

  2 Bladders borne on ordinary leaves; leaf segments entire, sometimes toothed at the tip . . . . . 2. *U. minor*

1 Ultimate leaf segments filiform, the segments progressively narrower in successive branchings; lower lip of the corolla little if any longer than the upper . . . . . 3. *U. vulgaris*

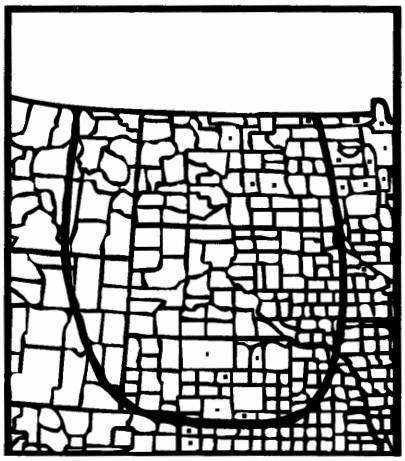
1. *Utricularia intermedia* Hayne

Stems very slender, usually creeping along the bottom in shallow water. **Leaves** numerous, commonly trichotomous at the base and then 1-3X dichotomous, 0.5-2 cm long, the segments slender, flat, not much reduced with each branching, the ultimate segments blunt-tipped; **bladders** borne on specialized branches distinct from the leaves, 2-4 mm wide; **winter buds** ovoid or ellipsoid, 5-7 mm long. **Flowers** usually 2-4 in a lax raceme; **peduncle** 6-20 cm long; **corolla** with a lower lip mostly 8-12 mm long, the palate well- developed, nearly 2X as long as the upper lip; **spur** nearly as long as the lower lip; **fruiting pedicels** suberect. Jul—Aug. Shallow water of springs, bogs and swamps; rare, in n ND; (Circumboreal, in N. Amer. s to DE, IN, IA, ND and CA).



2. *Utricularia minor* L.

Similar in habit to the preceding. **Leaves** numerous, commonly trichotomous at the base and then dichotomous or irregularly 1-3X divided, mostly 0.3-1 cm long, the segments slender, flat, entire, sometimes toothed at the tip, not much reduced with each branching, the ultimate segments strongly acuminate; **bladders** borne on ordinary leaves, 1-2 mm wide; **winter buds** obovoid to globose, 2-5 mm long. **Flowers** usually 2-9 in a lax raceme; **peduncle** 4-15 cm long; **corolla** with a lower lip 4-8 mm long, 2X as long as the upper lip, the palate scarcely developed; **spur** small, to 1/2 as long as the lower lip; **fruiting pedicels** recurved. Jul—Aug. Shallow water of fens and fresh marshes; rare, n and c ND, c and sw NE; (Circumboreal, in N. Amer. s to NJ, IN, ND and CA).

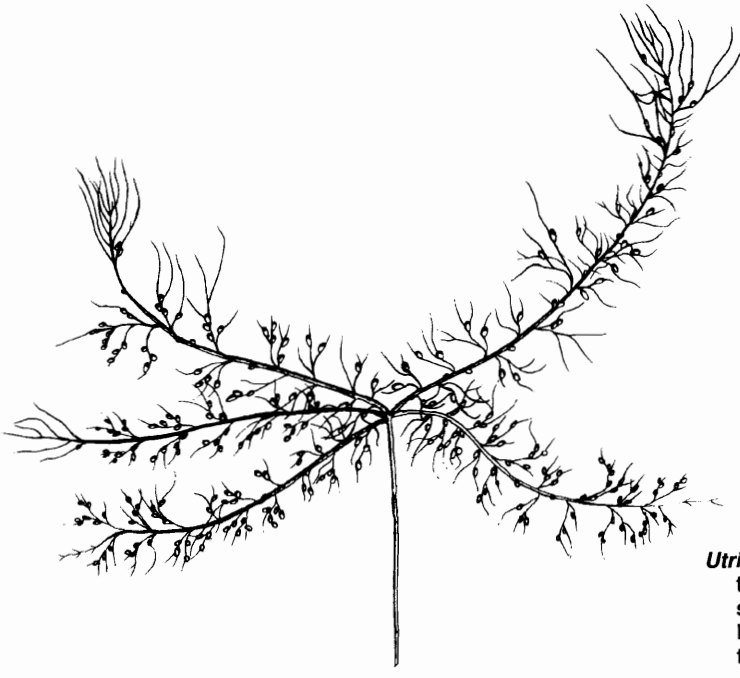


3. *Utricularia vulgaris* L. — Common bladderwort

Stems free-floating, often extensive. **Leaves** numerous, mostly dichotomous at the base and then repeatedly and unequally dichotomous, 1-5 cm long, the segments more or less terete, progressively reduced with branching, the ultimate segments filiform, attenuate; **bladders** borne on segments of ordinary leaves, 1-4 mm wide; **winter buds** ovoid or ellipsoid, 1-2 cm long. **Flowers** usually 6-20 in a lax raceme borne on a stout peduncle 6-25 cm long; **corolla** with a lower lip mostly 10-20 mm long, sometimes much smaller on later flowers, the palate well-developed, the upper lip about equaling the lower one; **spur** ca. 2/3 as long as the lower lip; **fruiting pedicels** recurved. Jun—Aug. Shallow, standing water of lakes, ponds, marshes and ditches, often among rushes or cattails; common in all but the w part; (Circumboreal, in N.Amer. s to FL, TX, AZ and CA).







Utricularia vulgaris. **Photo courtesy U.S. Fish & Wildlife Service, showing the emersed flowers. Drawing depicts submersed portion of plant.**

47. **Campanulaceae**, the Bellflower Family

Perennial or biennial herbs with simple, alternate, exstipulate leaves. **Flowers** in terminal bracteate racemes or solitary and pedicelled in upper leaf axils, perfect, 5-merous, regular (*Campanula*) or irregular (*Lobelia*); **calyx** of 5 more or less equal sepals; **corolla** white to blue-violet, funnelform or bilabiate, in the latter case, split open along the upper side with the anthers protruding through the cleft; **stamens** 5, separate or united into a tube around the style; **ovary** inferior or partly so, 2- to 5-celled, many-ovuled; **hypanthium** usually prominent. **Fruit** a many-seeded capsule, opening laterally or at the top.

1 Flowers regular; stamens separate . . . . . 1. *Campanula*

1 Flowers irregular; stamens united to form a tube around the style . . . . . 2. *Lobelia*

1. ***Campanula*** L. — Bellflower

1. *Campanula aparinoides* Pursh — Marsh bellflower

Perennial from slender rhizomes, the stems slender, weak, usually reclining on other plants, 2-6 dm long, 3-angled, usually roughened on the angles. **Leaves** sessile, linear or narrowly lanceolate, 1-8 cm long, 2-8 mm wide, reduced upward, often roughened on the margins and midvein beneath, acuminate at the tip, with very low remote teeth on the margins, tapered to the base. **Flowers** solitary on long, slender pedicels from the upper leaf axils, regular; **sepals** triangular to lanceolate, 1.5-5 mm long; **corolla** funnelform, pale blue to white, 4-12 mm long. **Capsule** opening near the base to release the seeds. Jul—Aug. Fresh wet meadows, fens and boggy places; rare in e ND, ne SD and e NE, occasional from the Black Hills to c NE; (N.S. and Que. to Sask., s to GA, KY, MO and NE).



2. ***Lobelia*** L. — Lobelia

Perennial or biennial plants with irregular flowers in terminal bracteate racemes. **Corolla** sometimes showy, white, pale blue or dark blue, often with white or yellow markings, bilabiate, the 2 lobes of the upper lip erect or projecting forward, the 3 lobes of the lower lip spreading, the corolla split to the base along the upper side between the lobes of the upper lip, the anthers projecting through the cleft; **stamens** fused to form an upward-arching tube around the style, the anthers usually colored, the lower 2 bearded at the tip; **ovary** 2-celled. **Capsule** dehiscing at the top.

Reference:

McVaugh, E. 1936. Studies in the taxonomy and distribution of the eastern North American species of *Lobelia*. Rhodora 38:241-263, 276-298, 305-329, 346-362.

1 Flowers large and showy, the corolla 16-30 mm long, dark blue with white stripes on the lower lip ..... 2. *L. siphilitica*

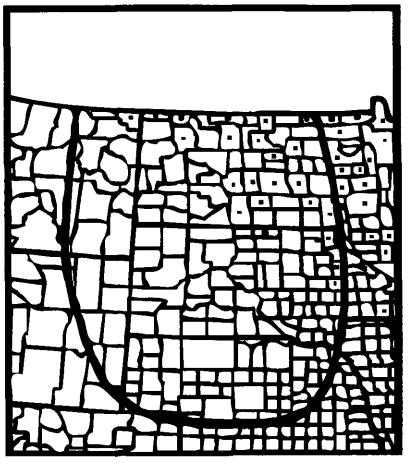
1 Flowers small, not especially showy, the corolla 4-11 mm long, white to lavender or blue, often with a white or yellow center.

2 Cauline leaves linear or narrowly lanceolate, 1-5 mm wide; racemes rather loose and open, the pedicels mostly 4-10 mm long ..... 1. *L. kalmii*

2 Cauline leaves oblanceolate to lanceolate, 5-18 mm wide; racemes rather dense and spikelike, the pedicels 1-4 mm long ..... 3. *L. spicata*

1. *Lobelia kalmii* L. — Kalm's lobelia

Small, erect, essentially glabrous biennial 1-4 dm tall, simple or sparingly branched above, often with a basal rosette of small obovate to oblanceolate leaves. **Cauline leaves** linear to narrowly lanceolate, 1-5 cm long, 1-5 mm wide, blunt to acute-tipped, remotely and obscurely toothed. **Racemes** rather loose and open, the flowers widely spaced on minutely bracteolate **pedicels** mostly 4-10 mm long. **Calyx lobes** linear to linear-lanceolate, 1.5-5 mm long; **corolla** blue with a white or white-and-yellow center, 7-11 mm long. Late Jul—Sep. Fresh springs, fens, seepage areas and wet meadows; occasional from ne MT and n ND to n and e SD; (Newf. to B.C., s to PA, OH, IL, MN, ND, MT and WA).



2. *Lobelia siphilitica* L. — Blue cardinal-flower

Erect perennial (1)2-8 dm tall, often flowering the first year; **stems** sparsely ciliate on decurrent leaf bases. **Leaves** sessile, oblong or elliptic to lanceolate or oblanceolate, 2-12 cm long, 1-3 cm wide, reduced upward and becoming bractlike in the inflorescence, acute or blunt-tipped, irregularly crenate-serrate, narrowed to the base. **Racemes** usually many-flowered (few-flowered on depauperate specimens), mostly 1-3 dm long; **pedicels** ascending, 4-10 mm long. **Sepals** triangular to lanceolate, 5-19 mm long, usually with narrow appendages toward the base; **corolla** showy, dark blue with the lower lip longitudinally blue-and-white striped, 16-30 mm long. Aug—Sep. Stream banks, shores, wet meadows and swampy places; se ND, e and s SD and throughout NE; (ME to Man., s to NC, TX and CO).





Lobelia siphilitica.

3. *Lobelia spicata* Lam. — Pale-spike lobelia

Erect perennial (1)2-6 dm tall, simple or sometimes branched, pubescent especially toward the base. **Leaves** obovate to spatulate and often short-petiolate below, becoming oblanceolate upward on the stem, 1.5-5(7) cm long, 5-18 mm wide, puberulent mainly above, rounded at the apex, obscurely crenate to irregularly serrate, narrowed or long-tapered to the base. **Racemes** many-flowered, rather dense and spikelike; **pedicels** mostly 1-4 mm long, minutely bracteolate at the base. **Calyx lobes** linear to linear-lanceolate, 2-6 mm long; **corolla** white to pale blue, marcescent, 4-8 mm long. Jul—Aug. Fresh wet meadows, low prairie, springs, seepage areas and boggy places; frequent from ne MT and n ND to n and e SD, less common and scattered elsewhere; (Que. and N.S. to Alta., s to GA, AR and KS).



48. **Rubiaceae**, the Madder Family

1. ***Galium*** L. — Bedstraw

Ascending to reclining, often matted perennials from slender rhizomes (those included here), with slender, 4-angled stems and small, simple, entire leaves in whorls of 4-6. **Flowers** minute, perfect, regular, 1-few in axillary or terminal cymes, the peduncles and pedicels short and slender. **Calyx** none; **corolla** white, inconspicuous, rotate, 3- or 4-lobed; **stamens** equaling the number of corolla lobes, inserted on the tube; **styles** 2, short, ovary inferior, 2-celled and 2-lobed, the 2 carpels maturing as dry, globose fruit segments which separate at maturity, sometimes one of the carpels abortive.

References:

Puff, C. 1975. The *Galium trifidum* group (*Galium* sect. *Aparinoides*, Rubiaceae). Canad. J. Bot. 54:1911-1945.

Puff, C. 1977. The *Galium obtusum* group (*Galium* sect. *Aparinoides*, Rubiaceae). Bull. Torrey Bot. Club 104:202-208.

1 Corolla lobes 4, acute; leaves hispidulous on the margin.

2 Mature fruit segments 1-1.5 mm in diameter; fruiting pedicels 1-2.5(4) mm long; leaves eventually reflexed, 1-3 mm wide . . . . . 1. G. *labradoricum*

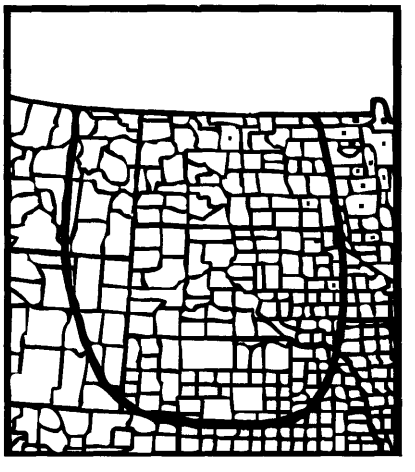
2 Mature fruit segments 2.5-3.5 mm in diameter; fruiting pedicels 5-10 mm long; leaves ascending to spreading, (2)3-5(6) mm wide. . . . . 2. G. *obtusum*

1 Corolla lobes 3, obtuse; leaves scaberulous on the margin but not hispidulous . . . . . 3. G. *trifidum*

1. *Galium labradoricum* (Wieg.) Wieg. — Labrador bedstraw

Stems 1-3 dm long, simple or branched above, pubescent only at the nodes, smooth or scaberulous on the angles. **Leaves** in whorls of 4, soon recurved or deflexed, linear-oblanceolate, 8-15 mm long, 1-3 mm wide, hispidulous on the margins, smooth on the midvein or mostly so, blunt-tipped, tapered to the base. **Inflorescences** few, mostly terminal, 3-flowered, soon overtopped by ascending lateral branches. **Corolla** lobes 4, 1-1.5 mm long, acute. **Fruit** segments black, 1-1.5 mm in diameter; **fruiting pedicels** 1-2.5(4) mm long. Jun—Jul. Bogs, fens and swamps; rare, nc and se ND and e SD; (Newf. and Labr. to Alta., s to PA, OH, IL, MN and e SD).

2. *Galium obtusum* Bigel. — Bluntleaf bedstraw



Stems 2-6 dm long, branched throughout or mainly from the base, pubescent at the nodes, otherwise glabrous. **Leaves** in whorls of 4(-6), ascending to spreading, linear to lanceolate, oblanceolate or elliptic-oblong, 10-25(30) mm long, (2)3-5(6) mm wide, hispidulous on the margins and slightly so on the midrib beneath, often slightly revolute along the margins, obtuse-tipped. **Inflorescences** terminal on main stems and branches, not overtopped by lateral branches. **Corolla lobes** 4, 1-1.3 mm long, acute. **Fruit segments** black, 2.5-3.5 mm in diameter at maturity; **fruiting pedicels** 5-10 mm long. May—Jul. Wet meadows, stream banks, ditches, wet thickets and floodplains; uncommon, e and sc SD, e and c NE; (N.S. and Que. to MN and SD, s to FL and e TX).



3. *Galium trifidum* L. — Small bedstraw

Stems 2-6 dm long, freely branching, retrorsely scaberulous on the angles. **Leaves** in whorls of 4-6, mostly spreading, linear to narrowly elliptic or oblanceolate, 5-20 mm long, 1-3.5 mm wide, often scaberulous on the margin and on the midrib of the underside, blunt-tipped, narrowed to the base. **Inflorescences** usually many, axillary and terminal, 1- to 3-flowered. **Corolla lobes** 3, ca. 0.5 mm long, obtuse. **Fruit segments** black, 1-2 mm in diameter. Jun—Aug. Springs, seepage areas, shores, stream banks and swampy or boggy places, where water is fresh; frequent, n, c and e ND; nc, ne and sw SD; throughout NE; (Circumpolar, in N.Amer. s to GA, OK, CA and into Mex.).

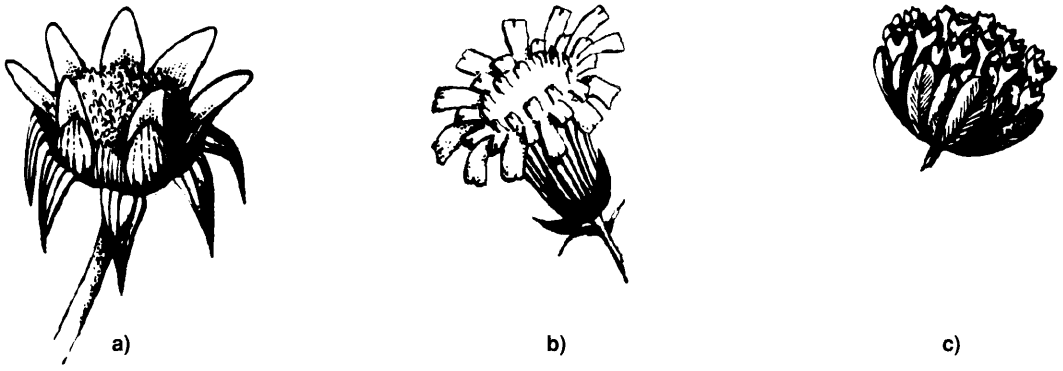




Galium trifidum.

Annual, biennial or perennial herbs (those included here) of various growth habits. **Leaves** simple or compound, exstipulate, opposite, alternate or both, sometimes whorled, occasionally the principal leaves basal. **Flowers** reduced in size, crowded into **involucrate heads** and sharing a common receptacle, the **disk**, the heads each resembling a single flower and arranged in various kinds of inflorescences; flowers of the head usually of 2 types, **ray** (or **ligulate**) **florets** simulating petals around the outside of the disk, and the usually less conspicuous **disk** (or **tubular**) **florets** occupying the central portion of the disk (to form a **radiate head**, or the head comprised entirely of ray florets (**ligulate head**), or disk florets (**discoid head**), the disk florets of a radiate or discoid head sometimes intermixed with bracts so that the receptacle is **chaffy**, otherwise the receptacle naked or pitted; **involucral bracts** sepaloid or foliaceous, surrounding and subtending the disk in 1-several series, often imbricate. **Individual flowers** perfect or imperfect*, regular (disk florets) or irregular (ray florets), lacking a definite calyx; a **pappus** of **capillary bristles**, **scales** or **awns** often encircling the summit of the ovary outside the corolla, commonly accrescent and persistent in fruit, often functioning in dispersal; **corollas** of 2 types, those of the ray florets tubular only at the base, expanded into the flat, petaloid **ray** or **ligule**, entire or toothed at the tip, the **disk corollas** tubular, with 5 equal lobes or teeth at the summit; **stamens** 5, epipetalous, usually with the elongate anthers united into a tube around the style; **style branches** usually 2, ovary inferior, 2-carpellary, 1-celled and 1-ovuled, ripening into an achene.

*Imperfect flowers in composite flower heads are commonplace. The ray florets of radiate heads are pistillate or sterile, whereas the disk florets are perfect or functionally staminate. In ligulate and discoid heads, usually all the florets are perfect, but in some discoid types, e.g., *Xanthium*, staminate and pistillate florets are borne in 2 very different types of discoid heads.



Representative inflorescence types of the Asteraceae: a) radiate head, b) ligulate head, and c) discoid head.

1 Heads ligulate, comprised entirely of yellow ray florets; plants with milky juice.

2 Leaves in a basal rosette like those of a dandelion; mature achenes terete . . . . . 7. *Crepis*

2 Leaves cauline; mature achenes flattened . . . . . 17. *Sonchus*

1 Heads radiate or discoid; plants with watery juice.

3 Leaves with sharp spines . . . . . 5. *Cirsium*

3 Leaves spineless.

4 Leaves all opposite or whorled.

5 Receptacle chaffy.

6 Pappus none; leaves, or at least the upper ones, connate-perfoliate, forming a cup around the stem . . . . . 15. *Silphium*

6 Pappus of awns or awn-tipped scales; leaves sessile or petiolate, sometimes slightly connate, but not forming a cup around the stem.

7 Pappus of 2-4 retrorsely barbed awns . . . . . 3. *Bidens*

7 Pappus of 2 awn-tipped scales . . . . . 12. *Helianthus*

5 Receptacle naked . . . . . 9. *Eupatorium*

4 Leaves alternate or partly so, or the leaves chiefly basal.

8 Heads radiate with yellow rays.

9 Pappus of 2-several awns or scales.

10 Receptacle chaffy; leaves short-petioled, not decurrent on the stem . . . . . 12. *Helianthus*

10 Receptacle naked; leaves tapered to the base, decurrent as wings on the stem . . . . . 11. *Helenium*

9 Pappus of numerous capillary bristles.

11 Involucral bracts in one series, not imbricate, sometimes with a few reduced bracts below . . . . . 14. *Senecio*

11 Involucral bracts in few to several series, imbricate.

12 Inflorescence corymbiform; leaves linear to linear-lanceolate or linear-elliptic, 2-10 mm wide, entire, glandular-punctate . . . . . 10. *Euthamia*

12 Inflorescence paniculiform; leaves lanceolate to elliptic, 10-40 mm wide, serrate, not glandular . . . . . 16. *Solidago*

8 Heads discoid or radiate with rays colored other than yellow.

13 Heads unisexual and dimorphic, the male florets in small heads above the larger female heads; involucres of the female heads spiny, completely enclosing the pistillate florets to form a bur . . . . . 19. *Xanthium*

13 Heads bisexual or rarely unisexual, all alike; involucres not spiny.

14 Principal leaves basal, sagittate or palmate, white-woolly at least on the lower surface; flowering in spring or early summer . . . . . 13. *Petasites*

14 Principal leaves cauline, shaped other than sagittate or palmate, not white-woolly; flowering late summer or autumn (except *Erigeron philadelphicus*).

15 Heads discoid.

16 Leaves pinnately dissected; pappus none . . . . . 1. *Artemisia*

16 Leaves simple, entire or toothed; pappus of numerous capillary bristles.

17 Perennial with lanceolate to ovate-lanceolate leaves; involucral bracts purple-tipped . . . . . 18. *Vernonia*

17 Annual with linear leaves; involucral bracts green . . . . . 2. *Aster*

15 Heads radiate (the rays very narrow and only slightly, if at all, exceeding the involucre in *Erigeron lonchophyllus* and *Conyza canadensis*, therefore inconspicuous).

18 Pappus of 2 awns and several minute bristles . . . . . 4. *Boltonia*

18 Pappus of numerous capillary bristles.

19 Plants taprooted annuals blooming in late summer or fall; involucre 3-4(5) mm high . . . . . 6. *Conyza*

19 Plants fibrous-rooted perennials, often with rhizomes, blooming in early or late summer or fall; involucre usually more than 4 mm high.

20 Involucral bracts green, often chartaceous at the base; rays wider than 0.5 mm . . . . . 2. *Aster*

20 Involucral bracts hyaline at the tip and on the margins above, green in the middle and at the base; rays 0.1-0.6 mm wide . . 8. *Erigeron*

1. *Artemisia biennis* Willd. — Biennial wormwood

Erect, taprooted annual or biennial (1)3-12 dm tall, glabrous, weakly aromatic, plants strict to pyramidal in shape. **Leaves** alternate, pinnately dissected nearly to the middle, 4-12 cm long, 2-5 cm wide, the segments toothed or themselves pinnatisect on lower leaves. **Heads** discoid, small and numerous, in a dense, spikelike inflorescence or in spikelike branches; **involucres** campanulate, 2-3 mm high, the bracts imbricate, obovate with broad scarious margins; **receptacle** naked. **Achenes** ellipsoid, slightly flattened, 4- to 5-nerved, ca. 0.5 mm long; **pappus** none. Aug—Sep. A weedy species of shores, stream banks, ditches, mud flats and other places where water stands temporarily; common; (Native to nw U.S., but now widespread in N.Amer. as a weed; Que to B.C., s to NJ, KY, MO, NM and CA).



2. *Aster* L. — Aster

Annual or most often perennial herbs with simple, alternate leaves. **Heads** radiate (discoid in *A. brachyactis*), (1) few to many, often showy, borne at the ends of leafy stems or branchlets, often aggregated in paniclelike inflorescences; **ray florets** pistillate, the ligules white to pink to various shades of blue or purple, mostly more than 0.5 mm wide; when rays are absent, the outermost florets on the disk pistillate with a slender, tubular corolla; **involucral bracts** in 2 or more series, usually imbricate, herbaceous and green-tipped, chartaceous at the base; **receptacle** naked, flat or slightly convex; **disk florets** perfect, the corollas yellow, white or red to purple; style branches flattened with minutely hairy appendages. **Achenes** mostly several-nerved, rarely 2-nerved; **pappus** of numerous capillary bristles.

1 Rays lacking; plants annual, taprooted . . . . . 1. *A. brachyactis*

1 Rays evident; plants perennial.

2 Involucres, peduncles and upper stem glandular-pubescent.

3 Leaves lanceolate, clasping the stem . . . . . 5. *A. novae-angliae*

3 Leaves linear to linear-oblanceolate, not clasping. . . . . 6. *A. pauciflorus*

2 Involucres, peduncles and upper stem glabrous or pubescent but not glandular.

4 Pappus a double row of capillary bristles, the outer row much shorter than the inner; heads clustered in a terminal, somewhat flat-topped inflorescence; rays white . . . . . 8. *A. pubentior*

4 Pappus a single row of equal capillary bristles; heads usually in paniclelike inflorescences; rays white to pink or blue.

5 Leaves auriculate-clasping.

6 Plants arising from a short rhizome or caudex; leaves of the inflorescence not conspicuously crowded . . . . . 9. *A. puniceus*

6 Plants arising from long creeping rhizomes; leaves of the inflorescence not conspicuously crowded . . . . . 4. *A. lucidulus*

5 Leaves sessile but not auriculate-clasping, only weakly clasping if at all.

7 Leaves linear, 2-6 mm wide; rhizome slender, 0.5-1.5(2) mm thick; heads rather few (sometimes solitary) and uncrowded . . . . . 3. *A. junciformis*

7 Leaves linear to linear-lanceolate, 3-25 mm wide; rhizome stouter, mostly 2-6 mm thick; heads usually many, often crowded.

8 Veinlets of the leaf forming a conspicuous reticulum on the underside, outlining nearly equal-sided areolae . . . . . 7. *A. praealtus*

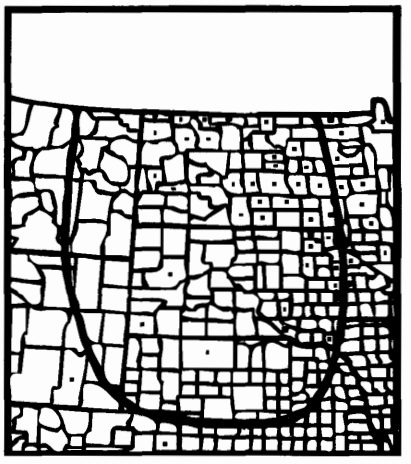
8 Veinlets of the leaf forming a rather inconspicuous reticulum on the underside, the areolae, if evident, clearly longer than broad.

9 Involucral bracts mostly not strongly imbricate in flowering heads, the outer bracts usually at least 2/3 as long as the inner ones in mature heads; lobes of the disk corollas comprising 19-36% of the limb (the widening portion of the tubular corolla) . . . . . 2. *A. hesperius*

9 Involucral bracts more or less strongly imbricate in flowering heads, the outer bracts seldom as much as 2/3 as long as the inner ones in mature heads; lobes of the disk corollas 30-45% of the limb . . . . . 10. *A. simplex*

1. *Aster brachyactis* Blake — Rayless aster

Taprooted annual 1.5-6 dm tall, simple and erect to branched and spreading, mostly glabrous. **Leaves** sessile, linear, 2-8 cm long, 2-5 mm wide, remotely ciliolate on the margins, acuminate. **Heads** usually numerous, hemispheric, 1-2 cm across, in an open-paniculate to spikelike inflorescence which commonly comprises the bulk of the plant; **involucre** 5-11 mm high, the bracts linear, equal or slightly imbricate, or the outer ones sometimes slightly longer than the inner; **rays** none, the outer pistillate florets with short, tubular corollas, more numerous than the perfect disk florets. **Achenes** flattened, 1.5-2 mm long, appressed-puberulent; **pappus** conspicuous, longer than the corollas, soft and copious. Jul—Sep. Shores, stream banks, wet meadows and flats, often where saline; frequent in ND and e SD, less common s and w; (MN to B.C., s to MO, KS, CO, UT and WA, sparingly intro. e in the U.S. and Can.; also native in Siberia).



2. *Aster hesperius* A. Gray — Marsh aster

Erect or leaning perennial 3-12 dm tall, colonial from stout rhizomes mostly 2-6 mm thick, usually branched above; **stems** glabrous below, pubescent above in lines decurrent from the leaf bases. **Leaves** linear to linear-lanceolate, 3-15 cm long, 3-25 mm wide, acuminate, entire to shallowly toothed, smooth to scabrous on the margin, often slightly clasping the stem. **Heads** usually numerous, often crowded in a leafy panicle-like inflorescence, mostly 1.5-2.5 cm across; **involucre** 5-7.5 mm high, the bracts mostly not strongly imbricate in flowering heads, the outer bracts usually at least 2/3 as long as the inner ones in mature heads, sometimes to 1 mm or more wide, ciliolate on the margins; **rays** 20-50, white to pink or light blue, mostly 6-14 mm long; **lobes of the disk corollas** comprising 19-36% of the limb. Aug—Sep. Wet meadows, ditches, shores, stream banks, springs, seepage areas and other wet places; common and often rather weedy; (WI to Alta., s to MO, KS, NM and CA). *A. coerulescens* DC.

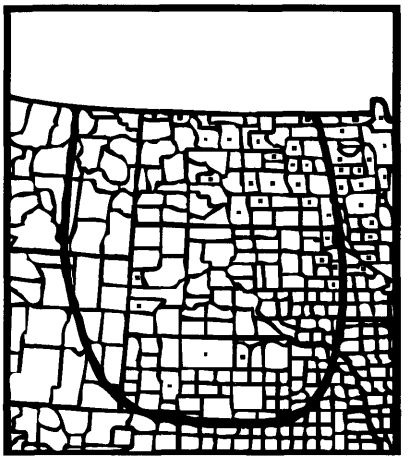




Aster hesperius. **Photo by James R. Johnson.**

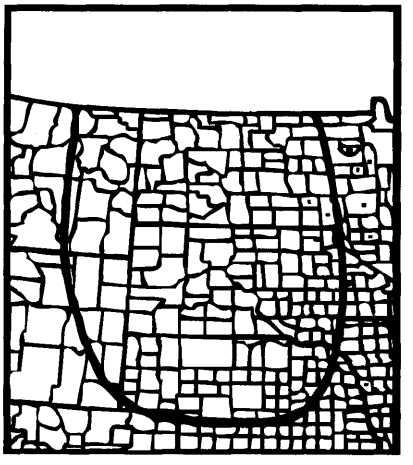
3. *Aster junciformis* Rydb. — Rush aster

Slender erect perennial 3-8 dm tall, from slender rhizomes 0.5-1.5(2) mm thick, mostly glabrous except for lines of appressed pubescence decurrent from leaf bases; **stem** simple below, usually branched above in the inflorescence. **Leaves** sessile, linear, 4-11 cm long, 2-6 mm wide, acuminate, scabrous on the margin, sometimes slightly clasping at the base. **Heads** (1) few to several, seldom many, uncrowded, 1.5-2 cm across; **involucre** 5-7 mm high, the bracts imbricate, often with purplish tips and margins; **rays** usually 20-50, white to light blue or lavender, 7-15 mm long. Late Jul—Sep. Springs, fens, seepage areas, wet meadows and boggy places, typically where the soil remains saturated all year; occasional from n ND to e SD, less common sw SD and c NE; (Que. to AK, s to NJ, MN, NE, CO, ID and B.C.). *A. junceus* Ait.



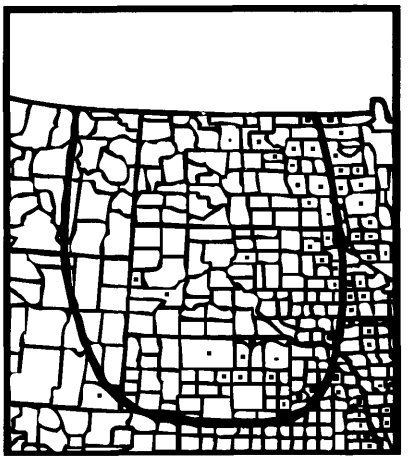
4. *Aster lucidulus* (A. Gray) Wieg.

Erect perennial 4-12 dm tall, from long-creeping rhizomes; **stem** stout, branched above, pubescent in lines in the inflorescence, glabrous or sparingly hispid below the inflorescence. **Leaves** sessile, lanceolate, 5-15 cm long, 1-3.5 cm wide, reduced and crowded in the inflorescence, scabrous above, acuminate, entire to shallowly toothed, auriculate-clasping. **Heads** usually many, rather crowded, 1.5-2 cm across; **involucre** 5-9 mm high, the bracts slender, scarcely or not at all imbricate, the outer ones occasionally enlarged and foliaceous; **rays** usually 30-60, blue to lavender or seldom white, 7-18 mm long. Aug—Sep. Stream banks, pond margins and swampy places; uncommon in extreme se ND; (NY to MN and se ND, s to WV and MO).



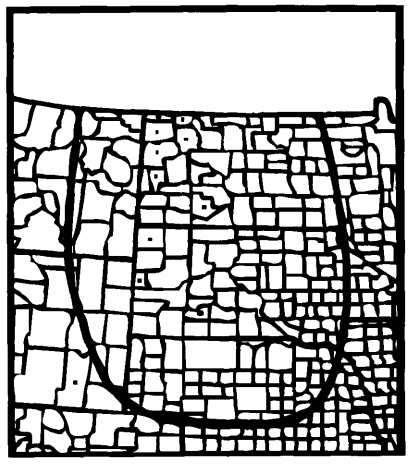
5. *Aster novae-angliae* L. — New England aster

Stout erect perennial 4-10 dm tall, from a short rhizome or caudex; **stems** usually clustered, spreading hirsute, also finely glandular-pubescent upward. **Leaves** sessile, lanceolate, 3-7 cm long, 0.8-2.5 cm wide, scabrous or short appressed-hairy on the upper side, more softly pubescent beneath, acute, entire, strongly auriculate-clasping. **Heads** usually several to many, 1.5-3 cm across; **involucre** 7-12 mm high, the bracts slender, attenuate, glandular-pubescent, sometimes purplish; **rays** 45-100, blue-violet to reddish-purple, 1-2 cm long. Aug—Sep. Wet meadows, boggy areas and low prairie; occasional in the e and c parts, scattered w; (MA to ND and WY, s to AL, OK and NM).



6. *Aster pauciflorus* Nutt. — Few-flowered aster

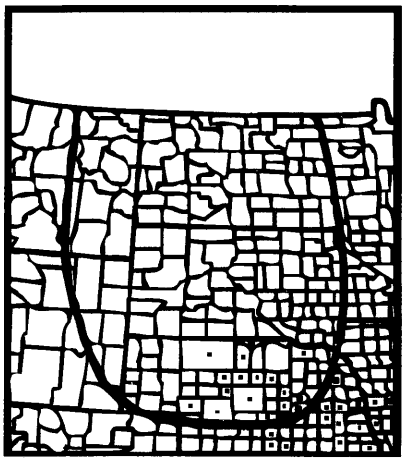
Perennial 1.5-4 dm tall, from a slender rootstock; **stems** slender, single or clumped, erect to decumbent, glandular-pubescent above, especially in the inflorescence. **Leaves** much reduced upward, the basal leaves sometimes petiolate with a broadened blade, otherwise the leaves sessile, linear to linear-oblanceolate, the lower ones 4-15(20) cm long, 1-6 cm wide, smaller above, rather thick, acute, entire. **Heads** rather few, uncrowded, solitary at the ends of branches in a corymbiform arrangement, 1-1.5 cm across; **involucre** 3-8 mm high, the bracts linear-lanceolate, acute, loosely imbricate, glandular-puberulent; **rays** mostly 15-25, white to light blue or lavender, 4-8 mm long. Late Jul—Sep. Wet alkaline or saline ground of shores, marshes, stream banks and seepage areas; occasional in w ND, w SD, e WY and probably e MT; (Man. and Sask., s to NM, AZ and into Mex.)



7. *Aster praealtus* Poir. — Willowleaf aster

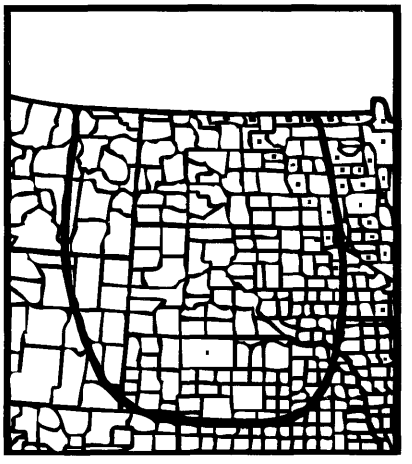
Quite similar to A. hesperius, differing mainly as follows: Stem usually rather uniformly pubescent, less often glabrate or with pubescence in lines decurrent from the leaf bases. Leaves thick-textured and firm, the veinlets on the lower surface dark and forming a conspicuous reticulum with nearly equal-sided areolae. Involucral bracts imbricate in several series, the outer much shorter than the inner, often reddish; rays blue, purple or sometimes whitish. Sep--Oct. Moist to wet meadows, floodplains, stream banks and thickets; occasional in c and e NE; (MA and MI to NE, s to GA, TX and into n Mex.).

In the northern Great Plains the prevalent form of *A. praealtus* is var. *nebraskensis* (Britt.) Wieg., with the stems and undersides of leaves rather uniformly pubescent with short, spreading hairs. Entering e NE is var. *praealtus* with stems glabrate in the lower part to pubescent above in lines decurrent from the leaf bases and with the leaves glabrate to scantily scabrous-puberulent on the underside.



8. *Aster pubentior* Cronq.

Stout, erect perennial 5-15 dm tall, from a thick rootstock; stem appressed-puberulent mainly above. **Leaves** subsessile to short-petiolate, narrowly to broadly elliptic or elliptic-ovate to elliptic-lanceolate, 4-14 cm long, 0.8-3(4) cm wide, scabrous above, densely puberulent beneath, acute to acuminate, entire, tapered to the subsessile or short-petiolate base. **Heads** usually many (few in depauperate specimens), 1-1.5 cm across, in a terminal, often flat-topped, corymbiform inflorescence; **involucre** 3-5 mm high, the bracts long-triangular and acute, puberulent; **rays** 4-7, white, 5-8 mm long. Late Jul—Aug. Wet meadows, springs and swampy or boggy places; occasional in nc and e ND, ne SD; also one record from Cherry Co., NE; (n MI to Alta., s to IA and NE). *A. umbellatus* Mill.



9. *Aster puniceus* L. — Swamp aster

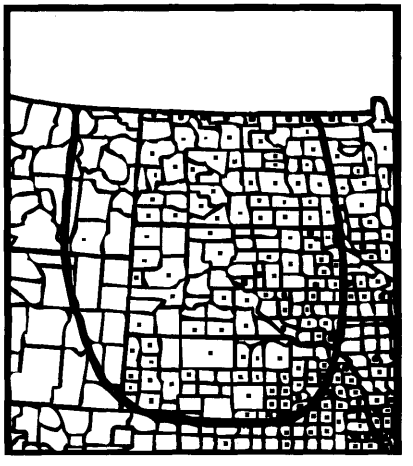
Very similar to *A. lucidulus*, differing mainly as follows: Plants arising from a short stout rhizome or caudex, sometimes producing short stolons as well; **stem** uniformly hairy at least under the heads, conspicuously spreading-hispid to occasionally glabrous below the inflorescence. **Leaves** averaging larger, 7-20 cm long, 1-3.5 cm wide, scabrous above, glabrous or hispid on the midvein beneath. **Inflorescence** leafy but rather open, the leaves not especially crowded; **heads** several to many, 1.5-2.5 cm across; **involucre** 7-10 mm high. Aug—Sep. Stream banks, pond margins, springs and swampy or boggy places; occasional nc and e ND to ne SD, otherwise rare and scattered; (Newf. to ND, s to GA, AL, IL and NE).



10. *Aster simplex* Willd. — Panicled aster

Very similar to *A. hesperius* and intergrading with it in our area, differing mainly as follows: **Involucres** averaging smaller, 4-6 mm or less high, the bracts more or less strongly imbricate, the outer bracts seldom as much as 2/3 as long as the inner ones in mature heads, narrower than 1 mm; **lobes of the disk corollas** comprising 30-45% of the limb. Aug—Sep. Same habitats as *A. hesperius*; common, especially in the e half; (N.S. to ND, s to VA and TX).

Three varieties may be recognized among plants of this region. The var. *interior* (Wieg.) Cronq. barely enters our range in extreme e NE. It is a small-headed form with involucres mostly less than 4 mm high and pappus ca. 3-3.5 mm long. Our other two varieties have larger heads with involucres 4-6 mm high and pappus ca. 3.5-7 mm long. Var. *ramosissimus* (T. & G.) Cronq. is prevalent throughout our region and is distinguished by cauline leaves which are 3-12 mm wide and at least 12X longer than wide. Var. *simplex* is mainly e in our region and differs in having broader cauline leaves, mostly 1-3.5 cm wide and seldom over 11X longer than wide.



3. ***Bidens*** L. — Beggarticks

Weedy annuals varying greatly in size and degree of branching. **Leaves** simple or ternately to pinnately compound, opposite, obscurely to coarsely serrate, sessile or petiolate. **Heads** discoid or radiate, the ray florets, when present, rather few, sterile or rarely pistillate, the ligules yellow; **involucral bracts** biseriate and dimorphic, the outer row usually foliaceous and spreading, the inner row short and erect, membranous, striate; **receptacle** flat to convex, chaffy, the chaffy bracts narrow, membranous, conspicuously few-nerved; **disk florets** perfect, numerous or sometimes few, the corollas yellow; style branches flattened, bearded above. **Achenes** flattened parallel to the involucral bracts, narrowed at the base and widening upward, more or less truncate at the apex, with a **pappus** of 2-4 retrorsely barbed awns which persist atop the achene, the achene body also barbed or stiffly appressed-hairy at least on the angles, the achenes commonly functioning as stick-tights in animal fur and clothing by means of the barbs.

References:

Fassett, N. C. 1925. A key to the northeastern species of *Bidens*. Rhodora 27:184-185.
Sherff, E. E. 1937. The genus *Bidens*. Publ. Field Mus. Nat. Hist., Bot. Ser. 16:1-709.
Weedon, R. R. 1973. Taxonomy and distribution of the genus *Bidens* (Compositae) in the north-central Plains States. Unpubl. Ph.D. thesis, Univ. Kans., Lawrence.

1 Leaves simple and toothed, some rarely incised or ternate.

2 Achene margins barbed downward for their entire length.

3 Achenes with 4 awns; heads nodding after flowering (except on depauperate specimens) . . . . . 2. *B. cernua*

3 Achenes with 3 awns; heads erect . . . . . 3. *B. comosa*

2 Achene margins (and often the faces) barbed upward at least toward the base . . . . . 4. *B. connata*

1 Leaves all ternately or pinnately compound.

4 Rays well-developed and conspicuous, 1 cm or more long . . . . 5. *B. coronata*

4 Rays absent or poorly developed and inconspicuous, less than 5 mm long.

5 Leaves pinnate-pinnatifid to bipinnate, the leaflets lobed; achenes with (2)3-4 awns . . . . . 1. *B. bipinnata*

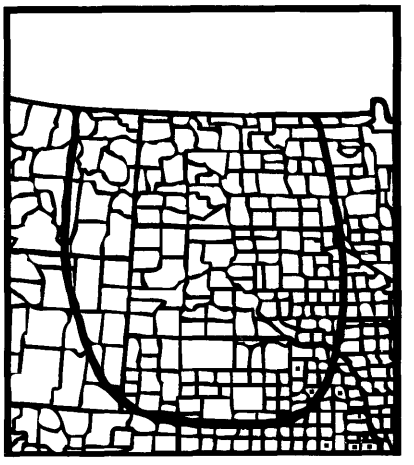
5 Leaves pinnate or 3-foliate, the leaflets serrate; achenes with 2 awns.

6 Outer involucral bracts 5-10, typically 8; achenes dark brown to blackish . . . . . 6. *B. frondosa*

6 Outer involucral bracts 10-16 or more, typically 13; achenes olivaceous to yellowish, or occasionally brown . . . . . 7. *B. vulgata*

1. *Bidens bipinnata* L. — Spanish needles

Erect, branching annual 3-12(17) dm tall, glabrous or seldom hispidulous. **Leaves** pinnate-pinnatifid to bipinnate, 4-20 cm long including the petiole which is 2-5 cm long, the leaflets ovate to oblong and deeply lobed, lobes acute to nearly rounded. **Heads** inconspicuously radiate, appearing discoid, 4-6 mm across; **outer involucral bracts** 7-10, linear, acute, shorter than the inner ones; **rays** yellowish-white and dark striate, less than 5 mm long, not exceeding the disk florets. **Achenes** with (2)3-4 retrorsely barbed, yellowish awns, the body brown to blackish, linear, mostly 10-18 mm long and much surpassing the involucre or the outermost achenes shorter. Aug—Oct. Moist to wet disturbed areas and shores; uncommon in e NE, probably as a sporadic introduction from farther s; (MA to NE s to FL, TX, AZ and into Mex.; also S.Amer. and intro. in the Old World).



2. *Bidens cernua* L. — Nodding beggarticks

Small to large, often bushy annual 1-12 dm tall; **stem** glabrous or with spreading hairs. **Leaves** simple, linear-lanceolate to ovate-lanceolate, 3-18 cm long, 0.5-4.5 cm wide, acuminate, shallowly to coarsely toothed and usually scabrous on the margin, sessile and usually clasping at the base. **Heads** discoid or radiate, hemispheric, 1.5-3 cm across, usually nodding after flowering; **outer involucral bracts** 4-8, linear-lanceolate, unequal, often exceeding the disk; **rays**, when present, 6-8, yellow, to 1.5 cm long. **Achenes** with 4 retrorsely barbed awns, the body often purplish with pale, thickened margins, 5-7 mm long, retrorsely barbed on the margins. Aug—Oct. Shores, stream banks, marshes, ditches, wet meadows and other wet places; common; (N.B. to B.C., s to NC, OK, NM and CA; also widespread in the Old World).



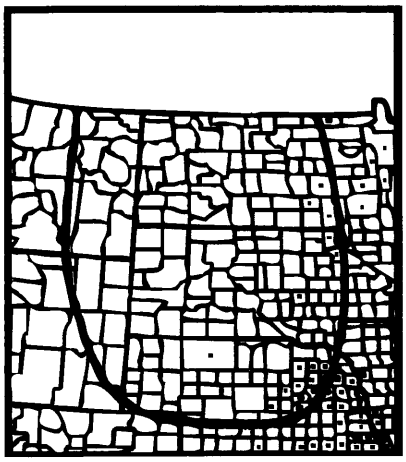
3. *Bidens comosa* (A. Gray) Wieg.

Simple and erect to branched and spreading annual 1-12 dm tall, glabrous. **Leaves** simple, oblong-lanceolate to ovate-lanceolate, 3.5-15 cm long, 0.5-5 cm wide, acuminate, shallowly to sharply toothed and scabrous on the margin, sessile or tapered to a winged, subpetiolate base. **Heads** discoid, broadly campanulate to hemispheric, 1-2.5 cm across, remaining erect after flowering; **outer involucral bracts** 5-10 or more, often greatly enlarged and much surpassing the disk. **Achenes** with 3 retrorsely barbed awns, the body reddish-brown to dark brown at maturity, 3.5-7 mm long, retrorsely barbed on the margins. Aug—Oct. Same habitats as *B. cernua*; frequent; (ME and Que. to MT, s to NC, TN, NM and UT). *B. tripartita* L., *B. acuta* (Wieg.) Britt.



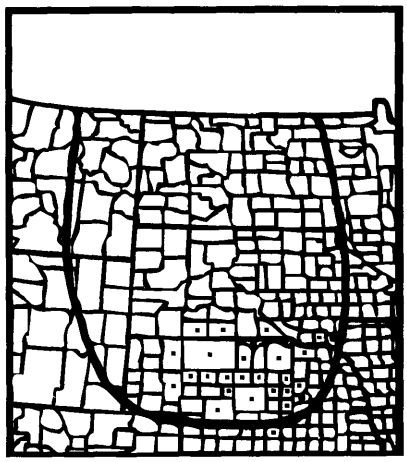
4. *Bidens connata* Muhl. ex Willd. — Stick-tights

Erect to spreading, glabrous annual 1-8 dm tall. **Leaves** simple and toothed or the lower ones incised to ternate, 4-15 cm long, 0.5-4 cm wide, acuminate, subsessile or tapering to a winged petiolate base. **Heads** discoid, campanulate to hemispheric, 1-2 cm across; **outer involucral bracts** 4-9, usually not much exceeding the head. **Achenes** with 2-4 retrorsely barbed awns, the body brown at maturity, 3.5-7 mm long, antrorsely barbed on the margins (and often on the faces), at least toward the base. Aug—Oct. Same habitats as *B. cernua*; c and e NE and scattered n to se ND; (N.S. and Que. to MN and se ND, s to NJ, MO and KS). *B. tripartita* L.



5. *Bidens coronata* (L.) Britt. — Tickseed sunflower

Glabrous annual (possibly partly biennial) 3-15 dm tall, rather strict to widely branched, the stems often purplish. **Leaves** pinnately divided into 3-7(9) narrow leaflets, short-petioled, to 15 cm long in overall length; **leaflets** linear to linear-lanceolate, entire to coarsely toothed or pinnately incised. **Heads** radiate, showy, the disk 8-15 mm across; **outer involucral bracts** 6-8(11), linear to linear-spatulate, to 10 mm long, short-hairy on the margins; **inner involucral bracts** shorter; **rays** bright golden-yellow, 1-2.5 cm long. **Achenes** with a pappus of 2 apical teeth or short awns, these antrorsely hispid or barbed, the body brown, cuneate-oblong or the inner ones longer, cuneate-linear, up to 9 mm long, antrorsely hispid on the margins. Sep—Oct. Shores, stream banks, marshes, floodplains and sand bars; frequent in extreme s SD and c NE, especially in the Sand Hills; (MA and s Ont. to MN and SD, s to GA, KY, IA and NE).



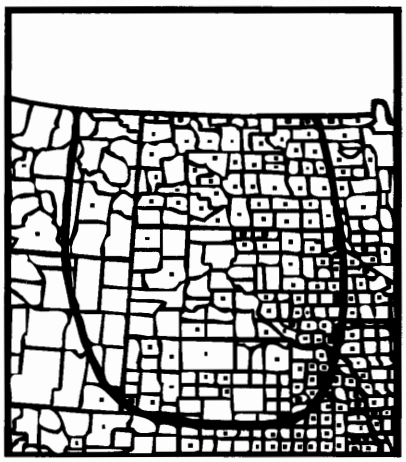
6. *Bidens frondosa* L.

Erect annual 1.5-8 dm tall, usually branched; **stems** rather slender, often purplish, glabrous except slightly villous at upper nodes. **Leaves** all or mostly ternate, some larger ones sometimes pinnately divided into 5 leaflets, the **leaflets** ovate to lanceolate, glabrous to puberulent above, sparingly pubescent beneath, acuminate, serrate, the terminal leaflet largest, 3-9 cm long, 1-3.5 cm wide; **petioles** 1-4 cm long. **Heads** discoid, campanulate to hemispheric, 1-2 cm across; **outer involucral bracts** 5-10, typically 8, often sparingly ciliate, usually surpassing the disk. **Achenes** with 2 retrorsely barbed awns, the body dark brown to blackish, 4-9 mm long, antrorsely appressed-hairy. Late Jul—Oct. Same habitats as *B. cernua*; common, often abundant; (Newf. and N.S. to WA, s to GA, LA and CA).



7. *Bidens vulgata* Greene

Similar in habit to the preceding; **stems** pubescent at the nodes and in the upper part. **Leaves** commonly divided into 3-5, or occasionally 7 leaflets, the **leaflets** ovate-lanceolate to lanceolate, sometimes incised, puberulent or nearly glabrous above, sparingly pubescent beneath, acuminate, serrate, the terminal leaflet 3-10 cm long, 1-3 cm wide; **petioles** 1-5 cm long. **Heads** discoid, averaging larger than in *B. frondosa*, 1-3 cm across, **outer involucral bracts** 10-16 or more, typically 13, ciliate. **Achenes** with 2 retrorsely barbed awns, the body olivaceous to yellowish or occasionally brown, antrorsely appressed-hairy. Aug—Oct. Same habitats as *B. cernua*; common, especially in the e part; (N.S. to Alta. and WA, s to GA, MO, KS, NV and CA).



1. *Boltonia asteroides* (L.) L'Her

Stout, erect, glabrous, shortlived perennial 3-11 dm tall, fibrous-rooted, sometimes stoloniferous. **Leaves** simple, entire, linear to lanceolate or elliptic-lanceolate, 5-18 cm long, 0.5-2(4) cm wide, much smaller in the inflorescence, acute, scabrous on the margin, narrowed to a sessile or weakly clasping base. **Heads** several to usually numerous in a corymbiform or paniculiform inflorescence, radiate, 1.5-2.5 cm across; **ray florets** many, pistillate, the ligules white, pink, light blue or lavender, 5-15 mm long; **involucres** 2.5-5 mm high, the bracts imbricate, scarious-margined with a green midvein, the bracts linear and acute to spatulate and obtuse; **receptacle** hemispheric or conic, naked; **disk florets** perfect, their corollas yellow, drying brownish; style branches flattened, with short, lanceolate, hairy appendages. **Achenes** flattened, obovate, wing-margined, 1.5-2 mm long; **pappus** of 2 awns and several shorter bristles, reduced or absent in ray achenes. Jul—Aug. Wet meadows, marshes, shores, low prairie and occasionally in wet woods; nw ND to e NE and with one record from the Black Hills, most common in the n part; (NJ to s Man., s to FL and TX; intro. in nw U.S.). *B. latisquama* A. Gray.

Two varieties occur in this region: var. *recognita* (Fern. & Griscom) Cronq., with linear, acute-tipped involucral bracts, and var. *latisquama* (A. Gray) Cronq., with at least the outer bracts spatulate and obtuse-tipped. Many of our plants appear to be intermediate between these two varieties.



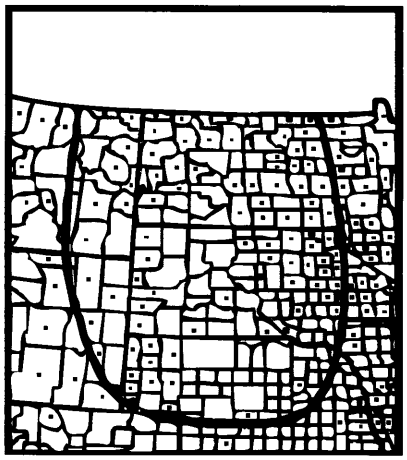


Boltonia asteroides. **Photo courtesy U.S. Fish & Wildlife Service.**

1. *Cirsium arvense* (L.) Scop. — Canada thistle

Weedy stout perennial from deep rhizomes, dioecious or mostly so, 5-15 dm tall, often forming large patches. **Leaves** alternate, oblong, toothed to irregularly pinnatifid, spiny on the margins, 4-14 cm long, 0.5-4(5) cm wide, glabrous or occasionally white-tomentose beneath, acute to obtuse at the apex, tapered to a sessile base. **Heads** several to many in a terminal, usually branched inflorescence, discoid, 1.5-2 cm across; **involucres** campanulate, 1-2 cm high, the bracts in several series and strongly imbricate, sharply acute; **receptacle** flat, bristly; **disk corollas** pinkish-purple to occasionally white, elongate with 5 narrow lobes; **pappus** of numerous, plumose bristles, surpassing the corollas in pistillate heads, shorter than the corollas in staminate heads. **Achenes** tan, 3-4 mm long, the pappus deciduous as a ring of bristles. Late Jun—Aug. Wet meadows, shores, stream banks, ditches and drier places as well, especially where disturbed; common in the n and w parts, more scattered s; (Intro. from Eurasia and well established as a noxious weed throughout n U.S. and s Can.).

Cirsium flodmanii (Rydb.) Arthur, Flodman's thistle, is a native perennial thistle often encountered in wet prairies and sometimes in wet meadow zones. It is easily distinguished from Canada thistle by its fewer and larger heads borne singly at the tips of branches, with involucres 2-3 cm high. The plant is not weedy nor does it form dense patches.



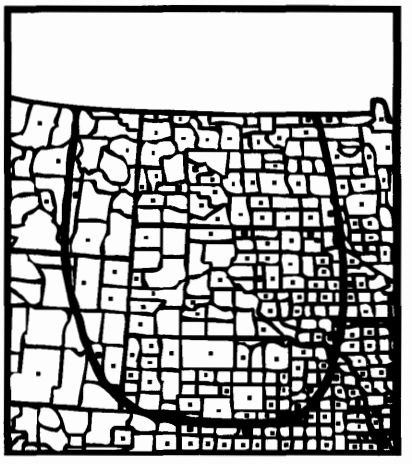


Cirsium arvense. **Photo by James R. Johnson.**

6. ***Conyza*** Less.

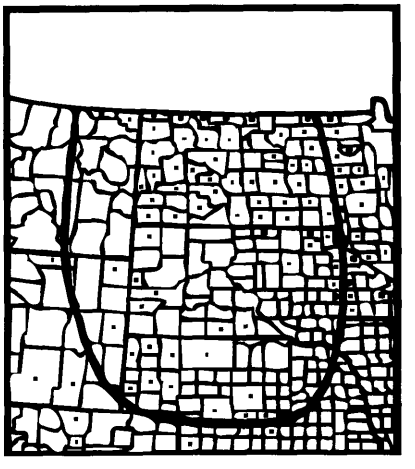
1. *Conyza canadensis* (L.) Cronq. — Horseweed

Slender, erect, weedy annual (1)2-15(25) dm tall, with a taproot, usually strongly hirsute with spreading to ascending hairs; **stem** simple or rarely branched below the inflorescence. **Leaves** numerous, alternate, ascending, mostly linear to linear-oblanceolate or lower ones elliptic-oblong to oblanceolate and often coarsely toothed, the latter often early deciduous, 2-10 cm long, 2-10 mm wide, acute, tapered to a sessile or short-petiolate base, usually hispid on the margins and at least on the midrib beneath. **Inflorescence** a terminal, elongate cluster with ascending racemiform branches; **heads** usually numerous (few on depauperate specimens), inconspicuously radiate; **involucre** 3-4 mm high, the bracts in ca. 3 series, the inner linear and much longer than the outer; **receptacle** smooth, slightly convex; **rays** minute, white or pink-tinged, about equal to or slightly exceeding the involucre; **disk corollas** yellowish to light pinkish. **Achenes** flattened, 2-ribbed, ivory to light brown, 1-1.2 mm long, appressed-puberulent; **pappus** of numerous, dull white capillary bristles. Late Jul—Oct. A weed of disturbed ground that often invades shorelines and drawdown zones; common throughout; (Throughout s Can. and the U.S. and widely intro. elsewhere). *Erigeron canadensis* L.



1. *Crepis runcinata* (James) T. & G.

Milky-juiced perennial from 1-several strong roots, the principal leaves in a basal rosette (appearing like those of a dandelion); **stems** 1-3, scapose or nearly so, (1.5)2.5-5(7) dm tall, glabrous or sparsely hairy, the cauline leaves much reduced and bractlike. **Basal leaves** oblanceolate to elliptic or obovate, narrowed to a petiolate base, 4-15(25) cm long, 1.2-4(8) cm wide, obtuse to rounded, entire to toothed or runcinate. **Heads** ligulate, usually 1-several, rarely to 20, 1-2(3) cm across, mostly 20- to 50-flowered, sometimes with white tomentum on the outside of the receptacle, often glandular-pubescent on the involucre and onto the peduncle; **involucre** cylindrical to campanulate, 8-13 mm high, the bracts not numerous, linear, in 2 series, the outer ones few and reduced; **receptacle** naked; **ligules** yellow, 9-18 mm long. **Achenes** reddish-brown, terete, 4-5.5 mm long; **pappus** of numerous white capillary bristles. Jun—Jul. Wet meadows, shores and prairie swales, especially where alkaline; frequent except in e NE; (MN and Man. to WA, s to NE, NM, CA and n Mex.).



8. *Erigeron* L. — Fleabane

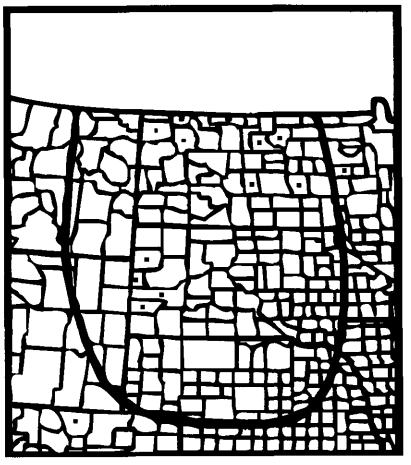
Biennial to perennial herbs with simple, alternate leaves. **Heads** radiate, hemispheric, few to many in a terminal inflorescence; **involucral bracts** in 1 or 2 series, linear, equal or the outer ones a little shorter, hyaline at the tip and on the margins above, green in the middle and at the base; **receptacle** flat to slightly convex; **outer 1-few rows of florets** pistillate, with narrow, white to pink ligules 0.1-0.6 mm wide; **disk florets** perfect, their corollas yellow; style branches flattened, the appendages short, obtuse or acute. **Achenes** 2- to 4-nerved; **pappus** of 20-30 capillary bristles.

1 Leaves not clasping; rays inconspicuous . . . . . 1. *E. lonchophyllus*

1 Leaves auriculate-clasping; rays conspicuous . . . . . 2. *E. philadelphicus*

1. *Erigeron lonchophyllus* Hook.

Shallowly fibrous-rooted biennial or shortlived perennial 1-4 dm tall; **stems** 1-few, spreading-hirsute. **Leaves** oblanceolate or linear-oblanceolate and petiolate at the base to linear and sessile above, not clasping, 4-14 cm long, 1-5 mm wide, acute, entire, hirsute on the margins. **Heads** few to many in a rather strict inflorescence, 1-1.5 cm across; **involucres** 6-9 mm high, the bracts hirsute, outer ones shorter than the inner; **rays** numerous, inconspicuous, white, turning brown at the tips with age, very narrow, 0.1-0.2 mm wide, about equaling to slightly exceeding the involucre; **disk corollas** exceeded by the pappus bristles. Jul—Sep. Wet meadows, seepage areas and boggy places; occasional from nw to ec ND and in w SD; (Que. and Ont. to AK, s to ND, NM, UT and CA).



2. *Erigeron philadelphicus* L. — Philadelphia fleabane

Fibrous-rooted biennial or shortlived perennial 2-7 dm tall; **stems** 1-few, hirsute. **Leaves** oblanceolate to spatulate below, oblong to lanceolate, auriculate-clasping and reduced upward, 2-15(27) cm long, 0.5-4(5) cm wide, pubescent to nearly glabrous, obtuse to rounded, entire to crenate or sinuate. **Heads** few to many in a narrow to widely branched inflorescence, 1.5-2.5 cm across; **involucres** 3-6 mm high, the bracts hirsute, equal or nearly so; **rays** numerous, conspicuous, white to deep pink, 5-10 mm long, 0.2-0.6 mm wide; **disk corollas** exceeding the pappus bristles. Jun—Jul, occasionally flowering in Aug—Sep. Wet meadows, shores, stream banks, wet woods, floodplains, springs and boggy places; common in the n and e parts, rather scattered s and w; (Newf. to B.C., s to FL and CA).





***Erigeron philadelphicus*. Photo by James R. Johnson.**

9. ***Eupatorium*** L.

Stout, erect perennials from a thick rootstock; **leaves** simple, opposite and connate-perfoliate or whorled and short-petiolate, serrate. **Heads** discoid, usually numerous and clustered in a terminal corymbiform inflorescence; **involucral bracts** in 2-4 series, imbricate or weakly so, green or colored like the corollas; **receptacle** flat to conic, naked; **disk florets** perfect, their corollas pinkish-purple to purple or white; style branches terete, elongate, papillose. **Achenes** 5-angled, glandular; **pappus** of numerous capillary bristles.

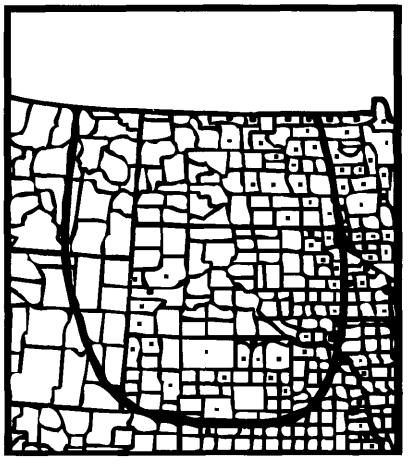
1 Leaves whorled, short-petiolate . . . . . 1. *E. maculatum*

1 Leaves opposite, connate-perfoliate . . . . . 2. *E. perfoliatum*

1. *Eupatorium maculatum* L. — Joe-Pye weed

Stems 4-15 dm tall, short-pubescent above, densely so on branches of the inflorescence. **Leaves** in whorls of 3-6, lanceolate to ovate-lanceolate, 6-20 cm long, 2-6 cm wide, sparingly puberulent above, densely soft-puberulent beneath, acuminate, serrate, cuneate to nearly rounded at the base; **petioles** 0.5-2 cm long. **Inflorescence** or parts of it usually flat-topped; **involucres** 5-9 mm high, the bracts pinkish-purple or seldom white, imbricate, obtuse; **corollas** light pink to purple, seldom white. **Achenes** blackish, glandular-spotted, 2.5-4 mm long. Late Jul—Sep. Wet meadows, marshes, shores, stream banks, ditches, springs and swampy or boggy places, where water is fresh; frequent in e and c ND, e and w SD and across NE; (Newf. to B.C., s to MD, OH, IL, NM and UT).

Plants of this region belong to var. *bruneri* (A. Gray) Breitung.

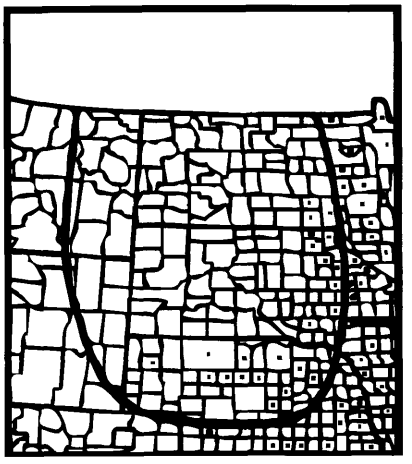




Eupatorium maculatum. **Photo courtesy U.S. Fish & Wildlife Service.**

2. *Eupatorium perfoliatum* L. — Boneset

Stems 3-12 dm tall, villous, especially above. **Leaves** opposite, broad-based and mostly connate-perfoliate, lanceolate, 6-15(20) cm long, 1.5-5 cm wide, sparingly pubescent to nearly glabrous above, more densely pubescent beneath, punctate with yellowish glands on both surfaces, acuminate, finely crenate-serrate and scabrous on the margins. **Inflorescence** flat-topped; **involucres** 3-5 mm high, the bracts green with white margins, glandular, weakly imbricate, acute to acuminate; **corollas** white. **Achenes** blackish, glandular-spotted, 1.5-2 mm long. Late Jul—Sep. Marshes, wet meadows, shores and swampy places; occasional in se ND, e SD and across NE; (N.S. and Que. to se Man., s to FL and TX).

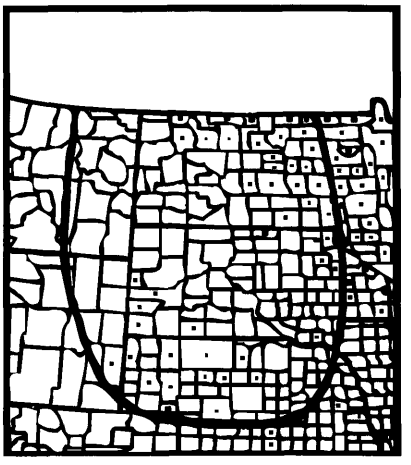


1. *Euthamia graminifolia* (L.) Nutt. — Narrow-leaved goldenrod

Erect rhizomatous perennial 3-9 dm tall; **stem** usually simple below and branched above, leafy except in the lower portion where the leaves are deciduous, glabrous or with scabrous lines decurrent from the leaf bases. **Leaves** simple, alternate, sessile, linear to linear-lanceolate or linear-elliptic, 2-10 cm long, 2-10 mm wide, 3- to 5-nerved, glabrous or scabrous on the margins and midrib, glandular-punctate, acute to acuminate, entire. **Heads** small, radiate, 20- to 35-flowered, usually numerous in flat-topped clusters comprising a corymbiform inflorescence; **involucres** campanulate to turbinate, 3-5 mm high, glutinous, the bracts in few to several series, imbricate, yellowish or green-tipped with a chartaceous base, outer ones ovate and obtuse, inner ones oblong to linear-oblong, obtuse to acute or acuminate; **receptacle** small, flat or convex, naked; **ray florets** pistillate, more numerous than the disk florets, the ligules yellow, 1-3 mm long; **disk florets** perfect, yellow; style branches flattened, puberulent. **Achenes** several-nerved, ca. 1 mm long, short-hairy; **pappus** of numerous white capillary bristles. Late Jul—Sep. Fresh wet meadows, springs, fens, seepage areas, shores and stream banks, often where sandy or gravelly; frequent in e and c ND, e and sw SD, n NE and e WY; (Newf. and Que. to B.C., s to VA, AL, TX and NM). *Solidago graminifolia* (L.) Salisb.

The prevalent phase of *E. graminifolia* in the northern part of our area is var. *major* (Michx.) Moldenke, distinguished by the usually acute-tipped leaves which are obscurely glandular-punctate, and the heads containing 20-35 florets. The var. *graminifolia* is similar except the leaves have attenuate tips and are conspicuously punctate under magnification. The latter occurs infrequently in se ND.

Euthamia gymnospermoides Greene is a similar species that is uncommon and scattered from se ND to NE. It tends to favor drier sites than the above and differs in having heads with 12-20 florets and narrower, conspicuously punctate leaves with only 1-3 nerves. This entity has been treated by many authors as *Solidago graminifolia* var. *media* (Greene) S.K. Harris.



1. *Helenium autumnale* L.

Erect, fibrous-rooted perennial 3-11 dm tall; **stems** single or clustered, puberulent or strigulose, especially above. **Leaves** alternate, ovate-lanceolate to elliptic-lanceolate or oblanceolate, 4-10 cm long, 0.8-3.5 cm wide, puberulent, glandular-punctate, acute to acuminate, entire to shallowly toothed, tapered to a narrow base which is decurrent as wings on the stem. **Heads** radiate (1) few to many in a leafy inflorescence, hemispheric to subglobose, 1.5-4 cm across; **involucral bracts** in 2-3 series, not imbricate, linear and ultimately deflexed, puberulent; **receptacle** convex, naked; **ray florets** 10-20, pistillate or sterile, the ligules yellow, (2)3(4)-lobed, 1.5-2.5 cm long; **disk florets** perfect, the corollas yellow to brownish, glandular; style branches flat with broadened tips. **Achenes** 4- to 5-angled, 1.5-2 mm long, appressed-hairy with white to coppery hairs; **pappus** of several hyaline, awn-tipped scales. Late Jul—Sep. Wet meadows, shores, stream banks, seepage areas and swales; frequent in the e part, scattered w to ne MT and se WY; (Que. to B.C., s to FL and AZ).



12. ***Helianthus*** L. — Sunflower

Stout perennials (those included here) with a stout rootstock and thick tuberous roots; **stem** simple or branched above. **Leaves** simple, petiolate, usually opposite below and alternate above, but sometimes all opposite, or opposite and alternate mixed over the length of the stem, the blades narrowly lanceolate to ovate-lanceolate, entire or serrate. **Heads** 1-several (seldom many), terminal on the main stem and lateral branches, conspicuously radiate; **involucre** of several series of narrow, overlapping bracts; **receptacle** flat to convex, chaffy, the chaffy bracts clasping the achenes (ovaries) of the disk florets; **ray florets** usually 10-20, sterile, the ligules yellow, spreading; **disk florets** numerous, perfect, their corollas yellow. **Achenes** flattened, narrowly obovate; **pappus** of 2 deciduous, awn-tipped scales.

References:

Heiser, C. B. 1969. The North American sunflowers (*Helianthus*). Mem. Torrey Bot. Club 22:1-218.

Long, R. W. 1966. Biosystematics of the *Helianthus nuttallii* complex. Brittonia 18:64-79.

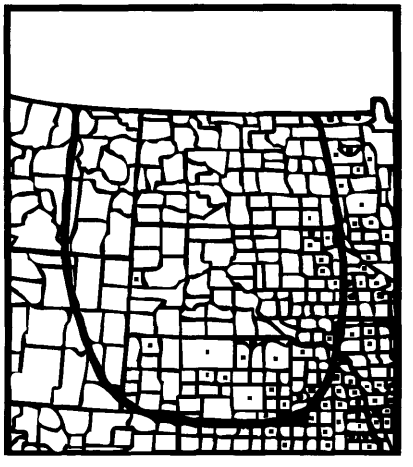
1 Leaves coarsely serrate, often more than 4 cm wide; stem glabrous in the middle and lower portions ..... 1. *H. grosseserratus*

1 Leaves entire to shallowly dentate, less than 4 cm wide; stem glabrous to hispid in the middle and lower portions ..... 2. *H. nuttallii*

1. *Helianthus grosseserratus* Martens — Sawtooth sunflower

Colonial perennial 1-3 m tall; **stem** strigose in the inflorescence, otherwise glabrous, often purplish or glaucous. **Leaf blades** lanceolate to oblong-lanceolate, 10-23 cm long, 2-5 cm wide, acuminate, coarsely serrate with widely spaced teeth, cuneate to abruptly tapered at the base, scabrous on both surfaces but often more densely strigose on the paler lower surface; **petioles** 1-4 cm long. **Involucral bracts** linear-lanceolate, acuminate, strigose, sometimes ciliolate; **disk** 1.5-2.5 cm across; **rays** 2.5-4 cm long. **Achenes** 3-4 mm long. Aug—Oct. Wet meadows, moist prairies and stream margins; w MN, se ND, e SD, e and c NE and possibly rare in w NE and the Black Hills; (NY to Sask. s to AR and TX).

See discussion under the following.

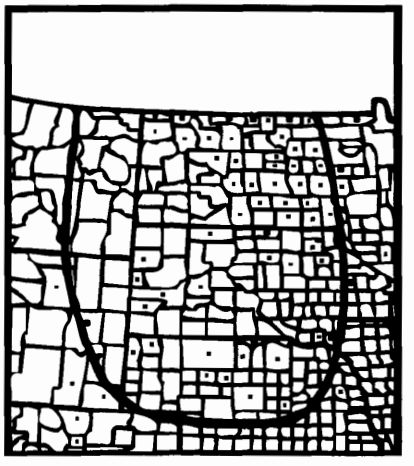


2. *Helianthus nuttallii* T. & G. — Nuttall's sunflower

Similar to the preceding and grading into it in the e part of our region, differing mainly as follows: Smaller in stature, 0.4-2 m tall; **stem** glabrous or sometimes hispid in the middle and lower portions, strigose in the inflorescence. **Leaf blades** narrowly lanceolate to lanceolate or ovate-lanceolate to elliptic, 4-15(20) cm long, 0.8-4.5 cm wide, entire to shallowly toothed, cuneate to rounded at the base; **petioles** 0.5-2(4) cm long. Jul—Sep. Wet meadows, marshes, shores, stream banks, ditches and other wet places; nw, c and e ND, across SD and e WY and s to c NE; (MN to Sask. and se B.C., s to NE, NM, AZ and CA). *H. rydbergii* Britt.

Two phases of *H. nuttallii* are encountered in our region. *H. nuttallii* subsp. *rydbergii* (Britt.) Long is most common, with mostly opposite, ovate-lanceolate to lanceolate or elliptic leaves, acute to obtuse at the tip. The other phase is subsp. *nuttallii*, with mostly alternate, linear-lanceolate to narrowly lanceolate leaves, acute to acuminate at the tip.

In the e part of our region where *H. nuttallii* and *H. grosseserratus* overlap in range, intermediate populations are found which cannot be assigned to either species with confidence.





Helianthus nuttallii. **Photo by James R. Johnson.**

13. *Petasites* Mill. — Sweet coltsfoot

Rhizomatous perennials; **principal leaves** basal, long-petioled, the blades sagittate or palmate, white-woolly at least on the lower surface; **cauline leaves** reduced and bractlike, alternate. **Heads** radiate or discoid, subdioecious, several to many in a racemiform or corymbiform inflorescence; **involucral bracts** in a single series, sometimes with a few reduced bracts below, broadly linear, herbaceous with scarious margins; **receptacle** flat, naked; **female heads** inconspicuously radiate, the florets all or nearly all pistillate, with a filiform corolla, some with whitish ligules; style shallowly 2-lobed, puberulent; **male heads** discoid, the florets with style and ovary but not developing achenes, their corollas tubular, 5-lobed. **Achenes** linear, 5- to 10-ribbed; **pappus** of numerous white capillary bristles, that of the sterile florets reduced.

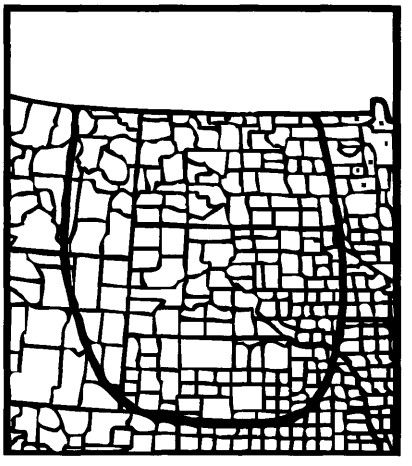
1 Leaf blades palmately lobed ..... 1. *P. frigidus*

1 Leaf blades sagittate, merely toothed and not lobed ..... 2. *P. sagittatus*

1. *Petasites frigidus* (L.) Fries

Flowering stem 3-5 dm tall, glabrous or glandular-puberulent above, especially in the inflorescence, sometimes thinly white-tomentose. **Basal leaves** expanding with or slightly after flowering, broadly triangular to reniform in outline, palmately lobed, coarsely toothed as well, 5-25 cm across, green and glabrous above, white-tomentose beneath, occasionally glabrous with age; **bractlike cauline leaves** mostly 2-6 cm long, reduced upward; **petioles of basal leaves** 1-3 dm long. **Heads** whitish, campanulate; **involucres** 4-9 mm high. May—Jun. Aspen woods and swampy places; rare in n ND; (Circumboreal, in N.Amer. s to MA, MI, MN, ND and CA).

Plants of North America belong to var. *palmatus* (Ait.) Cronq.



2. *Petasites sagittatus* (Pursh) A. Gray

Similar to the preceding in habit; **flowering stems** 3-6 dm tall, thinly white-tomentose, sometimes glandular-puberulent as well. **Basal leaf blades** sagittate and toothed, 5-20 cm long, 3-30 cm wide, glabrous to thinly tomentose above, densely white-tomentose beneath; **cauline leaves** averaging longer and narrower than in *P. frigidus*, the lower ones often with abortive blades; **petioles** of basal leaves 1-3 dm long. **Heads** as in the preceding. May—Jun. Fresh wet meadows, boggy and swampy woodlands; uncommon in nc and ne ND, the Black Hills, SD, and se WY; (Labr. to AK, s to MN, SD, CO, ID and WA).





Petasites sagittatus. **Photo by James R. Johnson.**

14. *Senecio* L. — Ragwort

Erect annuals or perennials; **leaves** simple, entire to usually variously toothed or lobed, alternate, often petiolate at or near the base, sessile and commonly reduced upward. **Heads** radiate, few to many in one or more corymbiform to umbelliform clusters; **involucral bracts** in one series and essentially equal, not imbricate, sometimes with a few highly reduced bracts below, herbaceous throughout or scarious above; **receptacle** flat to convex, naked; **ray florets** pistillate, the ligules yellow; **disk florets** perfect, yellow; style branches flattened, truncate and puberulent at the tip. **Achenes** subterete, 5- to 10-nerved; **pappus** of numerous capillary bristles.

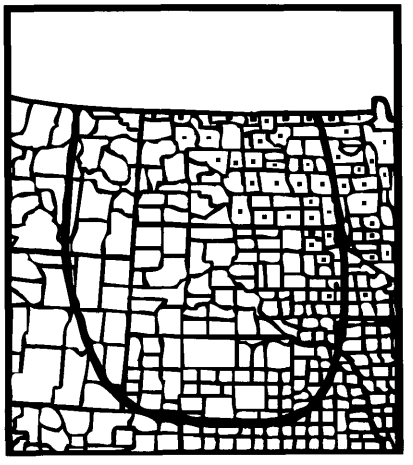
1 Plants annual or biennial, hollow-stemmed; leaves basically all similar in shape . . . . . 1. *S. congestus*

1 Plants perennial, solid-stemmed; basal leaves differing in shape from cauline leaves . . . . . 2. *S. pseudaureus*

1. *Senecio congestus* (R.Br.) DC. — Swamp ragwort

Fibrous-rooted annual or biennial 1.5-10 dm tall; **stems** hollow, especially toward the base, sparsely to densely villous. **Leaves** basically all similar in shape, oblong-linear to oblong-lanceolate or the lower ones often spatulate, 4-20 cm long, 0.5-6 cm wide, or the basal leaves occasionally larger, glabrous or villous in patches, blunt to rounded at the apex, entire to coarsely toothed or sinuate-toothed, sometimes crisped, the basal and lower leaves usually petiolate, often deciduous, the middle and upper cauline leaves sessile, with winged to auriculate-clasping bases. **Heads** several to many, in one or more congested clusters, 1-1.5 cm across; **involucre** 4-8 mm high, the bracts pale and scarious toward the tip, darker at the base; **rays** pale yellow, 4-9 mm long. **Achenes** 1.5-2.5 mm long, glabrous; **pappus** bristles very fine and numerous, strongly accrescent. Late May—early Aug. Shores and mud flats; frequent across n ND and w MN, less common s to se SD; (Circumpolar, s in Am. to Que., n IA, e SD and Alta.).

Senecio hydrophilus Nutt. rarely occurs in the w part of our region, with records from Pennington Co., SD and Albany Co., WY. The plant is hollow-stemmed like *S. congestus*, but is a glaucous perennial with glabrous stems and leaves and with the cauline leaves greatly reduced upward on the stem. *S. hydrophilus* favors marshy, alkaline sites and can tolerate standing water.





***Senecio congestus*. Photo courtesy U.S. Fish & Wildlife Service.**

2. *Senecio pseudaureus* Rydb.

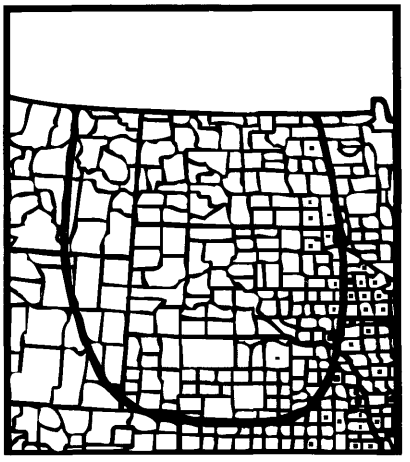
Perennial 2-5 dm tall, from a very short rhizome or caudex; **stems** solid, single or few clustered, glabrous or with only bits of tomentum in the leaf axils when young. **Leaves** changing in shape from the base upward on the stem; basal leaves with long slender petioles, the blades ovate, oval or suborbicular, 1-5 cm long, 0.8-4 cm wide, often purplish beneath, crenate, rounded to truncate or cordate at the base, transitional to the cauline leaves which are sessile, oblong to lanceolate or oblanceolate, 2-6 cm long, 0.4-2 cm wide, laciniate-pinnatifid at least toward the base, often clasping. **Heads** few to many, in a single terminal cluster, 1-1.5 cm across; **involucre** 4-7 mm high, the bracts herbaceous; **rays** pale yellow, 6-10 mm long. **Achenes** 1.5-2 mm long, glabrous; **pappus** slightly exceeding the disk corollas with age. Late May—Jun. Fresh wet meadows, fens and low prairie; occasional from n and e ND to e NE, also the Black Hills and nw NE; (MN to Sask. and B.C., s to MO, KS, NM and CA). *S. aureus* L.

Plants of this region belong to var. *semicordatus* (Mack. & Bush) T. M. Barkley.



1. *Silphium perfoliatum* L. — Cup plant

Stout, erect, rhizomatous perennial 8-20 dm tall; **stem** square, glabrous. **Leaves** simple, opposite, at least the upper ones connate-perfoliate, forming a cup around the stem, the lower leaves often short-petioled and connate by wings on the petioles, the blades ovate to deltate, 7-30 cm long, 3-15 cm wide, scabrous above, scabrous to hispidulous beneath, acute, coarsely toothed. **Heads** several to many in an open inflorescence, the disk 1.5-2.5 cm across; **involucre** 12-25 mm high, the bracts broadly ovate to elliptic, subequal, acute to obtuse, ciliolate on the margins; **receptacle** flat, chaffy, the outer bracts on the disk spatulate, transitional to narrower, more linear bracts inward; **ray florets** 20-30, pistillate, the ligules yellow, 1.5-2.5 cm long, the ovaries imbricate in 2-3 series, their styles branched, papillose; **disk florets** functionally male, their corollas pale to yellowish, their styles undivided, puberulent. **Achenes** flat, obovate, narrowly winged, 8-10 mm long, 5-6 mm wide; **pappus** none. Jul—Aug. River bottoms and swampy places; occasional from e ND, s to e NE; (s Ont. to ND, s to GA and LA).



16. ***Solidago*** L. — Goldenrod

Erect perennials, rhizomatous or clumped from a thick caudex. **Leaves** simple, alternate, entire or toothed, sessile or the lower ones petiolate. **Heads** radiate, rather small and usually numerous, in a paniculiform, corymbiform or capitate inflorescence; **involucres** campanulate to turbinate, the bracts in few to several series, imbricate, more or less herbaceous, green-tipped with a chartaceous base; **receptacle** small, flat or convex, naked; **ray florets** pistillate, with a yellow ligule; **disk florets** perfect, their corollas yellow; style branches flattened, puberulent. **Achenes** subterete or angled, several-nerved; **pappus** of numerous white capillary bristles.

Reference:

Croat, T. B. 1967. The genus *Solidago* of the north central Great Plains (U.S.A.). Unpubl. Ph.D. thesis, Univ. Kans., Lawrence.

1 Involucres 2-4.5 mm high; cauline leaves flat, not clasping . . . . . 1. *S. gigantea*

1 Involucres 5-6 mm high; cauline leaves conduplicate and clasping the stem . . . . . 2. *S. riddellii*

1. *Solidago gigantea* Ait. — Late goldenrod

Stems 5-12 dm tall, from stout, creeping rhizomes, often forming patches, mostly glabrous, puberulent on branches of the inflorescence. **Leaves** lanceolate to elliptic, 6-15 cm long, 1-4 cm wide, prominently 3-nerved, glabrous or sparsely pubescent on the 3 major veins beneath, acuminate, serrate, tapered to a subsessile or short-petiolate base. **Inflorescence** paniculiform, usually with numerous small heads on ascending to spreading or recurved-secund branches; **involucre** 2-4.5 mm high, the bracts linear, acute to blunt; **ray florets** usually 10-17, the ligules mostly 2-3 mm long. **Achenes** ca. 1.5 mm long, short-hairy. Late Jul—Oct. Wet meadows, ditches, stream banks, moist woods and thickets, also in drier places; common; (N.S. and Que. to B.C., s to GA, NM and OR).

The common phase in this region is var. *serotina* (O. Ktze.) Cronq., with the leaves entirely glabrous. Occasional plants, with the leaves sparsely pubescent on the midrib and main veins beneath, are var. *gigantea*.

Solidago canadensis L., Canada goldenrod, is a common upland species that sometimes occurs in wet meadows and other moist places. It is similar to *S. gigantea*, but smaller in stature and densely short-pubescent on lower leaf surfaces and on the stem below the inflorescence.

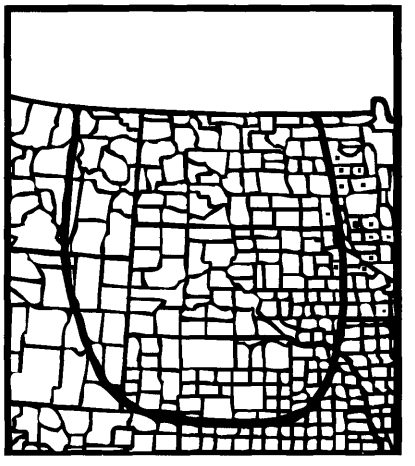




Solidago gigantea. **Photo by James R. Johnson.**

2. *Solidago riddellii* Frank — Riddell's goldenrod

Stems 2-7(10) dm tall, clumped from a thick caudex, sometimes with rhizomes, glabrous to sparsely pubescent above. **Leaves** with blades lanceolate to linear-oblong, conduplicate, firm and glabrous, margins entire or with obscure, remote teeth, the basal leaves much larger than the cauline, often deteriorating early, their blades 10-20 cm long, 5-30 mm wide, on long, winged petioles usually exceeding the blade in length; cauline leaves smaller and numerous, becoming sessile and clasping upward, falcate-folded. **Inflorescence** corymbiform, often with corymbiform lateral branches; **heads** usually numerous and crowded, not secund on the branches; **involucre** 5-6 mm high, the bracts obtuse or rounded; **rays** 7-9, the ligules ca. 2 mm long. **Achenes** ca. 2 mm long, glabrous or nearly so. Jul—Oct. Fresh wet meadows and fens; rare in se ND and extreme e SD, more common e into MN; (Ont. to se ND and e SD, s to OH and MO).



1. *Sonchus arvensis* L. — Field sow thistle

Stout, erect, milky-juiced perennial (3)5-15 dm tall, spreading by deep creeping roots; **stems** glabrous or with spreading gland-tipped hairs above. **Leaves** cauline, alternate, often larger and more crowded toward the base, lanceolate to oblong or oblanceolate, pinnately lobed to pinnatifid or unlobed, 10-30 cm long, 2-10 cm wide, acute to broadly rounded at the tip, prickly-margined, auriculate-clasping. **Inflorescence** containing several to many heads, open, corymbiform, the branches and involucres sometimes with spreading gland-tipped hairs; **heads** ligulate, yellow, many-flowered, 2-3.5 cm across; **involucres** campanulate, 10-22 mm high, sometimes thinly tomentose at the base, the bracts linear, imbricate, the outer ones much shorter than the inner; **receptacle** naked. **Achenes** reddish-brown, flattened, 2-3.5 mm long; **pappus** of numerous white capillary bristles, strongly accrescent. Late Jun—Aug. Wet meadows, shores, stream banks and other wet places; also fields, woods and roadsides; very common in the n, less so in the s; (A cosmopolitan noxious weed originating in Europe). *S. uliginosus* Bieb.

The great majority of plants in this region are subsp. *uliginosus* (Bieb.) Nyman (*S. arvensis* var. *glabrescens* Guenth.), characterized by glabrous stems and involucres. The subsp. *arvensis* is of limited occurrence, often appearing restricted to municipal areas. It differs from subsp. *uliginosus* in having spreading gland-tipped hairs on the upper portion of the stem, the inflorescence branches and the involucres.





Sonchus arvensis. **Photo courtesy U.S. Fish & Wildlife Service.**

1. *Vernonia fasciculata* Michx.

Stout, erect perennial 4-12 dm tall, from a thick rootstock; **stems** single or clumped, often reddish or purplish, glabrous below to puberulent above, especially in branches of the inflorescence. **Leaves** simple, alternate, short-petioled, lanceolate to ovate-lanceolate, 4-15 cm long, 0.8-4.5 cm wide, smooth to scabrous above, dark-pitted beneath, acute to acuminate, denticulate to serrate, cuneate at the base. **Inflorescence** corymbiform, the heads usually numerous and crowded in flat-topped clusters; **heads** discoid; **involucres** campanulate, 6-9 mm high, the bracts imbricate, green with purple tips, obtuse to subacute, finely villous on the margins; **receptacle** flat, naked; **disk florets** all perfect, the corollas purple; style branches slender and tapered, puberulent. **Achenes** 3-4 mm long, strongly ribbed; **pappus** of numerous purplish to coppery capillary bristles. Mid Jul—Oct. Wet meadows, stream banks, ditches, flood plains and prairie swales; frequent in the e and c parts, rare in the w; (OH to Man. and Sask., s to MO and n TX).

Northern Great Plains plants are mostly subsp. *corymbosa* (Schwein. ex Keating) S. B. Jones, which has **middle cauline leaves** less than 10 cm long and scabrous above, and **inner involucral bracts** 2-3 mm wide. Entering our range in se SD, c and e NE is subsp. *fasciculata*, with **middle cauline leaves** 8-15 cm long, glabrous above or nearly so, and with **inner involucral bracts** up to 2 mm wide.

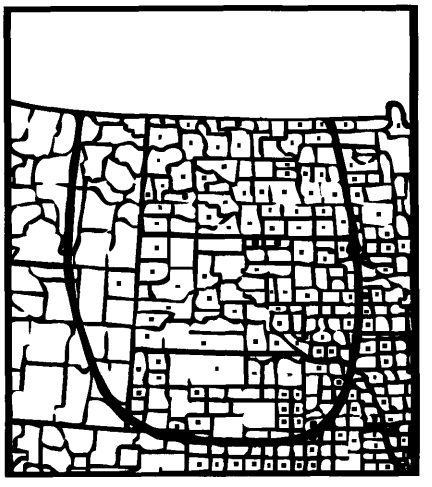




Vernonia fasciculata. **Photo courtesy U.S. Fish & Wildlife Service.**

1. *Xanthium strumarium* L.

Weedy taprooted annual 2-8 dm tall, simple to much branched; **stem** rough due to coarse, appressed hairs, often dark brown spotted. **Leaves** simple, alternate, the blades broadly ovate to suborbicular or reniform, often weakly 3- to 5-lobed, 3-15 cm long, narrower to wider than long, scabrous, minutely punctate, bluntly toothed, obtuse to truncate or cordate at the base; **petioles** 3-10 cm long. **Heads** small, unisexual and dimorphic, in axillary clusters, the male florets in small heads above the larger female heads; **male heads** nearly spherical, many-flowered, ca. 5 mm in diameter; **involucres** of 1-3 series of separate bracts; **receptacle** cylindric, chaffy; **florets** minute, their corollas brownish, filaments monadelphous, the nonfunctional pistil consisting mainly of an undivided style; **female heads** with a spiny involucre completely enclosing 2 florets, forming a conspicuous 2-chambered bur with hooked prickles; **corolla** none; **burs** ultimately yellow-brown to brown, ellipsoid, 1.5-3 cm long, with 2 prominent, hard, often incurved beaks at the tip, the body and spines of the bur typically covered with spreading hairs and stipitate glands. **Achenes** thick, one in each chamber of the bur. Late Jul—Sep. Shores, stream banks, wet meadows, sand bars, often where disturbed, also fields, roadsides and waste places; common; (A cosmopolitan weed probably originating in America). *X. italicum* Mor.





Xanthium strumarium. **Photo by James R. Johnson.**

Herbs (those included here) with vascular bundles of the stem usually scattered in the ground tissue, lacking a cambium; leaves often long and linear, sometimes reduced to sheathing at the base of the stem, mostly parallel-veined, the veins rarely forming a network; flower parts usually in multiples of 3; plant embryo usually with 1 cotyledon.

50. **Butomaceae**, the Flowering Rush Family

1. ***Butomus*** L. — Flowering rush

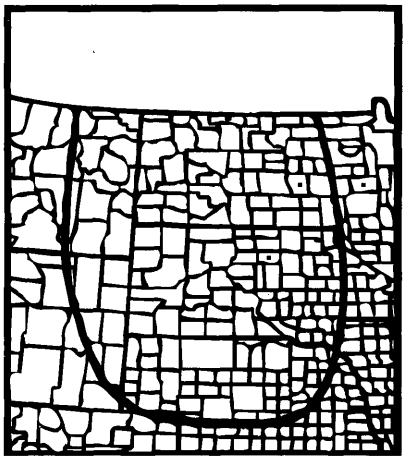
1. *Butomus umbellatus* L.

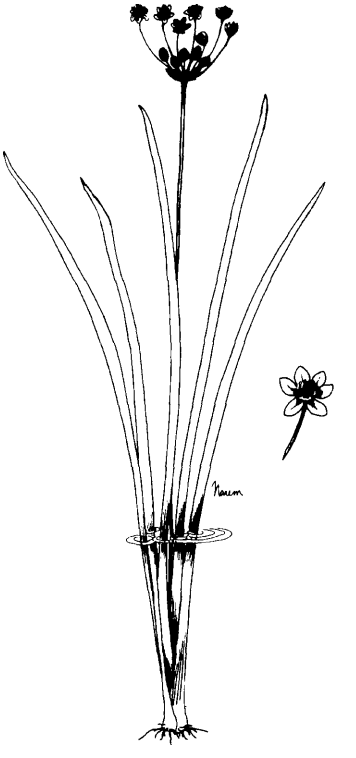
Moderately tall, rushlike perennial. **Leaves** basal, from a stout rhizome, stiff and erect when emersed or lax and floating in deep water, long-linear, to 1 m long, 5-10 mm wide. **Inflorescence** a many-flowered umbel borne on a scape 1-1.5 m tall; **bracts** subtending the umbel 4, lance-triangular, acute. **Flowers** perfect, regular, 2-3 cm across, pink; **sepals** 3, petaloid; **petals** 3; **stamens** 9-many, anthers elongate, filaments slender; **pistils** 6, simple, whorled, united at the base, stigmas sessile, apical, ovaries superior; **pedicels** 5-10 cm long. **Fruit** an indehiscent, many-seeded capsule. Jun—Aug. Emergent in shallow to moderately deep water of lakes and streams; locally introduced and established at widely scattered locations in ND and SD; (Intro. to N.Amer. from Eurasia and adventive here from the Great Lakes region).

References:

Godfread, C. and W. T. Barker. 1975. Butomaceae: a new family record for North Dakota. Rhodora 77:160-161.

Stuckey, R. L. 1968. Distributional history of *Butomus umbellatus* in the western Lake Erie and Lake St. Claire region. Michigan Bot. 7:134-142.





***Butomus umbellatus*, with enlargement of a flower.**

51. **Alismataceae**, the Water Plantain Family

Perennial or annual, acaulescent herbs, emergent, stranded or less commonly submersed in habit, often with tuber-bearing rhizomes or cormose at the base when perennial, fibrous-rooted. **Leaves** simple, all basal; **blades** of floating or emersed leaves oblong-elliptic, lanceolate, ovate or sagittate, often linear when submersed; **petioles** broadly winged at the plant base, somewhat sheathing. **Inflorescence** a terminal compound panicle with whorled branches, or the flowers mostly in whorls of 3 in a simple or sparsely branched raceme, the whorls of branches or flowers subtended by bracts. **Flowers** perfect, imperfect or both, regular, hypogynous; **sepals** 3, greenish; **petals** 3, white or pinkish; **stamens** 6-many; **pistils** several to numerous, maturing into laterally flattened or turgid, often beaked achenes.

1 Pistils or achenes in a single whorl on a flat receptacle, mostly fewer than 20 . . . . . 1. *Alisma*

1 Pistils or achenes numerous and crowded in a dense cluster on a globose receptacle.

2 Flowers mostly imperfect, with the male above the female in the inflorescence; achenes laterally flattened and winged; leaves usually sagittate. . 3. *Sagittaria*

2 Flowers all perfect; achenes turgid, strongly ribbed; leaves never sagittate . . . . . 2. *Echinodorus*

1. *Alisma* L. — Water plantain

Submersed to completely emersed perennials, cormose, fibrous-rooted and lacking rhizomes. **Leaves** variable depending upon the degree of submergence; emersed or floating leaf blades ovate, lanceolate or oblong-elliptic, never sagittate; submersed leaves often phyllodial, long-linear and ribbonlike (*A. gramineum*). **Inflorescence** a compound panicle, the branches and pedicels whorled, each whorl subtended by 3-several bracts. **Flowers** all perfect; **sepals** persistent, not reflexed; **petals** white or pinkish; **stamens** 6(9); **pistils** 10-20. **Achenes** in a single whorl on a flat receptacle, brown at maturity, grooved on the back, the style beak minute or absent.

References:

Fernald, M. L. 1946. North American representatives of *Alisma plantago-aquatica*. Rhodora 48:86-88.

Hendricks, A. J. 1957. A revision of the genus *Alisma* (Dill.) L. Amer. Midl. Naturalist 58:470-493.

Pogan, E. 1963. Taxonomical value of *Alisma triviale* Pursh and *A. subcordatum* Raf. Can. J. Bot. 41:1011-1013.

1 Leaf blades lanceolate to oblong-elliptic or absent when submersed, the leaves then consisting of long, ribbonlike phyllodes; petals usually pinkish, 1-2.5 mm long; mature achenes with a central ridge and 2 lateral ridges down the back . . . . . 1. *A. gramineum*

1 Leaf blades ovate to broadly lanceolate; petals white or very slightly pinkish, 1-4 mm long; mature achenes with a central groove and 2 lateral ridges down the back . . . . . 2. *A. plantago-aquatica*

1. *Alisma gramineum* Gmel.

Plants upright when submersed or emergent, often low-spreading when stranded, commonly 0.5-2 dm tall, but to 6 dm long in deeper water. **Emersed leaves**, if present, with blades lanceolate to oblong-elliptic, 2-10 cm long, 1-3 cm wide; **totally submersed leaves** phyllodial, long-linear, ribbonlike, to 6 dm long, 2-10 mm wide; **petioles** 3-15 cm long and often recurved on stranded plants, to 40 cm long on emergent specimens. **Scapes** 2-20(40) cm long, commonly short and recurved when stranded. **Panicles** shorter than to somewhat exceeding the leaves in height; **branches** spreading to ascending; **bracts** acute to obtuse, 3-10 mm long. **Flowers** numerous (sometimes few in stunted individuals); **sepals** obtuse, 2-2.5 mm long; **petals** usually pinkish, 1-2.5 mm long; **pedicels** 0.5-3 cm long. **Achenes** 2-2.5 mm long, with a central ridge and 2 lateral ridges down the back. Jul—Sep. Muddy shores, flats and stream banks or often in shallow water, commonly where the water is brackish; occasional from e ND to c NE, more frequent w; (Circumboreal, in N.Amer. from Que. to sw B.C., s to NY, MN, NE, CO, ID and n GA). *A. geyeri* Torr.





***Alisma gramineum*, emergent form.**

2. *Alisma plantago-aquatica* L.

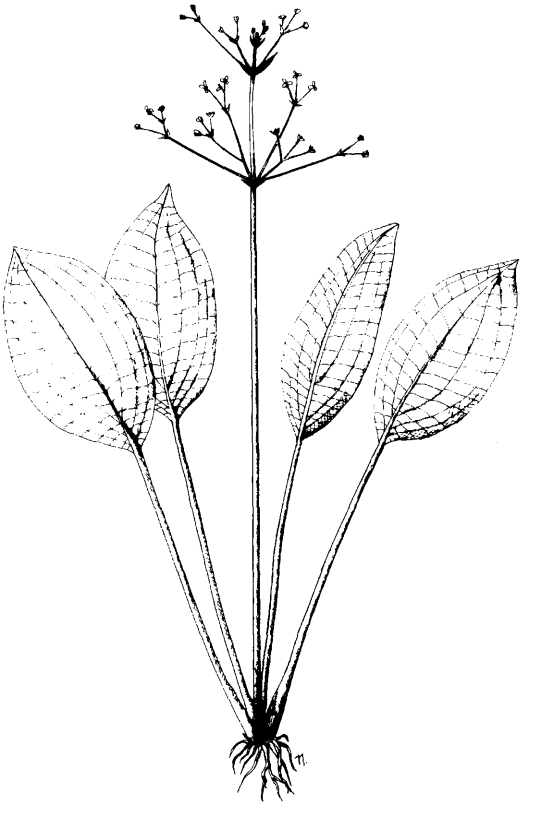
Plants emergent or emersed, erect, 2-10 dm tall. **Leaf blades** ovate to broadly lanceolate (narrowly lanceolate floating leaves commonly produced by young submersed plants), 4-15 cm long, 3-10 cm wide; **petioles** 15-50 cm long. **Scapes**, excluding the inflorescence, 10-50 cm long. **Panicles** typically much exceeding the leaves in height; **branches** ascending; **bracts** acute, 3-15 mm long. **Flowers** numerous, diffuse; **sepals** obtuse, 2-3 mm long; **petals** white or very slightly pinkish, 1-4 mm long; **pedicels** 1-4 cm long. **Achenes** 2-2.5 mm long, with a central groove and 2 lateral ridges down the back. Late Jun—Sep. Same habitats as the preceding but more widespread, mainly where water is fresh; common; (N.S. to B.C., s to NY, n MI, WI, MO, KS, CO, AZ and CA; also Eurasia, Africa and Australia). *A. subcordatum* Raf., *A. triviale* Pursh.

Some authors consider North American plants distinct from Old World *A. plantago-aquatica*. Old World examples have strongly pink or roseate petals rather than the essentially white petals of our plants. Although Old World *A. plantago-aquatica* has been reported as introduced to limited areas of North America, it has not been found in this region.

In separating American from European representatives, one or two species or varieties are commonly regarded to occur in this region. These include *A. subcordatum* Raf. and *A. triviale* Pursh, or considering these at the variety level, *A. plantago-aquatica* var. *parviflora* (Pursh) Farw. and var. *americana* Schultes & Schultes. Whether recognized at the species or the variety level, I find these entities are not clearly distinguishable among our material. They appear to be defined on character states that are intergradient and uncorrelated in populations of this region. North American plants may well deserve specific or varietal distinction relative to Old World counterparts, but there seems little if any basis for splitting within.



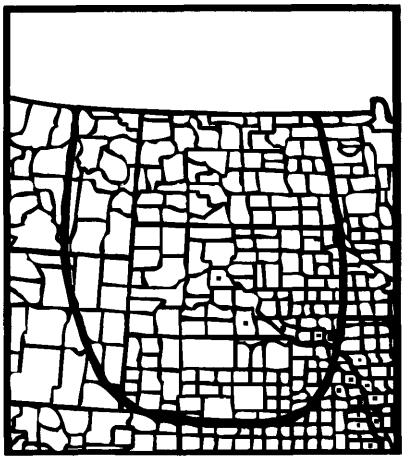




***Alisma plantago-aquatica*, juvenile floating-leaved plants and a mature flowering plant.**

1. *Echinodorus rostratus* (Nutt.) Engelm.

Fibrous-rooted annual or perennial 2-6 dm tall, emersed to emergent or sometimes submersed with floating leaves and then nonflowering. **Leaves** with blades broadly ovate to ovate-lanceolate, more oblong and thin-textured on submersed ones, mostly 3-10 cm long, 1-6 cm wide, rounded at the tip, truncate to cordate or broadly cuneate at the base, gradually tapered and decurrent on the petiole on submersed leaves; **petioles** trigonous (broadly winged on submersed leaves), mostly longer than the blades. **Inflorescence** oblong, surpassing the leaves, usually with whorls of 3 branches from lower nodes of the scape, the flowers in whorls of 3-9, the whorls of branches and flowers subtended by spreading, lance-subulate **bracts** to 10 mm long. **Flowers** perfect, usually nonshowy; **sepals** broadly ovate, 4-5 mm long, reflexed in fruit; **petals** white, from shorter than the sepals to 9 mm long; **stamens** usually 12; **pistils** numerous and crowded, long-styled. **Fruiting heads** globose, 4-6 mm in diameter, appearing burlike due to prominent style beaks; **achenes** somewhat laterally compressed but turgid, 2.5-3.5 mm long including the straight to curved style beak, strongly ribbed lengthwise on the body. Jul—Sep. Shores, mud flats and alluvial bars, sometimes in shallow water; c and se SD and e NE, principally along the Missouri R. drainage; (DE to IL and SD, s to FL, TX and into Mex; also Ont. and CA).





Echinodorus rostratus.

3. *Sagittaria* L. — Arrowhead, duck potato

Plants perennial or annual; **rhizomes** freely produced by perennial spp., often bearing starchy tubers in late summer and fall. **Emersed and floating leaf blades** usually sagittate with prominent basal lobes, sometimes blades partly or all ovate to lanceolate or elliptic and lacking basal lobes; a **basal rosette** of thin, lanceolate to linear submersed leaves characteristic of deeply submersed plants, these often preceding floating and emersed leaves, generally absent on flowering specimens. **Inflorescence** a simple or sparingly branched, bracteate raceme with few to many, mostly 3-flowered whorls, branches sometimes replacing flowers at the lower 1-few nodes of the scape, the inflorescence shorter than to surpassing the leaves. **Flowers** usually male above and female below in the inflorescence, sometimes partly or even mostly perfect or rarely all of one sex, the male flowers soon falling; **sepals** greenish, persistent, eventually reflexed or sometimes appressed on the fruiting heads; **petals** white, showy, ephemeral; **stamens** many, filaments glabrous or pubescent; pistils numerous, densely crowded on a subglobose receptacle. **Achenes** crowded in globose or subglobose heads, laterally flattened and winged, sometimes with a low wing on the faces as well, apically beaked with the persistent style, the beak sometimes obscure.

References:

Bogin, C. 1955. Revision of the genus *Sagittaria*. Mem. New York Bot. Gard. 9:179-223.

Wooten, J. W. 1973. Taxonomy of seven species of *Sagittaria* from eastern North America. Brittonia 25:64-74.

1 Blades of emersed leaves not sagittate, lacking basal lobes or some occasionally with small caudal lobes.

2 Female flowers and fruiting heads apparently sessile on the scape . . . . . 6. *S. rigida*

2 Female flowers and fruiting heads obviously pedicellate . . . . . 4. *S. graminea*

1 Blades of emersed leaves mostly or all sagittate, the basal lobes prominent.

3 Sepals appressed to the fruiting heads; pedicels of fruiting heads inflated; plants annual, lacking rhizomes . . . . . 2. *S. calycina*

3 Sepals reflexed on fruiting heads; pedicels of fruiting heads slender; plants perennial, with rhizomes.

4 Floral bracts acute to obtuse, mostly less than 1 cm long; achene beak projecting horizontally from the apex of the achene . . . . . 5. *S. latifolia*

4 Floral bracts acute to acuminate or attenuate, usually more than 1 cm long; achene beak erect or oblique to recurved-ascending.

5 Achene beak short, erect, 0.1-0.4 mm long; ventral wing of achene usually convex below the beak; basal lobes of leaf mostly shorter than the terminal one . . . . . 3. *S. cuneata*

5 Achene beak prominent, oblique to recurved-ascending, 0.5 mm or more long; ventral wing of the achene straight below the beak; basal lobes of leaf usually equaling or longer than the terminal one . . . . . 1. *S. brevirostra*

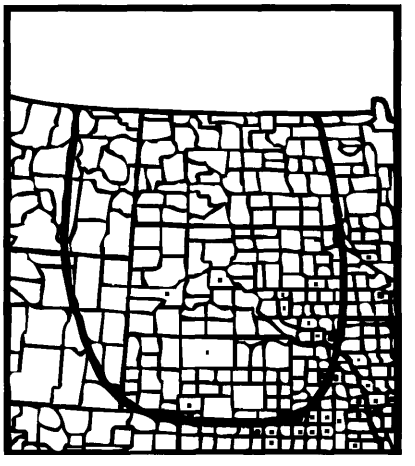
1. *Sagittaria brevirostra* Mack. & Bush

Erect, rhizomatous perennial with long-petioled leaves to 6 dm tall. **Leaf blades** sagittate, mostly 10-30 cm long, to 20 cm wide; the basal lobes usually equaling or longer than the terminal lobe. **Inflorescence** usually simple or sometimes branched from the lower 1-3 nodes; **bracts** 1-5.5 cm long, acuminate or attenuate; **pedicels** of female flowers ascending, 0.5-2 cm long. **Flowers** male above and female below, often predominantly male or female, seldom all of one sex; **sepals** reflexed in fruit; **petals** 1-2 cm long; **filaments** glabrous, about as long as to longer than the anthers. **Fruiting heads** to 2 cm across, often apically depressed; **achenes** 2-3 mm long, dorsal wing entire to crenulate, truncate apically and not continuous with the beak, separated from the beak by a saddlelike depression, ventral wing straight below the beak; **beak** obliquely ascending to recurved-ascending (even when immature), 0.5-1.5 mm long at maturity. Jul—Sep. Mud or shallow water of streams and lakes; occasional in e and c SD and NE, rare in the w; (OH and MI to SD, s to TX and NM). *S. engelmanniana* J. G. Smith.



2. *Sagittaria calycina* Engelm.

Dwarf to large emergent annual 1-10 dm tall, lacking rhizomes and tubers. **Leaves** with terete, spongy-thickened petioles, erect to spreading; **emersed blades** sagittate to hastate or earlier ones elliptic-ovate, (1)3-40 cm long, (0.5)2-25 cm wide, the basal lobes much shorter to longer than the terminal lobe. **Inflorescence** ultimately leaning or procumbent, the scape terete and spongy-thickened; **bracts** membranous, short and broadly rounded at lower nodes, longer and acute to acuminate upward, 3-10 mm long; **pedicels** of fruiting heads inflated, 0.5-5 cm long, recurved in fruit, those of upper male flowers slender. **Lower flowers** female or perfect (with a single whorl of stamens), **upper ones** perfect or more often male; **sepals** broad and obtuse, 5-12 mm long, reflexed in flower but soon appressed to the head of developing fruits and remaining so on mature heads; **petals** white with a yellow base, usually not much exceeding the sepals; **filaments** roughened with minute hairs. **Fruiting heads** eventually nodding, to 2 cm across, convex to somewhat flattened apically; **achenes** 2-3 mm long, about equally winged dorsally and ventrally, usually with a prominent resin duct curving over the faces; **beak** horizontal or oblique, 0.2-0.6 mm long. Jul—Sep. Mud or shallow water of ponds, marshes and drying pools; sporadic and local in occurrence from the s half of SD through NE; (OH and MI to SD, s to VA, TN, LA, TX, NM, CA and into Mex.). *S. montividensis* Cham. & Schlect. subsp. *calycinus* (Engelm.) Bogin.

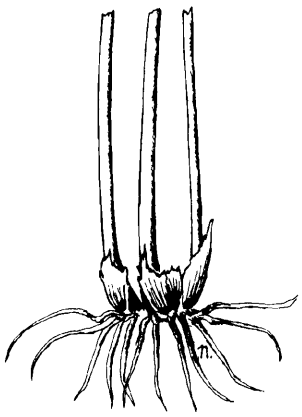


3. *Sagittaria cuneata* Sheld.

Emersed or emergent perennial with rhizomes and tubers, (0.5)1-6 dm tall, or to 9 dm long when emergent in deep water, often comprised of a basal rosette of thin, subulate or linear-oblong, submersed leaves (phyllodes) during juvenile stages, also commonly producing long-petioled floating leaves with small, ovate to elliptic or sagittate blades when young and submersed, generally not flowering in this condition. **Emersed leaf blades** sagittate or earliest 1-few sometimes oblong-elliptic, 5-20 cm long, 1-14 cm wide, the basal lobes usually shorter than the terminal one; petioles erect to spreading. **Inflorescences** 1-several, erect to reclining, frequently branched from lower nodes; **bracts** acute to acuminate or attenuate, (0.5)1-4(5) cm long; **pedicels** of fruiting heads ascending to spreading, 0.3-2 cm long, those of male flowers longer and more slender. **Flowers** male above and female below or some perfect; **sepals** ovate, 4-10 mm long, reflexed in flower and fruit; **petals** white, 7-15 mm long; **filaments** glabrous, about equaling or longer than the anthers. **Fruiting heads** globose or nearly so, 5-13 mm in diameter; **achenes** 2-3 mm long, dorsal wing wider than the ventral one, rounded above and usually separated from the beak by a concavity, ventral wing broadened upward and usually convex below the beak; **beak** erect, often obscure, 0.1-0.4 mm long. Jun—Sep. Mud or shallow water of marshes, lakes, ponds, streams and ditches; common; (N.S. to B.C., s to NY, IN, IL, n TX, NM, UT and CA).



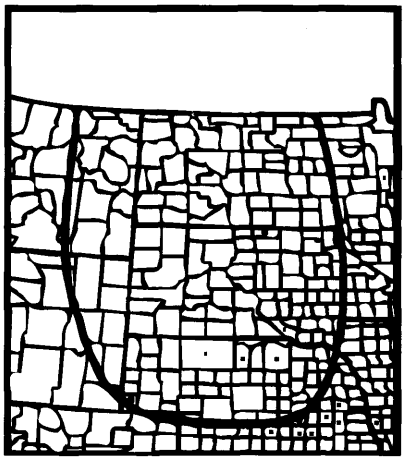




***Sagittaria cuneata*, the most common arrowhead in the northern Great Plains. Similar species are distinguished mainly by achene characters.**

4. *Sagittaria graminea* Michx.

Emergent to emersed perennial or perhaps usually annual in our range, producing rhizomes well after flowering in first year plants. **Leaves** variable depending on degree of submergence and age of plant, submersed plants with the earliest leaves comprising a rosette of phyllodes, these tapelike, to 1 cm wide, acute-tipped, often absent by flowering time; **emergent leaves** or leaves of emersed plants with blades elliptic to linear-oblong, never sagittate, 3-20 cm long, 0.5-3 cm wide, acute or attenuate to the blunt tip. **Inflorescences** 1-few, shorter than to exceeding the leaves, simple, with 2-6(9) whorls of flowers; **bracts** triangular-ovate, connate in the lower 1/2, 2-8 mm long; **pedicels** slender to filiform, 1-4 cm long, ascending to spreading. **Flowers** usually male above and female below, rarely all of one sex; **sepals** ovate, 3-5 mm long, reflexed in fruit; **petals** white, about equaling to over 2X the sepal length; **filaments** equaling to longer than the anther, puberulent. **Fruiting heads** globose or subglobose, 5-12 mm across; the receptacle often conspicuously spongy-thickened; **achenes** 1-2 mm long, prominently winged, the dorsal wing rounded over the top of the achene and continuous with the ventral wing; **beak** minute and projecting laterally or absent. Jun—Sep. Mud or shallow water of marshes, ponds and ditches; uncommon in NE and rarely n into SD, probably as a temporary introduction by waterfowl; (Labr. and Newf. to SD, s to FL and TX; also Cuba).



5. *Sagittaria latifolia* Willd.

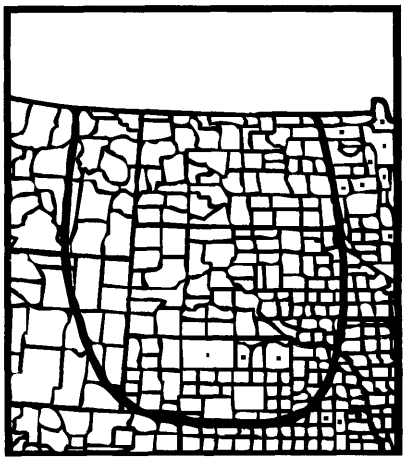
Emergent to emersed perennial 2-8 dm tall, or much longer when growing in deep water, rhizomatous and with tubers in autumn. **Leaves** highly variable depending on water depth, emersed leaf blades sagittate, mostly 8-40 cm long, 0.4-15 cm wide, the lobes narrow and linear on plants of deep water to broadly deltoid on emersed specimens, the basal lobes shorter to longer than the terminal one; submersed phyllodes, if produced, apparently gone by flowering time. **Inflorescences** 1-few, simple or rarely branched from the lowest node; **bracts** bluntly acute to obtuse, 0.5-1 cm long; **pedicels** slender, 0.3-3.5 cm long, ascending to spreading. **Flowers** male above and female below or seldom all of one sex; **sepals** ovate, 4-10 mm long, broadly rounded, reflexed in fruit; **petals** white, 7-20 mm long; **filaments** glabrous, longer than the anther. **Fruiting** heads globose to somewhat flattened, 1-2.5 cm across; **achenes** 2.5-4 mm long, dorsal wing rounded over the top of the achene, ventral wing gradually widened upward to meet the beak; **beak** projecting horizontally, tapered, 1-1.5(2.5) mm long. Jul—Sep. Mud or shallow water of rivers, streams, lakes and marshes; frequent in e ND, e and s SD and NE; (N.S. and Que. to B.C., s to S.Amer.).

Many records of *S. latifolia* for the w and c parts of ND and SD and e WY are based upon misidentifications of *S. cuneata*.



6. *Sagittaria rigida* Pursh

Rhizomatous perennial, emersed and erect to submersed and lax, 1-6 dm tall or to 9 dm long in deeper water. **Emersed leaf blades** linear to oblong when emergent in deep water or lanceolate to ovate when growing in shallow water or mud, seldom 1-few of the blades with short, narrow basal lobes, not truly sagittate, mostly 4-15 cm long, to 7 cm wide; **petiole** sometimes bent near the blade; leaves comprised entirely of lax, linear phyllodes when deeply submersed, plants generally nonflowering in this condition. **Inflorescence** solitary, simple, erect when emersed or lax in deep water, usually not exceeding the longest leaves, often bent near the lowest node, with 2-8 whorls of flowers; **bracts** ca. 5 mm long, obtuse, connate at the base. **Flowers** female below, male or some perfect above, the female sessile or nearly so, on pedicels to 3 mm long, the male on slender pedicels 1-3 cm long; **sepals** ovate, 4-7 mm long, reflexed in fruit; **petals** white, ca. 2X as long as the sepals; **filaments** longer than the anther, roughened with minute hairs. **Fruiting heads** subglobose to somewhat flattened, to 1.5 cm across, apparently sessile and appearing bristly due to the rather prominent achene beaks; **achenes** 2.5-4 mm long, narrowly winged; **beak** inserted laterally and recurved upward, 0.8-1.4 mm long. Jun—Sep. Mud or shallow water of marshes, ponds, lakes and streams; uncommon in n and e NE; (Que. to MN, s to VA, KY, TN, MO and NE).



52. **Hydrocharitaceae**, the Frog's-bit Family

Submersed, dioecious, perennial herbs (those included here) of calm or flowing water, densely leafy-stemmed with whorled or decussate, sessile leaves, or plants acaulescent with long, linear, ribbonlike leaves arising in clusters from stolons that creep over the substrate. **Flowers** solitary or numerous, sessile or peduncled, extended or freely floating to the surface at anthesis, arising from a 2-bracted or bifid (trifid) spathe, small and nonshowy, regular; **sepals** 3; **petals** (1-)3, seldom absent; **male flowers** with (1)2(3) or 9 stamens; **female flowers** with or without staminodes; **stigmas** 3, often 2-lobed, ovary inferior, ovules few to several, on 3 parietal placentae that extend nearly to the center of the ovary. **Fruit** ovoid or cylindric, few- to several-seeded, rupturing tardily and irregularly, maturing underwater.

1 Plants leafy-stemmed, the leaves whorled or decussate, to 3 cm long . . . 1. *Elodea*

1 Plants acaulescent, the leaves all basal, ribbonlike, to 1 m long . . . . . 2. *Vallisneria*

1. ***Elodea*** Michx. — Waterweed

Stems slender, lax to rather rigid and brittle, sparingly to freely branched, rooting from the lower nodes or sometimes free-floating. **Leaves** sessile, crowded toward the apex, mostly in whorls of 3(4) or opposite and decussate, the margins finely serrulate. **Flowers** minute, delicate, often lost in collection, solitary in the upper leaf axils, subtended by a 2-lobed spathe, usually extended to the water surface by a long, threadlike hypanthium or (in male flowers of *E. nuttallii*) sessile and breaking free to float to the surface; **sepals** 3; **petals** 3 or seldom absent; **male flowers** containing 9 stamens; **female flowers** with 3 staminodes and 3 stigma lobes protruding at the summit of the hypanthium, the stigmas entire or 2-lobed. **Fruit** ovoid to cylindric, several-seeded.

Reference:

St. John, H. 1965. Monograph of the genus *Elodea*. Part 4: The species of the eastern and central North America. Rhodora 67:1-35, 155-180.

1 Middle and upper leaves in whorls of 3(4).

  2 Leaves mostly (1)1.5-3(5) mm wide, obtuse-apiculate at the apex; male flowers extended to the surface by a long, threadlike hypanthium; sepals of female flowers 2-3 mm long . . . . . 1. *E. canadensis*

  2 Leaves (0.3)0.7-1.5 mm wide, acute or acute-apiculate at the apex; male flowers sessile inside the spathe, breaking free to float to the surface at anthesis; sepals of female flowers ca. 1 mm long . . . . . 3. *E. nuttallii*

1 Middle and upper leaves decussate . . . . . 2. *E. longivaginata*

1. *Elodea canadensis* L. C. Rich. in Michx.

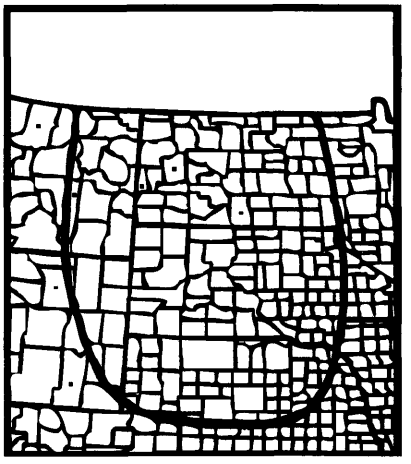
Stems terete, often freely branched, 2-5(10) dm long. **Lower leaves** opposite, reduced, ovate-lanceolate; **middle and upper leaves** in whorls of 3, linear-lanceolate (on male plants) or oblong-lanceolate to ovate-lanceolate (on female plants), 5-15 mm long, 1-5 mm wide, mostly more than 1.5 mm wide, obtuse-apiculate, more strongly overlapping on pistillate plants. **Winter buds** appearing as short, compact branches in late summer. **Spathes of male flowers** borne in upper axils, ca. 15 mm long, inflated upward to 4 mm wide; **male flowers** peduncled by the threadlike hypanthium which is 3-20 cm long; **sepals** elliptic, 3.5-5 mm long; **petals** white, clawed, linear, 5 mm long; **stamens** 9, the inner 3 uplifted on a common stalk. **Spathes of female flowers** borne in upper axils, cylindric, 10-20 mm long; **female flowers** extended to the surface by a threadlike hypanthium 2-28 cm long; **sepals** oblong-elliptic, 2-2.2 mm long; **petals** white, oblanceolate, ca. 2.5 mm long; **stigmas** 2-cleft, 4 mm long. **Fruit** ovoid, ca. 6 mm long; **seeds** narrowly cylindric, 4.5 mm long, glabrous. Jun—Aug. Quiet water of streams and reservoirs; occasional in e and c parts of our region and the Black Hills, otherwise scattered w; (Que. to B.C., s to NC, AL, AR, OK, CO, UT, NV and CA; intro. in Europe). *Anacharis canadensis* (Michx.) Rich.



***Elodea canadensis*, male and female plants.**

2. *Elodea longivaginata* St. John

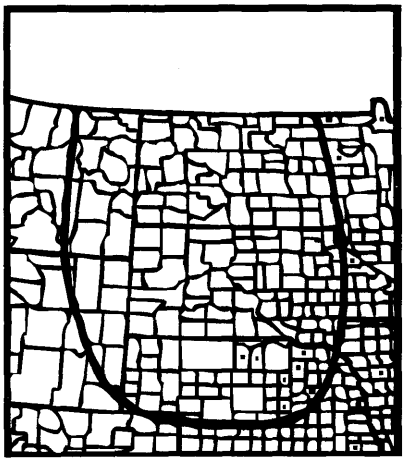
Stems terete, sparsely branched, 3-10 dm long. **Leaves** all decussate or some lower ones in whorls of 3, linear, 5-20 mm long, 0.5-2 mm wide, acute to obtuse. **Spathes of male flowers** 2-15 cm long, inflated near the summit, to 2.5-4 mm wide; **male flowers** peduncled by the threadlike hypanthium which is up to 30 cm long; **sepals** elliptic, 3.5-5 mm long; **petals** white, linear, 5 mm long; **stamens** 9, all attached at the summit of the hypanthium. **Pistillate spathes** linear-cylindric, 3-7 cm long; **female flowers** extended by the elongate, threadlike hypanthium which may attain lengths of several dm; **sepals** elliptic, 2.8 mm long; **petals** white, 4 mm long; **stigmas** entire, 1.5 mm long. **Capsules** ovoid, 10 mm long; **seeds** cylindric, 6 mm long. Jul—Aug. Prairie ponds, lakes and reservoirs; uncommon and scattered, c and w ND, e MT and e WY; (ND to Alta., s to NM and UT).



3. *Elodea nuttallii* (Planch.) St. John

Similar to *E. canadensis* but smaller and more delicate, the **stems** slender, terete, often freely branched. **Lower leaves** opposite and reduced, ovate-lanceolate; **middle and upper leaves** in whorls of 3 or occasionally 4, linear to linear-lanceolate, 6-13 mm long, (0.3)0.7-1.5 mm wide, acute or acute-apiculate at the apex. **Spathes of male flowers** borne in middle axils, sessile, ovoid, ca. 2 mm long, 2-parted but the lobes twisted together so that the spathe appears pointed; **male flowers** solitary and sessile in the spathe, breaking free and floating to the surface where the flower opens; **sepals** ovate, ca. 2 mm long, sometimes reddish; **petals** lacking or to 0.5 mm long, ovate-lanceolate; **stamens** 9, the inner 3 elevated on a common stalk. **Spathes of female flowers** borne in upper axils, narrowly cylindric but slightly broadened at the base and the bifid tip, 9-25 mm long; **female flowers** extended to the surface by a threadlike hypanthium to 9 cm long; **sepals** obovate, ca. 1 mm long; **petals** white, obovate, longer than the sepals; **stigmas** slender, shallowly bifid, slightly exceeding the sepals. **Fruit** narrowly ovoid to fusiform, 5-7 mm long; **seeds** cylindric, 3.5-4.5 mm long, pilose. Jun—Aug. Quiet water of streams and lakes; e and nc NE; (Que. to MN and NE, s to NC, MO, OK and NM; also ID). *Anacharis occidentalis* (Pursh) Victorin, *A. nuttallii* Planch.

Reports of this species for ND were based on misidentifications of *E. canadensis*. The same may be true for SD, even though *E. nuttallii* is perhaps to be expected in the se part of the state.

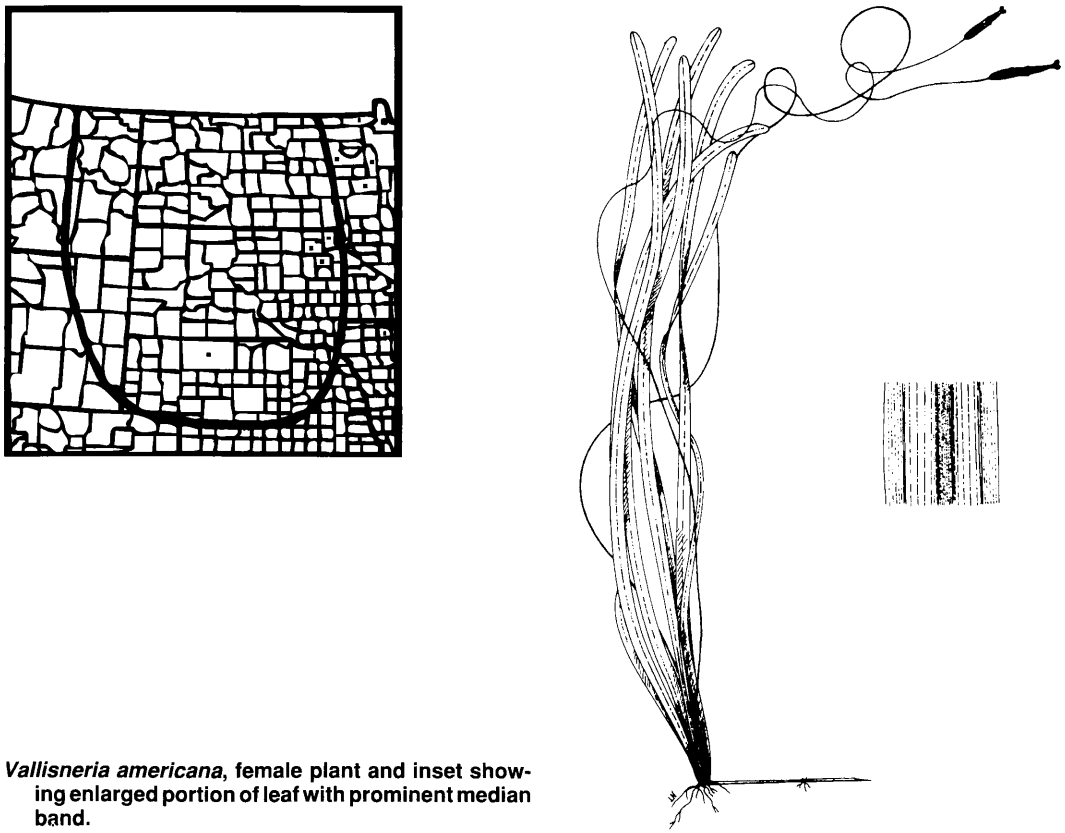


1. *Vallisneria americana* Michx.

Plants acaulescent with long, linear, ribbonlike leaves arising in tufts, fibrous-rooted, producing short stolons from the base, often forming extensive submerged beds. **Leaves** up to 1 m or more long though usually shorter, 3-12 mm wide, with a many-nerved median band bordered by nerveless or sparsely nerved marginal bands, blunt or rounded at the tip. **Male plants** producing a head of numerous flowers within a short-stalked, 2- to 3-parted spathe borne at the base; **male flowers** minute, with 3 sepals, 1(2) minute petal(s) and (1)2(3) stamens, individually released from the spathe to float freely to the surface where they open. **Female plants** bearing flowers singly on long, slender peduncles that extend the flower to the surface; **female flowers** with 3 sepals, 3 minute petals and 3 prominent stigmas, sometimes with 1 or more staminodes; **ovary** enclosed by a hypanthium, linear-cylindric, 2-3 cm long in flower, enclosed at the base by the 2-cleft spathe. **Fruit** cylindric, curved, 4-10 cm long, many-seeded; **peduncle** becoming loosely coiled to draw the fruit underwater. Jul—Sep. Uncommon though locally abundant in shallow water of lakes in ne SD; also reported for Cherry Co., NE; occurring also in slow-moving streams e of our range where it is common; (N.S. to MN and SD, s to FL, TX, NM and AZ).

Submersed forms of *Sagittaria* spp. are sometimes mistaken for this plant. In sterile material, the distinctive marginal bands of the leaves and the stoloniferous habit are diagnostic for *Vallisneria*.

To the east of this region, *V. americana* is an important food for waterfowl and other aquatic life. It is apparently limited here by high conductivities, turbidity and unstable water conditions, and is thus not abundant enough to be an important food source.



***Vallisneria americana*, female plant and inset showing enlarged portion of leaf with prominent median band.**

1. ***Scheuchzeria*** L.

1. *Scheuchzeria palustris* L.

Rushlike, bog-dwelling perennial from creeping rhizomes, (1)2-4 dm tall. **Leaves** alternate, 2-ranked, broadly sheathing at the base with a prominent ligule 2-10 mm long at the juncture of the sheath and blade, basal leaves 1-4 dm long, cauline leaves reduced upward; **leaf blades** terete or nearly so, 1-3 mm wide, with a small pore at the tip. **Inflorescence** a few- to several-flowered raceme, with a few leaflike bracts in the lower portion; **pedicels** to 25 mm long. **Flowers** perfect, regular; **tepals** 6, in 2 series, greenish-white, oblong, ca. 3 mm long, soft, eventually deciduous; **stamens** 6; **carpels** 3 (rarely to 6), free or nearly so to the base, stigmas subsessile. **Fruit** a group of 3 (rarely 4, 5 or 6) spreading follicles, these 1- to 2(-several)-seeded, inflated, 5-10 mm long; **seeds** black, ellipsoid, 4-5 mm long. Flowering late May—Jun, fruiting Jul—Aug. Acid bogs, often in sphagnum or sedge mats; rare, with one recent record from Bottineau Co., ND; (Circumboreal, s in N.Amer. to NJ, IN, IA, ND, ID, and n CA).

American plants are designated var. *americana* Fern. on the basis of their larger follicles and seeds.



***Scheuchzeria palustris*, inflorescence left, fruiting plant right.**

54. **Juncaginaceae**, the Arrow-grass Family

1. ***Triglochin*** L. — Arrow-grass

Perennial, grasslike herbs, tufted from a creeping rootstock. **Leaves** all basal, slender, terete or somewhat flattened, sheathing at the base, ligulate. **Inflorescence** a terminal, ebracteate, spikelike raceme; **pedicels** short and decurrent on the scape axis. **Flowers** perfect, regular; **tepals** 6, in 2 series, deciduous; **stamens** 6, anthers sessile, nearly as large as the tepals; **carpels** 3 or 6, each with an apical stigma, ovary superior, eventually splitting into 3 or 6, 1-seeded segments. Plants of wet, often alkaline or saline habitats.

Reference:
Howell, J. T. 1947. Remarks on *Triglochin concinna*. Leafl. W. Bot. 5:13-19.

1 Carpels and stigmas 3; fruits linear-clavate, the fruit axis 3-winged . . . . . 3. *T. palustris*

1 Carpels and stigmas 6; fruits short-cylindric, the fruit axis terete.

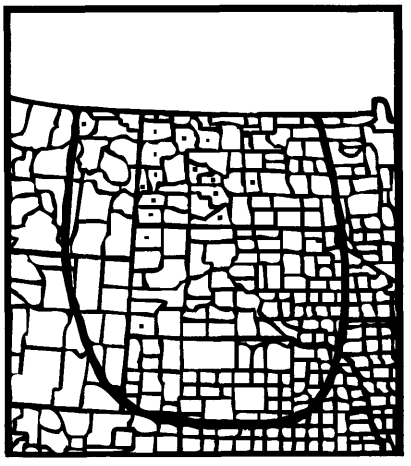
2 Ligules entire, acute or rounded; leaf blades somewhat flattened, mostly 1.5-3(4) mm wide; plants usually 3 dm or more tall . . . . . 2. *T. maritima*

2 Ligules deeply 2-lobed; leaf blades nearly terete, mostly 0.5-1(1.5) mm wide; plants often less than 3 dm tall . . . . . 1. *T. concinna*

1. *Triglochin concinna* Davy

Plants 1.5-4(6) dm tall, often less than 3 dm tall, tufted from a creeping rootstock. **Leaves** erect to curved-spreading, nearly terete, 1/3 to 3/4 the length of the plant, 0.5-1(1.5) mm wide; **ligules** deeply 2-lobed, the lobes rounded or acute, often overlapping, 1-2 mm long. **Racemes** loosely to rather densely flowered, (5)10-25 cm long; **pedicels** 1-5 mm long. **Flowers** ca. 2 mm across; **tepals** 1-2 mm long; **carpels** 6, stigmas 6. **Fruits** cylindric, 3-5 mm long, 1.5-2 mm thick, splitting into 6 oblong segments, the fruit axis terete. Jul—Aug. Wet, alkaline or saline meadows and flats; c and w ND, w SD, e MT and WY; (ND and SD to sw B.C., s to WY, CO, AZ and Baja CA; also s S.Amer.).

Plants of our region and other inland areas are designated var. *debilis* (M. E. Jones) J. T. Howell.



2. *Triglochin maritima* L.

More robust than the preceding, (2)3-8 dm tall, tufted from a thick creeping rootstock. **Leaves** erect to curved-spreading, somewhat flattened, especially toward the base, 1/2 to fully the length of the plant, 1.5-3(4) mm wide; **ligules** entire, acute to rounded, 1-5 mm long. **Racemes** densely flowered, (5)10-40 cm long; **pedicels** 1-6 mm long. **Flowers** 2-3 mm across; **tepals** 1.5-2 mm long; **carpels** 6, stigmas 6. **Fruits** short-cylindric, 2-5 mm long, 1-3 mm thick, splitting into 6 oblong segments, the fruit axis terete. Jun—Aug. Wet meadows, fens, alkaline or saline marshes, ditches and flats, stream banks and other wet places; common over most of the region; (Circumboreal, in N.Amer. s to PA, IN, IL, IA, NE, CO, Mex. and Baja CA; also S.Amer.).





Triglochin maritima.

3. *Triglochin palustris* L.

Small, slender plants 1.5-4 dm tall. **Leaves** erect, terete, 1/2 to 3/4 the length of the plant, very slender, 0.5-2 mm wide; **ligules** 2-lobed, 0.5-1.5 mm long. **Racemes** loosely flowered, 10-25 cm long; **pedicels** 2-5 mm long. **Flowers** small, 1-2 mm across; **tepals** 1-2 mm long; **carpels** 3, stigmas 3. **Fruits** linear-clavate, 5-8 mm long, ca. 1 mm thick, splitting upward from the base into 3 elongate segments, the fruit axis 3-winged. Late Jun—Sep. Springs, fens and seepage areas, often where alkaline or saline; occasional in ND and ne MT, uncommon s; (Circumboreal, in N.Amer. s to ME, PA, IL, IA, NE, CO, ID and CA; also S.Amer.).



55. **Potamogetonaceae**, the Pondweed Family

1. ***Potamogeton*** L. — Pondweed

Submersed or floating-leaved, rhizomatous aquatics, perennial from the rhizomes or tubers or by budding from the lower nodes, sometimes reproducing and overwintering by free-floating winter buds. **Stems** elongate, flexuous, anchored by roots and rhizomes. **Leaves** alternate, becoming opposite upward in some spp., simple; **stipules** present, fused to each other along one or both margins or adnate to the leaf blade in some linear-leaved spp., forming an open or closed sheath around the stem, fibrous or membranous, often rapidly deteriorating. **Submersed leaves** filiform to lanceolate, thin and often flexuous, usually sessile. **Floating leaves** produced in some spp., basically elliptic or oblong in outline, petioled, rather leathery with a waxy upper surface. **Winter buds** produced in the leaf axils of some spp., these consisting of tightly compressed apices bound by reduced leaves. **Inflorescences** of axillary or terminal spikes bearing few to many minute whorled flowers; **peduncles** stout to filamentous, usually lifting the spike above the water surface at anthesis, often recurved with age. **Flowers** perfect, regular; **perianth** of 4 sepaloid bracts (these considered enlargements of the staminal connectives by some authors); **stamens** 4, each inserted on the claw of a perianth bract; **carpels** 4, separate, each maturing into a strongly to weakly beaked, nutlet-like fruit.

References:

Fernald, M. L. 1932. The linear-leaved North American species of *Potamogeton* section *Axillares*. Mem. Amer. Acad. Arts 17:1-183.

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Reznicek, A. A. and R. S. W. Bobbette. 1976. The taxonomy of *Potamogeton* subsection *Hybridi* in North America. Rhodora 78:650-673.

St. John, H. 1916. A revision of the North American species of *Potamogeton* of the section *Coleophylli*. Rhodora 18:121-138.

1 Stipules adnate to the leaf blades for a distance of 10 mm or more, the free portion projecting as a ligule; floating leaves absent.

2 Stipular sheaths of the main stem inflated 2-5X the thickness of the stem; floral whorls 5-12 per spike . . . . . 18. *P. vaginatus*

2 Stipular sheaths of the main stem about as wide as the stem; floral whorls 2-6 per spike.

3 Stems dichotomously branched from the base, mostly unbranched above; fruits olivaceous, 2-3 mm long, the beak flat, inconspicuous . . . . . 6. *P. filiformis*

3 Stems dichotomously branched above; fruits yellowish to brown, 3-4 mm long, apiculate, with a beak usually 0.3-0.5 mm long . . . . 13. *P. pectinatus*

1 Stipules free of the blade or adnate for a distance of less than 10 mm, often early deteriorating; floating leaves present or absent.

4 Submersed leaves linear, 6 mm or less wide (sometimes wider in *P. epihydrus*), mostly 20X or more longer than wide.

5 Stipules adnate to submersed leaf blades for mostly 1-4 mm; embryo coil plainly visible through the papery thin walls of the fruit; small elliptic floating leaves usually present, 5-40 mm long . . . . . 4. *P. diversifolius*

5 Stipules free of the leaf blades; fruit walls firm, the embryo coil obscured by the walls of the fruit; floating leaves, if present, mostly larger.

6 Leaves dimorphic, both floating and submersed leaves produced.

7 Submersed leaves reduced to phyllodes 1-2 mm wide, these often absent with age; floating leaves rounded to cordate at the base . . . . 11. *P. natans*

7 Submersed leaves ribbonlike, mostly 3-6(10) mm wide, with a cellular-reticulate strip on each side of the midvein forming a conspicuous median band 1-2 mm wide; floating leaves tapered to the petiole . . . . . 5. *P. epihydrus*

6 Leaves all alike, all submersed.

8 Leaves with many (15-35) fine nerves; mature fruits 4-4.5 mm long . . . . . 19. *P. zosteriformis*

8 Leaves 3- to 7(9)-nerved; mature fruits 1.5-3.6 mm long.

9 Fruits with an undulate to dentate dorsal ridge or keel; glands rarely present at the base of the stipules . . . . . 7. *P. foliosus*

9 Fruits dorsally smooth and rounded; glands usually present at the base of the stipules.

10 Stipules whitish, fibrous, the oldest often shredding into fibers; peduncles mostly clavate; indurate winter buds often present.

11 Leaf tips acute, rarely obtuse; leaves 3- to 5(7)-nerved, 0.6-2 mm wide; peduncles mostly terete; stems mostly terete . . . . . 17. *P. strictifolius*

11 Leaf tips rounded to apiculate; leaves 5- to 7(9)-nerved, 1.2-3.2 mm wide; peduncles compressed; stems compressed . . . . . 8. *P. friesii*

10 Stipules tan to brownish-green, delicate, usually decomposing with age; peduncles filiform to cylindric; winter buds seldom present . . . . . 15. *P. pusillus*

4 Submersed leaves linear-lanceolate, lanceolate, oblong or ovate, broader in proportion to the length.

12 Leaves all submersed, sessile, weakly to strongly clasping at the base, often undulate-crisped.

13 Leaf margins finely serrate; fruit beak 2-3 mm long; indurate winter buds commonly produced in upper axils . . . . . 3. *P. crispus*

13 Leaf margins entire; fruit beak 1.5 mm or less long; winter buds lacking.

14 Stems whitish; leaves 10-25 cm long; peduncles over 10 cm long; fruits 4-5 mm long . . . . . 14. *P. praelongus*

14 Stems brownish to yellowish-green; leaves less than 10 cm long; peduncles 2-10 cm long; fruits 2.5-3.5 mm long . . . . . 16. *P. richardsonii*

12 Floating leaves commonly present by flowering time, occasionally lacking; submersed leaves sessile or petiolate, not clasping the stem; flat to falcate, not undulate-crisped.

15 Upper submersed leaves falcate-folded, 25- to 50-nerved; mature fruits 4-5 mm long . . . . . 2. *P. amplifolius*

15 Upper submersed leaves more or less symmetrical and not folded, 3- to 17(19)-nerved; mature fruits 1.7-4 mm long.

16 Fruits tawny-olive; floating leaves often lacking, thin and delicate, the blade tapering indistinctly into a short petiole; submersed foliage reddish-tinged . . . . . 1. *P. alpinus*

16 Fruits brown, reddish-brown or greenish; floating leaves leathery, the blades distinct from the petioles; submersed foliage dark green to brownish-green.

17 Submersed leaves commonly disintegrating by fruiting time, tapering to petioles (2)4 cm long or much longer, acute to blunt-tipped; mature fruits brownish to reddish-brown, 3-4 mm long. . . . . 12. *P. nodosus*

17 Submersed leaves usually persistent, sessile or tapering to petioles up to 4 cm long, acute to abruptly acuminate or apiculate; mature fruits green or olive, 1.7-3.5 mm long.

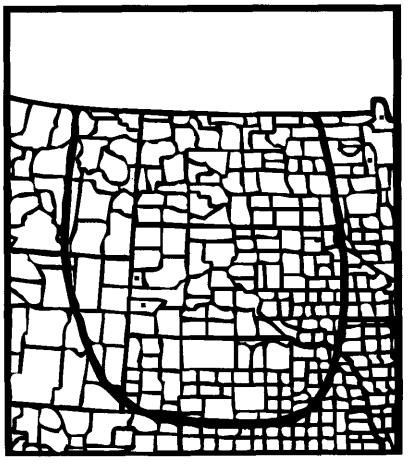
18 Stems usually freely branched, 0.5-1 mm thick; submersed leaves 3-10(15) mm wide, 3- to 7(9)-nerved; floating leaf blades 2-9 cm long, 1-3.5 cm wide; fruiting spikes 1.5-3.5 cm long; fruits 1.7-2.8 mm long, the lateral keels obscure . . . 9. *P. gramineus*

18 Stems simple or once-branched, 1-5 mm thick; submersed leaves (1)1.5-4 cm wide, 9- to 17(19)-nerved; floating leaf blades 4-14(19) cm long, 2-7 cm wide; fruiting spikes 2-6 cm long; fruits 2.7-3.5 mm long, the lateral keels strong . . . . 10. *P. illinoensis*

1. *Potamogeton alpinus* Balbis

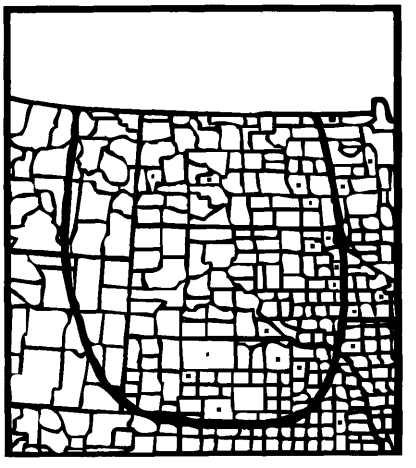
Stems terete, 1-2 mm thick, simple or rarely branched above, to 1 m long; **foliage** reddish-tinged, especially the upper leaves and peduncles. **Submersed leaves** linear-lanceolate to linear-oblong, 4-18 cm long, 5-15(20) mm wide, usually 7(-11)-nerved, blunt and obtuse to rarely acutish at the tip, narrowed to a sessile base. **Floating leaves** often lacking, thin and delicate, obovate or oblanceolate to elliptic-oblanceolate, mostly 4-6 cm long, 1-2 cm wide, 7- to 15-nerved, obtuse, tapering indistinctly into a short petiole. **Stipules** free, membranous, 1-2.5(4) cm long; **spikes** cylindric, with 5-9 crowded whorls of flowers, peduncles about as thick as the stem, 3-15 cm long. **Fruits** tawny-olive, obliquely obovoid, 2.5-3.5 mm long; dorsal keel usually narrow and prominent; lateral keels absent or low and rounded; beak short, curved backward. Jul—Sep. Cold streams and lakes in the Black Hills; (Circumboreal, in N.Amer. from Newf. to AK, s to MA, NY, WI, MN, SD, CO, UT and CA).

Reports of *P. alpinus* for outside of the Black Hills in this region were based on misidentifications.



2. *Potamogeton amplifolius* Tuckerm. — Largeleaf pondweed

Stems terete, 2-4 mm thick, simple or occasionally branched above, to 1 m long. **Upper submersed leaves** broadly lanceolate to ovate, falcately folded and often arcuate, 8-20 cm long, 2-7 cm wide, 25- to 50-nerved; **lower submersed leaves** often decayed by fruiting time, lanceolate, often not folded, 19- to 25-nerved; both submersed leaf types obtuse to broadly acute, tapering to petioles 1-6 cm long. **Floating leaves** seldom lacking at flowering time, ovate to elliptic, 5-10 cm long, 3-7 cm wide, 25- to 45-nerved, obtuse or abruptly acute, cuneate or rounded at the base; petioles 5-15 cm long; **stipules** open and free of the petioles, 5-12 cm long, fibrous and persistent. **Spikes** cylindric, dense, 4-8 cm long in fruit; **peduncles** broadening upward, 5-20(30) cm long. **Fruits** greenish-brown to brown, obliquely obovoid, 4-5 mm long; dorsal keel prominent, the lateral keels less distinct; beak to 1 mm long. Jul—Aug. Quiet waters of streams and lakes; uncommon and local mainly in the e part; (Que. to B.C., s to AL, OK and CA).



3. *Potamogeton crispus* L. — Curly pondweed

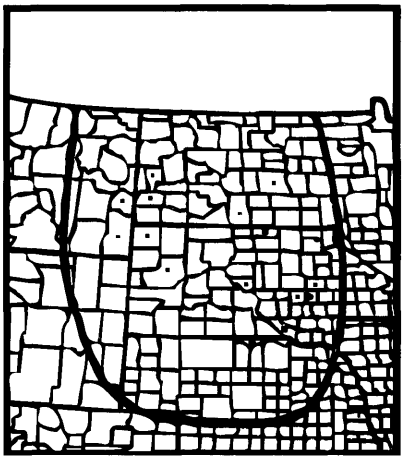
Stems slightly compressed, mostly 1-2 mm thick, usually branching, mostly 4-8 dm long. **Leaves** all submersed, sessile, slightly clasping, linear-oblong to linear-oblanceolate or oblong to oblanceolate, 3-8 cm long, 3-10 mm wide, 3- to 5-nerved, rounded at the tip, narrowed at the base, the margin usually undulate-crisped, finely serrate; **stipules** slightly adnate at the base, 4-10 mm long, early shredding. **Winter buds** commonly produced in some of the leaf axils, indurate, ca. 1-2 cm long. **Spikes** dense, short-cylindric, 1-2 cm long; **peduncles** terete, about as thick as the stem, 2-5(7) cm long. **Fruits** brown, ovoid, the body 2-3 mm long, the beak very prominent, 2-3 mm long; keels low, rounded. Apr—Jun. Shallow water of lakes, ponds and slow-moving streams, especially recreational waters; locally abundant at scattered locations; (Intro. along both coasts and inland in N.Amer.).



4. *Potamogeton diversifolius* Raf. — Waterthread pondweed

Stems slender, terete, 0.5-1 mm thick, to 8 dm long, usually with short lateral branches. **Submersed leaves** linear, flat, 1-8 cm long, 0.3-1.5 mm wide, 1(3)-nerved, obtuse to long-acuminate; **stipules of submersed leaves** 2-18 mm long, membranous, adnate to the leaf blade for mostly 1-4 mm, usually adnate for less than 1/2 the total length. **Floating leaves** sometimes lacking, the blades elliptic to elliptic-lanceolate or elliptic-oblanceolate, 5-40 mm long, 5-20 mm wide, 3- to 17-nerved, acute to rounded at the tip, cuneate to rounded at the base; **petioles** mostly 5-40 mm long; **stipules of floating leaves** free of the leaf bases, 2-25 mm long, membranous to weakly fibrous. **Spikes** dimorphic, the lower submersed spikes capitate to ellipsoid, 1.5-6 mm long, few- to several-fruited, the upper spikes ellipsoid to cylindric, 5-30 mm long, usually many-fruited; **peduncles** slightly clavate, 3-32 mm long. **Fruits** olive to yellowish, round and flattened, with a prominent winged dorsal keel and slightly ridged to winged lateral keels, the keels entire to toothed, the embryo coil plainly visible through the papery thin walls of the fruit, the beak minute. Jun—Sep. Shallow water of ponds and marshes; uncommon and scattered; (CT to MT and OR, s to FL, TX, AZ, CA and into Mex.).

Earlier reports of *P. spirillus* Tuckerm. for ND were based on misidentified specimens of *P. diversifolius*.

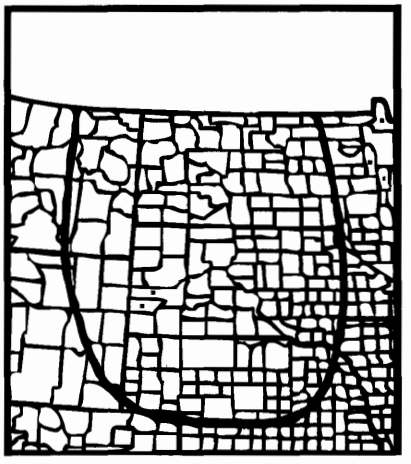




***Potamogeton diversifolius*. Occasionally floating leaves are absent.**

5. *Potamogeton epihydrus* Raf. — Ribbonleaf pondweed

Stems somewhat flattened, 1-2 mm thick, simple or sparingly branched, to 2 m long. **Submersed leaves** linear, ribbonlike, 5-20 cm long, 3-6(10) mm wide, 5- to 7(13)-nerved, with a cellular-reticulate strip on each side of the midvein forming a conspicuous median band 1-2 mm wide, acute to rather blunt, slightly tapered to the sessile base. **Floating leaves** usually present, elliptic or oblong-elliptic, (2)3-8 cm long, (5)10-20 mm wide, mostly 11- to 25-nerved, obtuse to bluntly mucronate at the tip, tapering to flattened petioles which are usually shorter than the blades; **stipules** free, rather membranous and delicate, 1-3 cm long. **Spikes** dense, cylindric, usually 2-4 cm long; **peduncles** about as thick as the stem, 3-8 cm long. **Fruits** olivaceous to brown, broadly and obliquely obovate, concave on the sides, 2-3 mm long; dorsal keel prominent, thickly winged; lateral keels low, mostly rounded; beak minute. Jul—Sep. Stream pools and lakes in the Black Hills; (Newf. and Que. to AK, s to GA, MO, SD, CO, ID and CA).



6. *Potamogeton filiformis* Pers. — Slender pondweed

Stems subterete, to 1 mm wide, branching dichotomously from the base, mostly unbranched above, 1-5 dm long. **Leaves** all submersed, filiform to narrowly linear, 5-12 cm long, 0.2-2 mm wide, 1(3)-nerved, acute to obtuse; **stipules** adnate to the base of the leaf blade, 1-4 cm long, forming a tight sheath around the stem, the free portion projecting as a ligule 2-10 mm long. **Spikes** elongate, 1-5 cm long, with 2-5 remote to adjacent whorls of flowers; **peduncles** slender, 2-15 cm long. **Fruits** olivaceous, obovoid, 2-3 mm long, rounded on the back, the beak flat, inconspicuous. Jul—Aug. Shallow standing or flowing water; uncommon and local in our region, mostly in the w part; (Circumboreal, in N.Amer. s to ME, PA, MI, MN, NE, CO, AZ and CA; also Africa and Australia).

Many previous records of *P. filiformis* in this region were based on misidentified *P. pectinatus*.



7. *Potamogeton foliosus* Raf. — Leafy pondweed

Stems compressed, mostly 0.5-1 mm wide, freely branched, to 8 dm long. **Leaves** all submersed, linear, 1.3-8.2 cm long, 0.3-2.3 mm wide, 1- to 3(5)-nerved, acute to apiculate at the tip, tapered to the sessile base; **stipules** free, greenish to brown, mostly 0.5-2 cm long, membranous or fibrous, eventually deteriorating; **glands** rarely present at the base of the stipules. **Winter buds** uncommon, lateral, 1-2 cm long. **Spikes** capitate to short-cylindric, 1.5-7 mm long; **floral whorls** 1 or 2, the whorls 0.6-1.2 mm apart when 2; **peduncles** usually clavate, recurved, 3-10 mm long. **Fruits** olive to greenish-brown, obliquely obovoid, 1.4-2.7 mm long; dorsal keel ridged or winged, with an undulate to dentate margin 0.1-0.4 mm high; sides rounded to centrally depressed. Jun—Aug. Shallow water of rivers, streams, lakes and ponds; common except in the nw portion of the region; (Newf. to B.C., s throughout most of the U.S. and into Mex. and C.Amer.; also HI and W. Indies).

Two varieties of *P. foliosus* occur in the region. In the w part, var. *fibrillosus* (Fern.) Haynes enters the region; we have collections from Pennington Co., SD, Rosebud Co., MT and Albany Co., WY. This variety is distinguished as follows: **Spikes** mostly interrupted; **fruit** pale green, 1.4-1.7 mm long, 1.1-1.2 mm wide; **keel** mostly less than 0.2 mm high; **beak** 0.2 mm long or less; **stipule veins** persistent as long fibers; **basal glands** common, to 0.5 mm in diameter.

The great majority of Great Plains plants are var. *foliosus* which differs as follows: **Spikes** rarely interrupted; **fruit** olive to greenish-brown, 1.5-2.7 mm long, 1.2-2.2 mm wide; **keel** mostly 0.2 mm high or more; **beak** 0.2-0.6 mm long; **stipule veins** decaying; **basal glands** rare, to 0.3 mm in diameter.



8. *Potamogeton friesii* Rupr.

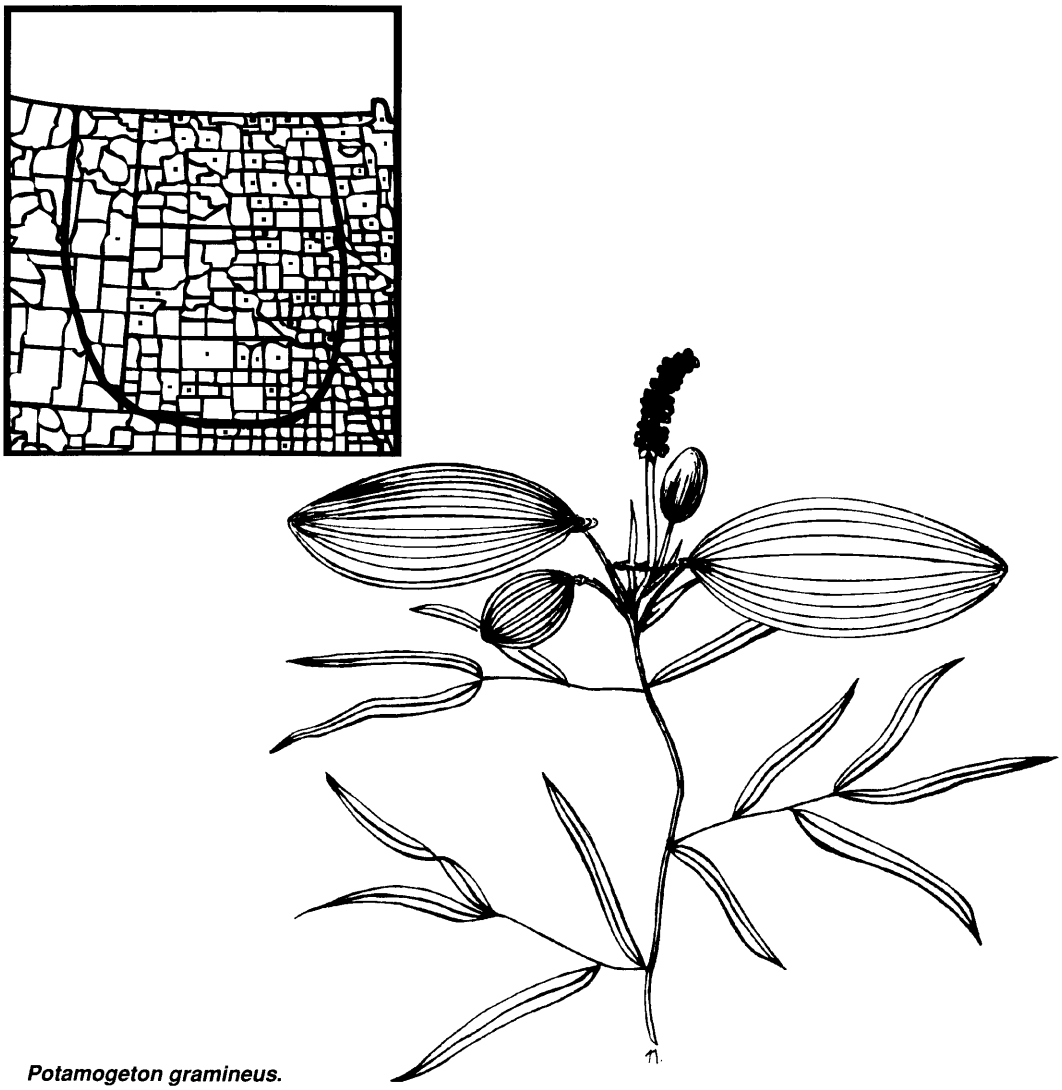
Stems compressed, mostly 0.5-1 mm wide, simple or branched, to 1-1.5 m long. **Leaves** all submersed, linear, 2.3-6.5 cm long, 1.2-3.2 mm wide, 5- to 7(9)-nerved, rounded to apiculate at the tip, the margin flat to eventually revolute, tapered to the sessile base; **stipules** free, white and fibrous, often shredding above, 5-20 mm long; **glands** present at the base of the stipules. **Winter buds** common, terminal or lateral, 1.5-5 cm long; **inner leaves** reduced, arranged into a fan-shaped structure; **outer leaves** 2-3 per side, apiculate to acute, indurate and corrugated at the base. **Spikes** cylindric, 7-16 mm long; **floral whorls** 2-5, 1.5-5 mm apart; **peduncles** slightly clavate, mostly 1.5-4(7) cm long. **Fruits** olive-green to brown, ovoid to obovoid, 1.8-2.5 mm long, rounded on the back. Jun—Aug. Shallow, fresh to brackish water of lakes and ponds; occasional from ND and e MT, s to n NE; (Newf. to AK, s to PA, n IN, IA, NE and UT).



9. *Potamogeton gramineus* L. — Variable pondweed

Stems subterete, 0.5-1 mm thick, usually freely branched, to 8 dm long. **Submersed leaves** linear to linear-lanceolate or broadly lanceolate, sometimes oblanceolate, 3-9 cm long, 3-15 mm wide, 3- to 7(9)-nerved, acute to acuminate, tapered to the sessile base. **Floating leaves** rarely absent, elliptic or oblong-elliptic, 2-9 cm long, 1-3.5 cm wide, 11- to 19-nerved, obtuse or abruptly acute at the tip, rounded to cuneate at the base; **petioles** 2-10(15) cm long, shorter than to exceeding the length of the blade; **stipules** free, persistent, mostly 0.5-4 cm long. **Spikes** dense, cylindric, 1.5-3.5 cm long; **peduncles** stout, usually broadening upward, 2-10(20) cm long. **Fruits** dull green, obliquely obovoid, 1.7-2.8 mm long, dorsal keel sharp, lateral keels obscure. Jun—Aug. Shallow, usually standing water of ponds, lakes, marshes and ditches; frequent in n and c ND, ne SD and the NE Sand Hills, otherwise occasional; (Circumboreal, in N.Amer. s to NY, IA, NE and CA).

Apparent hybrids between *P. gramineus* and the following species are frequently observed among collections from the Nebraska Sand Hills where they often grow together. The hybrids are typically intermediate between the parents in morphology, but may be mistaken for extremes of either parent. Flowers should be checked for abortive pollen grains to confirm a suspected hybrid.

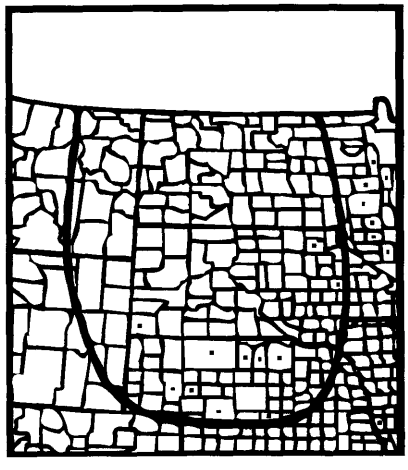


Potamogeton gramineus.

10. *Potamogeton illinoensis* Morong — Illinois pondweed

Stems subterete, (1)1.5-5 mm thick, simple or branched, to 2 m long. **Submersed leaves** elliptic or oblong-elliptic to lanceolate or linear-lanceolate, sometimes somewhat arcuate, 5-20 cm long, (1)1.5-4 cm wide, mostly 9- to 17(19)-nerved, acute to mucronate, tapered to the subsessile or petioled base, the petioles up to 2-4 cm long. **Floating leaves** often lacking, oblong-elliptic or ovate-elliptic to broadly elliptic, 4-14(19) cm long, 2-7 cm wide, 13- to 29-nerved, obtuse to bluntly mucronate at the tip, rounded to cuneate at the base; **petioles** 2-9 cm long, shorter than the blades; **stipules** free, persistent, mostly 2-8 cm long. **Spikes** dense, cylindric, 2-6 cm long; **peduncles** usually thicker than the stem, 4-20(30) cm long. **Fruits** olive-green or gray-green, obliquely obovoid, 2.7-3.5 mm long, dorsal and lateral keels prominent. Jun—Sep. Shallow to fairly deep water of sandy lakes and ponds; common in the NE Sandhills, otherwise widely scattered in SD; (N.S. to Ont. and B.C. s to FL, KS, CA and into Mex.).

See discussion under the preceding.



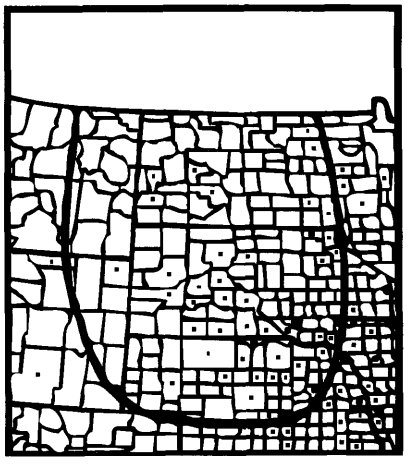
11. *Potamogeton natans* L. — Floatingleaf pondweed

Stems slightly compressed, 0.8-2 mm thick, simple or rarely branched, to 2 m long. **Submersed leaves** reduced to linear, bladeless phyllodes, these often disintegrating with age, 10-20 cm long, 1-2 mm wide, tapering to an obtuse tip. **Floating leaves** ovate-lanceolate to ovate-elliptic, 3-10 cm long, 1-5 cm wide, mostly 19- to 35-nerved, acute to obtuse at the tip, rounded to cordate at the base; **petioles** usually much exceeding the blade in length, usually forming an angle with the blade at their juncture; **stipules** free, fibrous, persistent or shredding with age, 4-10 cm long. **Spikes** dense, cylindric, 2-5 cm long; **peduncles** thicker than the stem, 3-10 cm long. **Fruits** greenish-brown to brown, obliquely elliptic-obovoid, 3-5 mm long, often pitted on the sides, the dorsal keel sharp or rounded with age, the lateral keels obscure. Jul—Aug. Shallow to rather deep water of lakes and ponds; frequent in the Turtle Mts., ND, and NE Sand Hills, otherwise uncommon; (Circumboreal, in N.Amer. s to PA, IN, IA, n KS, NM, AZ and CA).



12. *Potamogeton nodosus* Poir. — Longleaf pondweed

Stems subterete, 1-2 mm thick, simple or seldom branched, to 1.5 m long. **Submersed leaves** commonly deteriorating by fruiting time, linear-lanceolate to elliptic-lanceolate, 10-20(30) cm long, 1-2(3) cm wide, 7- to 15-nerved, acute to blunt-tipped, gradually tapering to petioles mostly (2)4-10 cm long. **Floating leaves** elliptic to oblong-elliptic, 5-13 cm long, (1.5)2-4.5 cm wide, 15- to 25-nerved, acute to nearly rounded at the tip, sometimes obtusely mucronate, acute to somewhat rounded at the base; **petioles** winged, mostly 2-3 mm wide, 5-20 cm long, usually longer than the blades; **stipules** free, those of the submersed leaves often decaying early, those of the floating leaves persistent, 3-10 cm long. **Spikes** dense, cylindric, 2-6 cm long; **peduncles** thicker than the stem, 3-15 cm long. **Fruits** reddish-brown to brown, obovoid, 2.7-4.3 mm long, the dorsal keel sharp, the lateral keels low. Jul—Aug. Shallow to rather deep water of streams, ponds and reservoirs; frequent in the s part, less common n; (Cosmopolitan).

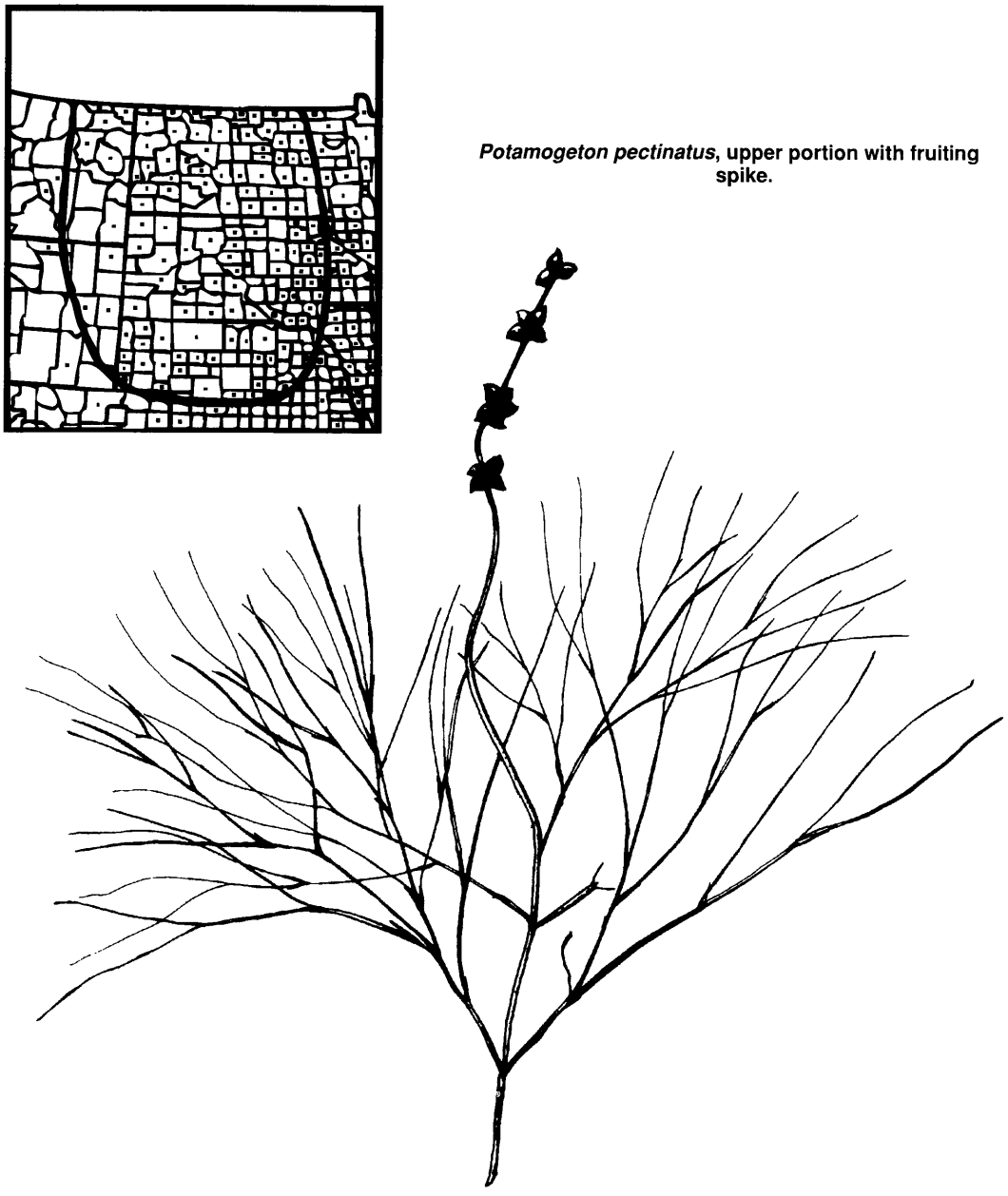




Potamogeton nodosus. **Submersed leaves are mostly or all deteriorated by this stage.**

13. *Potamogeton pectinatus* L. — Sago pondweed

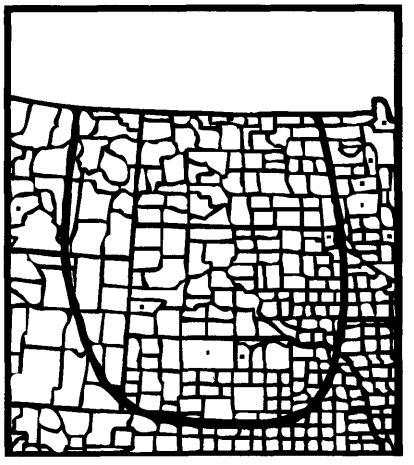
Stems terete, ca. 1 mm thick, or the main stem stouter on deep water forms, sparingly branched at the base, becoming freely dichotomously branched above, 3-10 dm long. **Leaves** all submersed, filiform to narrowly linear, 3-12 cm long, usually 0.2-1 mm wide, 1- to 3-nerved, acute, sometimes wider with obtuse tips early in the growing season or on plants from running water; **stipules** adnate to the base of the leaf blade for 1-3 cm, forming a sheath about as wide as the stem, occasionally wider on the main stem, especially in deep water forms. **Spikes** elongate, 1-5 cm long, with 2-5(7) unevenly spaced floral whorls; **peduncles** lax, filiform, to 15 cm long. **Fruits** yellowish to tawny, drying brown, obliquely obovoid, 2.7-4 mm long, rounded on the back, apiculate due to the style beak which is usually 0.3-0.5 mm long. Jun—Sep. Shallow to rather deep, fresh to subsaline water of lakes, ponds, marshes, ditches, rivers and streams; common and often abundant; (Nearly cosmopolitan).



***Potamogeton pectinatus*, upper portion with fruiting spike.**

14. *Potamogeton praelongus* Wulf. — Whitestem pondweed

Stems whitish, slightly compressed, 1.5-4 mm thick, sparingly branched, to 2-3 m long, the shorter internodes often zigzag. **Leaves** all submersed, oblong-lanceolate, 10-25(35) cm long, 1-3 cm wide, with 3-5 primary nerves, rounded and cucullate at the tip, the margin entire and somewhat undulate, sessile and weakly to strongly cordate-clasping at the base; **stipules** free, whitish, 1-3 cm long, fibrous, early shredding. **Spikes** dense, cylindric, 2.5-5 cm long; **peduncles** elongate and thickening upward, 10-40 cm long. **Fruits** greenish-brown, obovoid, 4-5 mm long, the dorsal keel sharp, the lateral ones obscure. Jun—Jul. Deep water of cold, clear lakes; rare and local from n ND to n NE; (Circumboreal, in N.Amer. s to CT, NY, IN, MN, NE, CO, UT and CA).



15. *Potamogeton pusillus* L. — Small pondweed, baby pondweed

Stems terete to subterete, 0.1-0.7 mm thick, simple to freely branching, 2-15 dm long. **Leaves** all submersed, linear, 0.9-6.5 cm long, 0.2-2.5 mm wide, 1- to 3(5)-nerved, acute to obtuse or apiculate at the tip, tapered to the sessile base; **stipules** free, brownish-green, 3-9 mm long, delicate and nonfibrous, soon decomposing; **glands** usually present at the base of the stipules. **Winter buds** sometimes produced, lateral or terminal, 0.9-3.2 cm long; **inner leaves** rolled into an indurate fusiform structure; **outer leaves** 1-3 per side, acute to obtuse, without corrugations at the base. **Spikes** short-cylindric to cylindric, 1.5-10 mm long; **floral whorls** 1-3(4), 1.2-4.7 mm apart; **peduncles** filiform to cylindric, 0.5-6 cm long. **Fruits** green to brown, obliquely obovoid, 1.5-2.2 mm long, rounded on the back, often concave on the sides. Jun—Aug. Shallow to deep water of lakes, ponds, marshes, ditches and streams, where water is fresh to brackish; common and often abundant; (Newf. to N.W.Terr., s throughout most of the U.S. and into Mex.; also Eurasia).

Two varieties, var. *tenuissimus* Mert. & Koch (*P. berchtoldii* Fieb.) and var. *pusillus*, occur in the region. By far the prevalent form is var. *pusillus*, characterized as follows: **Leaves** with up to 2 rows of lacunae along the midrib, apex acute, rarely apiculate; **stipules** mostly connate. **Spikes** usually of 2-4 verticels; **peduncles** filiform to cylindric, usually 1-3 per plant. **Mature fruit** widest above the middle, the sides concave, the beak positioned forward.

The var. *tenuissimus* is of limited occurrence in this region, occurring infrequently in the e part. It differs from var. *pusillus* as follows: **Leaves** with 1-5 rows of lacunae along the midrib, apex acute to obtuse; **stipules** mostly convolute. **Spikes** mostly of 1-2 adjacent verticels; **peduncles** cylindric, usually more than 3 per plant. **Mature fruit** mostly widest at or below the middle, the sides rounded, the beak positioned centrally.



16. *Potamogeton richardsonii* (Benn.) Rydb. — Claspingleaf pondweed

Stems brownish to yellowish-green, terete, 1-2.5 mm thick, sparingly to freely branched, mostly 3-10 dm long, the shorter internodes rarely zigzag. **Leaves** all submersed, ovate-lanceolate to lanceolate, 2-10 cm long, 1-2.5 cm wide, with 13-25 prominent nerves, rounded to acute and not cucullate at the tip, the margin entire and undulate-crisped, sessile and strongly cordate-clasping at the base; **stipules** free, 1-2 cm long, early shredding into whitish fibers. **Spikes** dense, cylindric, 1.5-4 cm long; **peduncles** strongly recurved in fruit, often thickening upward, 2-10 cm long. **Fruits** green to brown, obliquely obovoid, 2.5-3.5 mm long, rounded to faintly keeled dorsally. Jun—Aug. Shallow to moderately deep water of fresh to brackish lakes, ponds, marshes, reservoirs and slow-moving streams; common from the n part, s to n NE; (Labr. to AK, s to PA, IN, IA, NE, CO, UT and CA). *P. perfoliatus* L., misapplied.





***Potamogeton richardsonii*, a colony of flowering and fruiting plants.**

17. *Potamogeton strictifolius* Benn.

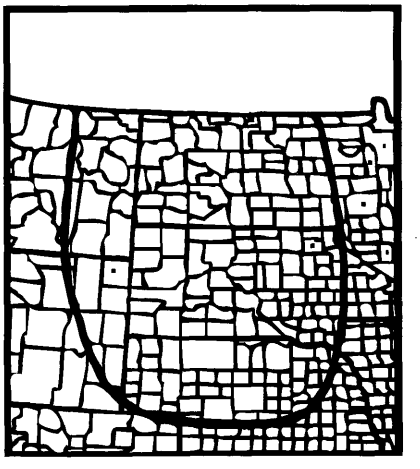
Stems mostly terete, 0.4-0.8 mm thick, simple or branched, to 1 m long. **Leaves** all submersed, linear, 1.2-6.3 cm long, 0.6-2 mm wide, 3- to 5(7)-nerved, acute to attenuate at the tip, the margin often revolute, tapered to the sessile base; **stipules** free, white, fibrous, shredding at the tip, 6-16 mm long; **glands** present at the base of the stipules. **Winter buds** common, terminal or lateral, 2.5-4.8 cm long; **inner leaves** undifferentiated from the outer ones; **outer leaves** 3-4 per side, acute, mostly without or rarely with corrugations at the base. **Spikes** cylindric, 6-13 mm long; **floral whorls** 3-4, 1.5-4.2 mm apart; **peduncles** cylindric, rarely slightly clavate, 1-4.5 cm long. **Fruits** greenish-brown, obovoid, 1.9-2.1 mm long, rounded on the back. Jul—Aug. Shallow water of ponds, lakes and slow streams; rare, reported from McHenry Co., ND, Cherry Co., NE and Albany Co., WY; (Newf. and Que. to Alta. and N.W.Terr., s to NY, OH, n IN, MN, n NE, WY and n UT).



18. *Potamogeton vaginatus* Turcz. — Sheathed pondweed

Stems terete, mostly 1-2 mm thick, freely branched above, to 1.5 m long. **Leaves** all submersed, filiform to narrowly linear, 2-8(30) cm long, 0.5-2 mm wide, 1(3)-nerved, the tip acute to obtuse or sometimes retuse; **stipules** adnate to the base of the leaf blade for 1-5 cm and sheathing the stem, the sheaths along the main stem inflated 2-5X the thickness of the stem. **Spikes** elongate, 3-6 cm long, with 5-12 evenly spaced floral whorls; **peduncles** slender and lax, to 10 cm long, often much surpassed by the upper leaves. **Fruits** dark green, obliquely obovoid, ca. 3 mm long, rounded on the back; stigma sessile, forming a low beak. Jul—Aug. Deep water of cold, clear lakes; occasional in the Turtle Mts., ND, otherwise collections from Day Co. SD and Crook Co., WY; (Newf. to AK, s to NY, WI, MN, SD, WY and OR; also Eurasia and Africa).

Deep water forms of *P. pectinatus*, especially those from wave swept areas, are often confused with *P. vaginatus*. In flowering or fruiting condition the two species are easily discerned by the number of floral whorls per spike and the shape of the fruit (beaked vs. nearly beakless). Unfortunately, deep water forms of *P. pectinatus* often do not flower and they tend to have stout stems sheathed by prominent, somewhat inflated stipules similar to *P. vaginatus*. The latter tends to have longer, more filiform leaves (much surpassing the spikes) than deep water forms of *P. pectinatus*, and the stipules are more prominently inflated.



19. *Potamogeton zosteriformis* Fern. — Flatstem pondweed

Stems strongly flattened, freely branched, to 1 m long. **Leaves** all submersed, linear, 5-15(20) cm long, 3-5 mm wide, many (15-35)-nerved, acute to cuspidate at the tip, sessile and slightly narrowed at the base; **stipules** free, usually whitish, fibrous and shredding with age,1-4 cm long. **Spikes** densely flowered, usually uncrowded in fruit, cylindric, 1-2.5 cm long; **peduncles** compressed, 1.5-10 cm long. **Fruits** dark green to brown, obliquely elliptic-ovoid, 4-4.5 mm long, the dorsal keel sharp and somewhat undulate or dentate, the lateral ones obscure. Jul—Aug. Shallow to deep water of lakes, ponds and marshes; locally common at scattered locations, throughout the region; (Que. and N.B. to B.C., s to VA, IN, IA, NE, MT, ID and n CA).

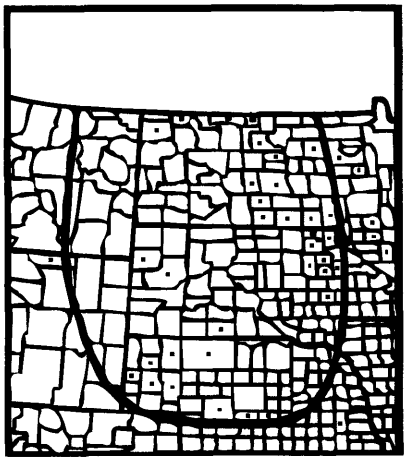


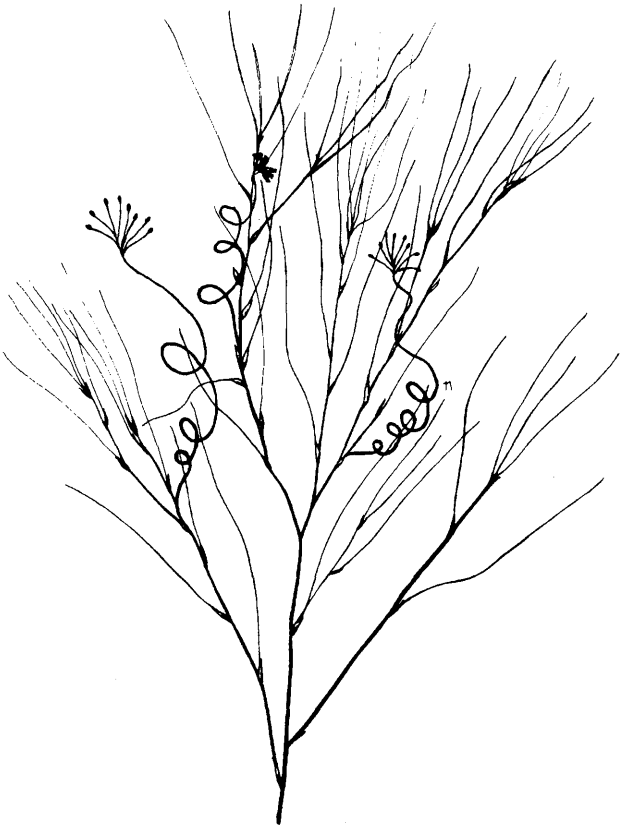
1. ***Ruppia*** L. — Ditch-grass, widgeon-grass

1. *Ruppia maritima* L.

Perennial submersed aquatic; **stems** slender and terete, flexuous, anchored by roots, branching at the base and short-branched above, to 6 dm long, the internodes often zigzag. **Leaves** simple, alternate, sessile, the blades filiform, attenuate, mostly 5-15(25) cm long, ca. 0.5 mm wide, stipular-sheathing at the base. **Inflorescence** a reduced axillary spike, included in the leaf sheath at anthesis; **peduncles** elongating and usually coiling as fruits develop. **Flowers** 2 per spike, perfect; **perianth** none or minute; **stamens** 2, briefly adherent during peduncle elongation; **carpels** 6 or more, separate, stipitate, the stipes gradually elongating from the common base so that the fruits are borne in an umbel. **Fruits** olive-green to black, ovoid, symmetrical to asymmetrical, beaked, 1.5-3 mm long. Jul—Aug. Alkaline to saline waters of lakes, ponds and marshes; locally common and scattered throughout the region; (Coastal marshes from N.Amer. to S.Amer. and in the Old World, also inland throughout Can. and the U.S., primarily in brackish or saline waters).

Two fairly distinct forms can be recognized in the region. The prevalent form is var. *occidentalis* (Wats.) Graebn., a robust, strongly rhizomatous plant with **leaf sheaths** 1.5-3 cm long. This variety often forms extensive grasslike mats in alkaline waters. A smaller form of lesser occurrence most closely fits var. *rostrata* Agardh., with **leaf sheaths** to 1 cm long. This form seems to favor waters of more extreme salinity.





Ruppia maritima.

57. **Najadaceae**, the Naiad Family

1. ***Najas*** L. — Naiad

Small, submersed, monoecious or dioecious, perennial herbs; **stems** flexuous, freely branched, anchored by roots. **Leaves** simple, opposite, sessile, abruptly broadened at the base to sheath the stem, the margins faintly to coarsely toothed. **Flowers** minute, imperfect, solitary and sessile in the leaf axils, enclosed by the sheathing leaf bases; **male flowers** consisting of a single anther enclosed in a membranous envelope, this in turn surrounded by a firmer, entire to 4-lobed, perianthlike structure; **female flowers** comprised of a single, 1-ovuled pistil, stigmas 2-4, style usually elongate and persistent. **Fruit** a fusiform achene, the pericarp thin and easily removed to expose the single ellipsoid seed.

Reference:

Clausen, R. T. 1936. Studies in the genus *Najas* in the northern United States. Rhodora 38:333-345.

1 Leaves coarsely spinulose-toothed; seeds 4-5 mm long . . . . . 3. *N. marina*

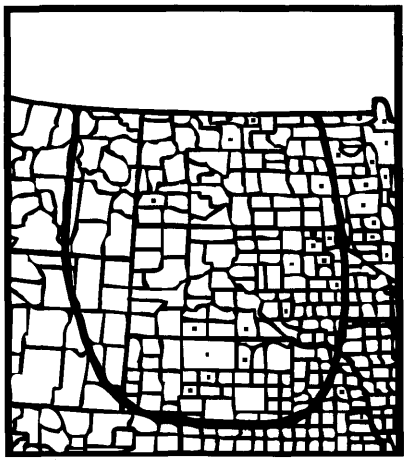
1 Leaves very faintly toothed; seeds 2-3 mm long.

2 Seed coat (under the thin pericarp) shiny, very faintly reticulate, with 30-40 rows of obscure pits across the middle; style beak of achene 1 mm or more long . . . . . 1. *N. flexilis*

2 Seed coat rather dull, coarsely reticulate, with 10-20 rows of pits across the middle; style beak of mature achene 0.5 mm or less long . . . . . 2. *N. guadalupensis*

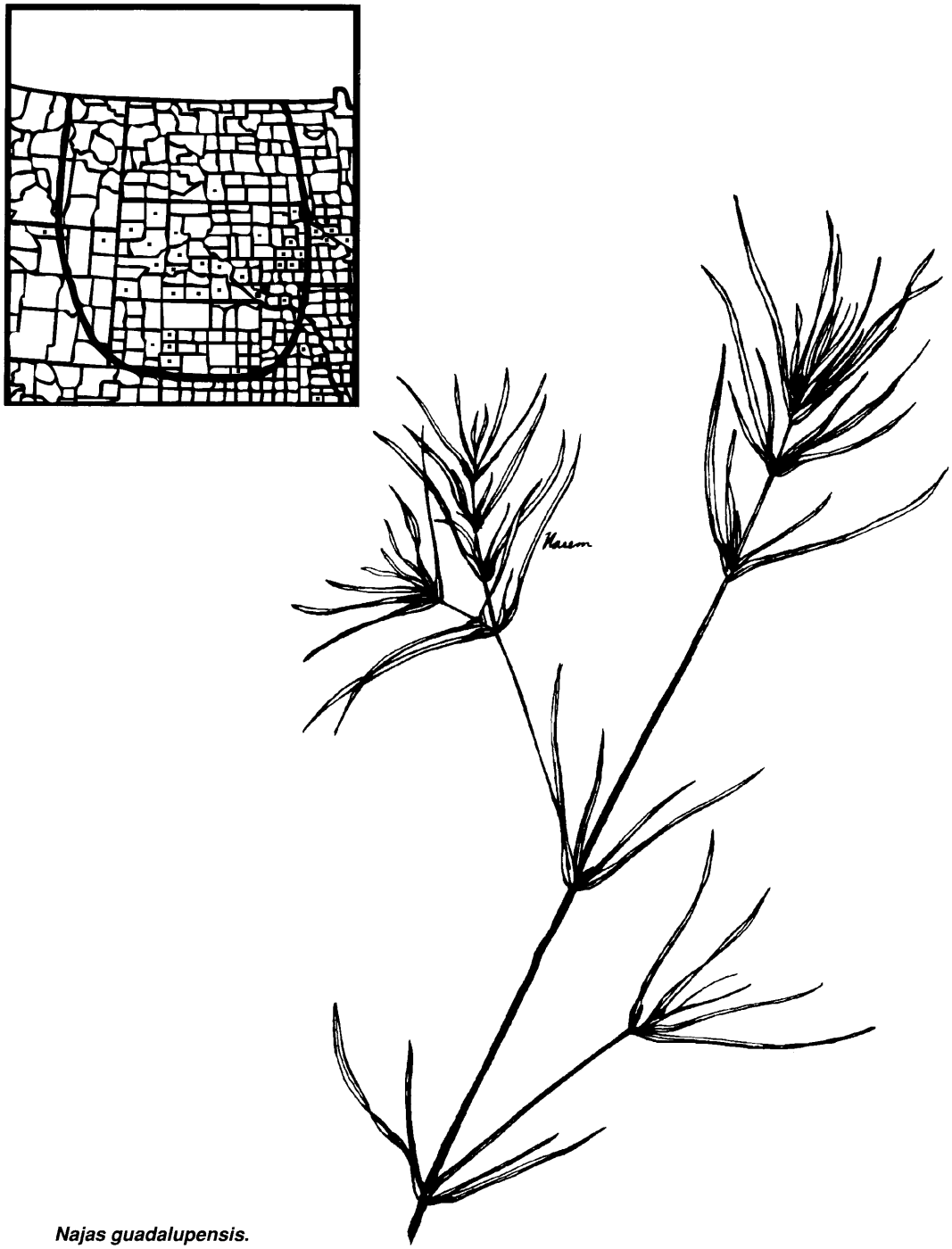
1. *Najas flexilis* (Willd.) Rostk. & Schmidt

Plants monoecious; **stems** branching, 5-30 cm long. **Leaves** densely clustered at stem tips, linear, attenuate, minutely spinulose on the margins, 1-3 cm long, 0.3-0.7 mm wide. **Achenes** olive-green to reddish, the beak 1 mm or more long. **Seeds** 2.5-3 mm long, 1/3 as thick, the seed coat shiny, very faintly reticulate, with 30-40 rows of obscure pits across the middle. Jul—Sep. Fresh or calcareous water of lakes and ponds; uncommon and local at scattered locations, mainly in the e and c parts; (Newf. and Que. to se Man., s to MD, IN, IA and NE; also B.C. and n Alta., s to ID and CA).



2. *Najas guadalupensis* (Spreng.) Magnus. — Southern naiad

Plants monoecious; **stems** branching, 10-30 cm long. **Leaves** linear, acute, minutely spinulose, 1-2 cm long, 0.4-0.8 mm wide; fascicles of smaller leaves appearing in the axils. **Achenes** brown or purplish, the beak 0.5 mm or less long at maturity. **Seeds** 2-3 mm long, 1/4 as thick, the seed coat rather dull, coarsely reticulate, with 10-20 rows of pits across the middle. Jul-Sep. Shallow water of marshes, ditches, lakes and impoundments; frequent over most of SD, NE and e WY, otherwise rare; (MA and s Que. to MN, ND, WY and OR, s to Mex., C. and S.Amer.).



Najas guadalupensis.

3. *Najas marina* L.

Plants dioecious; **stems** freely branched, 2-5 dm long, the internodes often spinulose. **Leaves** linear, coarsely spinulose-toothed, sometimes spinulose on the back, 10-20 mm long, 2-4 mm wide (including the teeth), the teeth triangular, projecting 0.5-1 mm, 1-4 mm apart. **Achenes** olive-green, the beak 0.5-1.5 mm long. **Seeds** 4-5 mm long, 1/2 as thick, finely reticulate. Jul—Sep. Shallow water of brackish lakes and marshes; rare, with collections from Lake Elsie and Mud Lake, Richland Co., ND; also in some lakes of w MN; (Nearly cosmopolitan, but quite localized in N.Amer.; NY, FL, TX, UT, AZ, NV and CA, as well as our area).

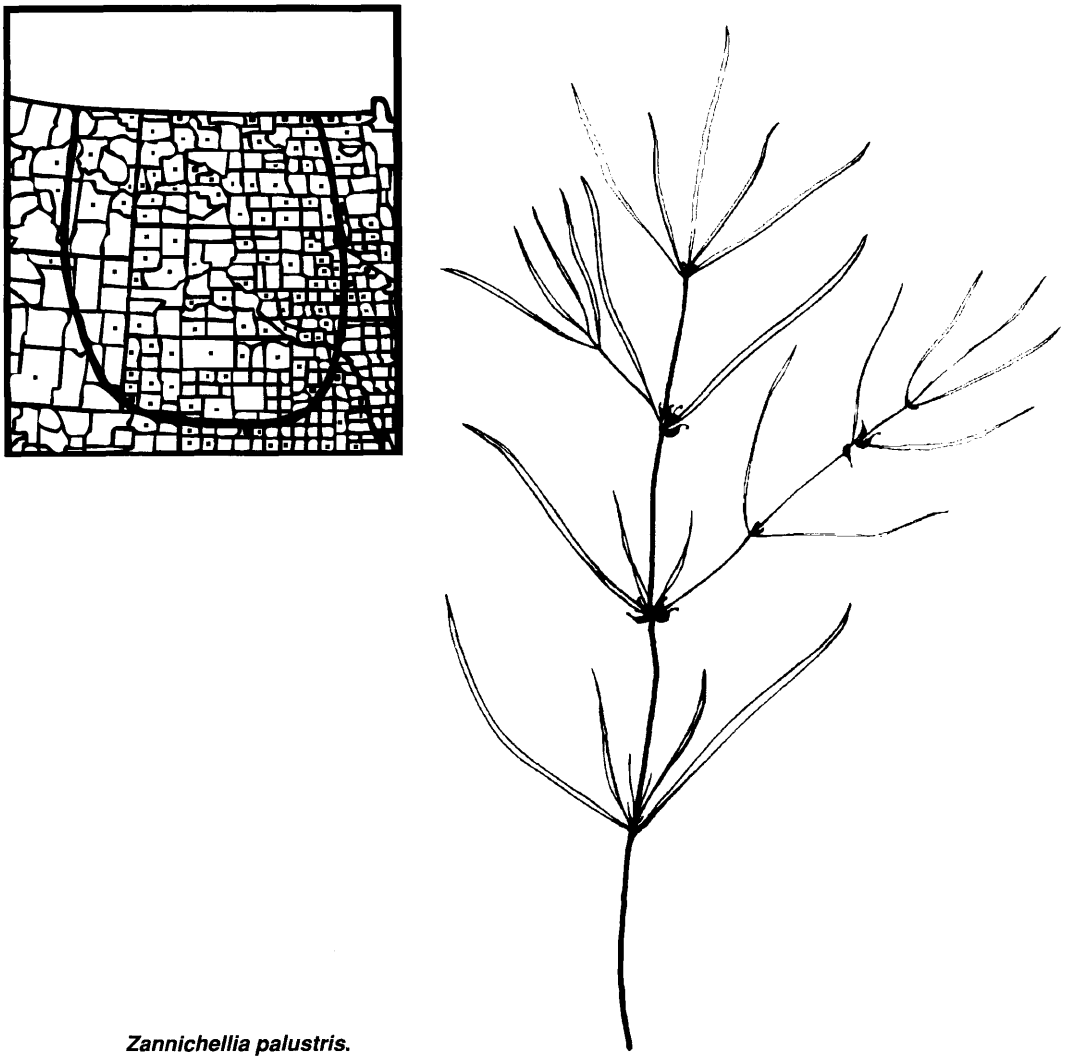


58. **Zannichelliaceae**, the Horned Pondweed Family

1. ***Zannichellia*** L. — Horned pondweed

1. *Zannichellia palustris* L.

Monoecious, perennial, submersed aquatic, often forming extensive mats; **stems** thin and flexuous, densely leafy, freely branched from the base, anchored by roots, 0.5-5 dm long. **Leaves** simple, opposite, sessile, filiform, 1.5-6 cm long, ca. 0.5 mm wide; **stipules** membranous and soon disappearing. **Flowers** highly reduced, one staminate and typically 4(1-5) pistillate flowers at each node; **perianth** none; **staminate flower** consisting of a solitary anther raised on a short, slender filament; **pistillate flowers** located in the same or opposite the axil containing the staminate flower, sessile or short-peduncled as a group, surrounded by a cup-shaped, membranous bract, each flower comprised of a single fusiform carpel with a peltate stigma. **Fruits** often abundantly produced, drupelike, stipitate, mostly 2-4 per node, brown to reddish-brown, crescent-shaped, narrowly undulate to serrate on the keeled edges, 3-5 mm long, including the 1-2 mm long persistent style, ca. 1 mm wide. Jun—Aug. Fresh to brackish water of streams, reservoirs, lakes, ponds, marshes and ditches; common throughout; (Coastal and inland N.Amer.; also S.Amer., Eurasia and Africa).



Zannichellia palustris.

59. **Araceae**, the Arum Family

Rhizomatous perennials of bogs and swamps. **Inflorescence** scapose, consisting of a fleshy cylindric **spadix** subtended by a leaflike or bractlike **spathe**. **Flowers** small, crowded on the spadix, perfect or mostly so (in those included here); **perianth** of 6 tepals or absent; **stamens** 6, anthers short and broad, filaments flat and appressed to the ovary; **pistil** 1- to 3-carpellary, stigma sessile, ovary superior. **Fruit** dry or fleshy, gelatinous within, containing 1-few seeds.

1 Leaves linear; spathe green, appearing as a leaflike extension of the scape, the spadix thus appearing lateral . . . . . 1. *Acorus*

1 Leaves petioled with broadly heart-shaped blades; spathe white, clearly differentiated from the scape, the spadix terminal . . . . . 2. *Calla*

1. *Acorus calamus* L.

Moderately tall, reedlike plant from stout rhizomes; fresh foliage and rhizomes sweetly fragrant when crushed. **Leaves** linear, acute-tipped, 5-15 dm long, 5-20 mm wide, rather tough and leathery, the margins scarious toward the base. **Scape** arising lateral to the leaves, tyigonous; **spathe** appearing as a leaflike extension of the scape, often as long as the scape itself, reaching about as high as the leaves; **spadix** protruding laterally from the juncture of the scape and spathe, erect or ascending, long-cylindric, 5-10 cm long, 5-10 mm thick at anthesis, to 20 mm thick in fruit. **Flowers** perfect, yellow or brownish, perianth of 6 chartaceous tepals, deciduous; **pistil** 2- or 3-carpellary. **Fruit** obpyramidal, hard and dry, 1- to 3-seeded. Jun—Jul. Bogs, marshes and stream margins; frequent in ne SD, otherwise rare and scattered from c and e ND to c and se NE; (Intro. from Europe and widely established in N.Amer. from N.S. and Que. to Alta., s to FL, TX, CO, n ID and WA; also Asia).

The distribution of *A. calamus* in the northern Great Plains probably reflects patterns of introduction from the east by eastern plains Indian tribes who used the plant for medicinal and religious purposes.



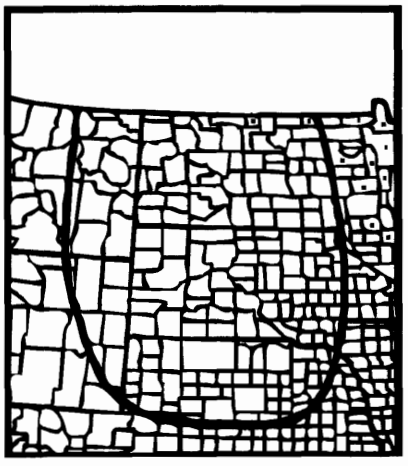


Acorus calamus.

2. *Calla* L. — Water arum

1. *Calla palustris* L.

Arising from thick sprawling rhizomes, the rhizomes buried in mud or floating under the water surface. **Leaves** petioled, the blades broadly heart-shaped, cordate, mucronate at the tip, 5-15 cm long, about as wide as long; **petioles** stout, flaccid when submersed, 5-20 cm long, often longer when submersed. **Scape** resembling the petioles; **spathe** and **spadix** terminal, the spathe clearly differentiated from the scape, white, ovate, caudate at the tip, exceeding or about equaling the mature spadix; **spadix** borne on a short stipe, short-cylindric, 3-4 cm long in fruit, 2-3 cm thick. **Flowers** perfect or the uppermost staminate; **perianth** none; **pistil** simple. **Fruit** a fleshy berry, ripening red, 8-12 mm long, containing few seeds. Jun—Jul. Bogs and swamps; rare in ND, with local populations in Pembina and Rolette Counties; (Circumboreal, in N.Amer. s to MD, IN, IA, n ND and nw to c AK).





Calla palustris.

60. **Lemnaceae**, the Duckweed Family

Small or minute thalloid plants with bodies not differentiated into stems and leaves, free-floating on or beneath the water surface.* **Thalli** reproducing vegetatively by budding from one or two pouches on the sides, the parent thallus and budded thalli often cohering in groups of 2-several, each thalloid segment commonly referred to as a "**frond**." **Roots**, if present, 1-several hanging down from near the center on the underside of each frond, short, unbranched, fine. **Flowers** rarely present, imperfect, contained in tiny reproductive pouches or pits at the edge (*Lemna*, *Spirodela*) or on the upper surface (*Wolffia*) of the frond, subtended by a spathe within the reproductive pouch; **perianth** none, staminate flowers 1 or 2, each comprised of a single anther on a short filament; **pistillate flower** 1, contained in the same pouch as the staminate flower(s), consisting of a single flask-shaped ovary. **Fruit** a utricle containing 1-few seeds.

References:

Clark, H. L. and J. W. Thieret. 1968. The duckweeds of Minnesota. Michigan Bot. 7:67-75

Daubs, E. H. 1965. A monograph of Lemnaceae. Illinois Biol. Monogr. 34:1-118.

Hartog, C. den and F. van der Plas. 1970. A synopsis of the Lemnaceae. Blumea 18:355-368.

Landolt, E. 1980. Biosystematic investigation of the family of duckweeds (Lemnaceae), vol. 1. Veroff. Geobot. Inst. ETH, Stiftung Rubel, Zurich, 70:1-247.

1 Fronds thickened, less than 1.5 mm long, lacking roots . . . . . 3. *Wolffia*

1 Fronds flat, mostly longer than 1.5 mm long, with 1-several roots trailing from the lower side.

2 Each frond with 3 or more roots; underside of the frond solid purple . . . . . 2. *Spirodela*

2 Each frond with a single root; underside of the frond green or purple-tinged or mottled . . . . . 1. *Lemna*

*The aquatic liverworts, *Riccia* and *Ricciocarpus* are occasionally encountered in fresh waters of this region. These nonvascular plants resemble the duckweeds in size and growth habit and, in fact, are sometimes collected with duckweeds. *Riccia fluitans* appears as a very narrow (ca. 1 mm wide), bifurcating, ribbonlike thallus, free-floating and lacking rhizoids. *Ricciocarpus natans* has a broadly lobed rosette form with numerous rhizoids on the underside. When stranded on mud, the thallus is nearly radially symmetric with the rhizoids anchored in the substrate. The free-floating form is more bilaterally symmetric with conspicuous reddish rhizoids trailing beneath the thallus.

Fronds solitary or more often 2-several attached in small thalloid colonies, floating on the water surface or (in *L. trisulca*) submersed, the individual fronds orbicular, ovate, obovate or oblong in shape, sometimes stipitate (*L. trisulca*), all green or often tinged or mottled with red (purple when dried), (1-)3(-5)-nerved, flat to slightly convex on the upper surface, often with one or more papillae (projections) over the midnerve or near the apex, flat or convex to strongly inflated on the underside. **Roots** one per frond (sometimes absent on oldest and youngest fronds), with a short sheath at the base and a usually prominent root cap. **Reproductive pouches** 2 per frond, one on each lateral margin. **Flowers** rarely produced, consisting of usually 2 stamens (male flowers) and a single pistil (female flower) in each pouch. **Fruits** 1- to several-seeded. Reproduction mostly by budding of new fronds from the reproductive pouches, sometimes producing thickened, rootless turions that sink to the bottom during unfavorable periods.

The entire duckweed family has recently been studied on a worldwide basis by Prof. E. Landolt (op. cit.) of the Geobotanical Institute in Zurich. As a result of his investigation, it appears that the surface-floating *Lemna* species (i.e., excluding *L. trisulca*, an essentially submersed species) are more diverse than traditionally viewed by authors. Most significantly, populations that have previously passed for *L. minor* in this region are predominately *L. turionifera* according to Landolt. Recognition of the latter seems reasonable in light of its unique ability to form small turions which sink to the bottom under unfavorable conditions. This is no doubt an important adaptation for overwintering in this part of the country. *L. minor* does occur as far north in the Great Plains as s and possibly e SD, but even in the s part of our range, *L. turionifera* is prevalent. Unfortunately morphological distinction between *L. minor* and *L. turionifera* is often difficult and one cannot discount the possibility of mixed populations.

Five other surface-floating species of *Lemna* occur within or at the s edge of this region, but these are uncommon and local in occurrence. Some occurrences may well represent temporary introductions by waterfowl. These species include *L. aequinoctialis*, *L. gibba*, *L. minuscula*, *L. obscura* and *L. perpusilla*. In the interest of completeness, these species verified for the northern Great Plains by Landolt are also included here.

The key that follows is based on Landolt's treatment and necessarily uses some minute characteristics to make distinctions between species. Fruits are valuable for identifying species of *Lemna* but are rarely present so that most identifications must be based on vegetative traits. For studying internal and some external details of duckweed fronds, Landolt (personal communication) recommends clearing some thalli of pigment by boiling for 2 minutes in a 70% alcohol solution. This enables one to see veins, papillae (on the upper surface of fronds) and air cavities within the fronds more clearly under magnification. Because the production of anthocyanin pigment is of taxonomic importance, uncleared material should also be saved and checked for the presence or absence of red (or purplish when dried) coloration. For purposes of preservation, duckweeds and other Lemnaceae can be pressed and dried like other plants. Their small size suits them well for storage in paper packets or envelopes.

Since duckweeds can colonize calm or slow-moving water almost anywhere (provided salt concentrations are not excessive), it would be meaningless to describe specific habitats for them. Their success is more dependent upon micro- rather than macrohabitat factors . Thus habitat descriptions are omitted from the species treatments that follow. Also, flowering periods are not given as flowering is so rare and sporadic.

1 Fronds denticulate toward the apex, tapered to a slender stipitate base, the stipe often as long as the main body and commonly attached to the parent frond; colonies star-shaped, usually submersed . . . . . 7. *L. trisulca*

1 Fronds entire on the margin, nearly rounded and not obviously stipitate at the base, solitary or in tight colonies, these not star-shaped, floating on the water surface or stranded on mud.

2 Fronds obscurely 1-nerved . . . . . 4. *L. minuscula*

2 Fronds 3- to 5-nerved.

3 Root sheath winged at the base; root tip sharply pointed; roots not longer than 3 cm; fronds completely green.

4 Fronds very often with 2-3 papillae in a row on the upper surface above the node (the level at which daughter fronds attach); seeds whitish, with 35-60 faint ribs, not escaping the fruit wall when ripening; . . . . . 6. *L. perpusilla*

4 Fronds with only 1 prominent papilla above the node; seeds brownish, with 8-22 prominent ribs, falling out of the fruit wall when ripening . . . . . 1. *L. aequinoctialis*

3 Root sheath not winged at the base; root tip mostly rounded; roots often longer than 3 cm; fronds often red-tinged beneath or with red spots on either surface.

5 Fronds with several about equal sized, small papillae on the upper surface from the midline to the tip (often obscure), very often red-tinged on the lower surface, forming small, obovate to orbicular, rootless, dark green to brown turions under unfavorable conditions, these sinking to the bottom of the water . . . . . 8. *L. turionifera*

5 Fronds lacking papillae or with one prominent papilla at the apex and another just above the node and with smaller papillae between them, rarely forming turions; if formed, the turionlike fronds have short roots and are slowly forming daughter fronds.

6 Fronds very often gibbous, strongly convex and obviously inflated beneath, with air spaces often larger than 0.3 mm in diameter, very often 4- to 5-nerved with the nerves all arising from the same point at the node; ovules 1-6; fruit winged . . . . . 2. *L. gibba*

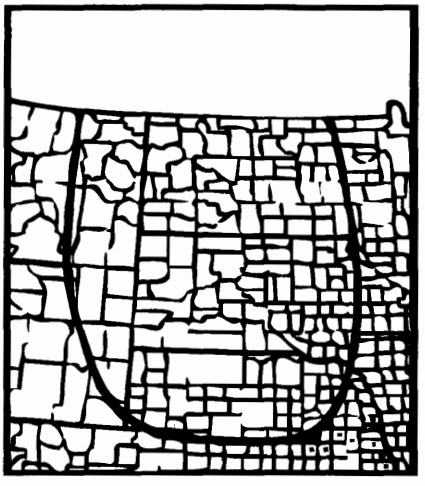
6 Fronds flat to slightly convex beneath, not inflated, with air spaces less than 0.3 mm in diameter, rarely with more than 3 nerves, but if 4- to 5-nerved, then the outer nerves arising at the base of the inner ones; ovule 1; fruit wingless.

7 Papilla at apex of the frond very prominent; fronds often red beneath . . . . . 5. *L. obscura*

7 Papilla at apex of the frond not very prominent; fronds never red beneath . . . . . 3. *L. minor*

1. *Lemna aequinoctialis* Welw.

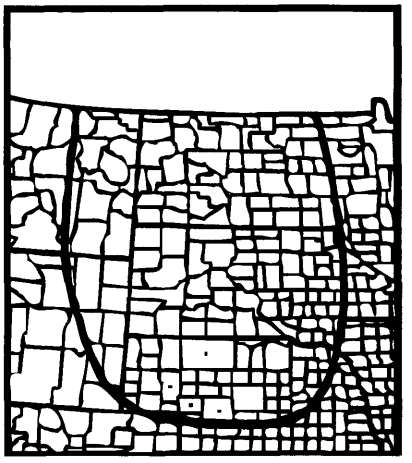
Very similar to *L. perpusilla* (see below) except with only **1 prominent papilla** above the node on the upper surface. **Seeds** brownish, with 8-22 prominent ribs, falling from the fruit at maturity. Uncommon in se NE; (Tropical to mild temperate regions of the world).



2. *Lemna gibba* L.

Fronds orbicular to obovate, 2-5(6) mm long, symmetric or not, green to yellowish-green, often red-tinged or mottled on both surfaces, 3- to 5-nerved, when 4- to 5-nerved the lateral and inner nerves diverging from the same point at the node; **upper surface** flat to slightly convex, with a prominent central papilla and usually a row of smaller papillae extending to near the apex, lacking a prominent papilla at the apex (except for small fronds); **lower surface** convex to very often much inflated (gibbous), with air spaces in 2 layers, those of the bottom layer often more than 0.3 mm in diameter. **Turions** not produced, or if turionlike fronds are present, then these have short roots and are slowly growing daughter fronds. **Root sheath** not winged, root tip mostly rounded. **Fruit** ovoid to ellipsoid, with lateral wings 0.1-0.2 mm wide; **seeds** (1)2-6, ovoid to ellipsoid. Rare, w NE; (In mild climates over most of the world except S.Amer. and Australia).

Although this species and the following are distinct in fruiting condition, they are often difficult to tell apart vegetatively. This is especially true when dealing with the occasional uninflated forms of *L. gibba*.



3. *Lemna minor* L.

Fronds nearly orbicular to elliptic-obovate, broadest near the middle, 2-4 mm long, symmetric or nearly so, green to yellowish-green, never red-tinged or mottled on either surface, obscurely 3(-5)-nerved, when 4- to 5-nerved (rare) the lateral nerves arising near the base of the inner ones; **both surfaces** flat to weakly convex, the upper surface with a low papilla at the apex and often one above the node, usually with a low median ridge or row of smaller papillae between them, the lower surface never inflated, with air spaces in 2 layers but these less than 0.3 mm in diameter. **Turions** not produced. **Root sheath** not winged, root tip rounded. **Fruit** ovoid to ellipsoid, wingless, 1-seeded. Frequent, s SD and NE, possibly rare in e SD; (Cool regions of N.Amer., Europe, Africa, Australia and all but eastern Asia, absent from S.Amer.).

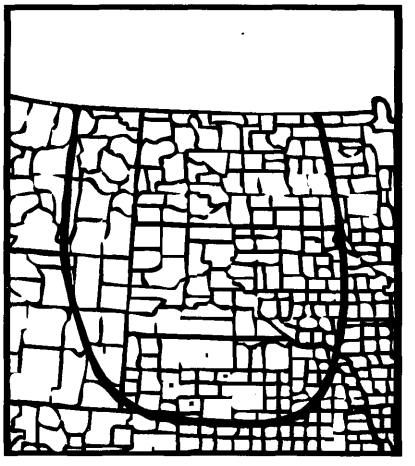
In this region, *L. minor* may be limited relative to *L. turionifera* by its inability to form turions. The few collections we have from s SD come from waters kept warm through the winter by active springs.



4. *Lemna minuscula* Herter

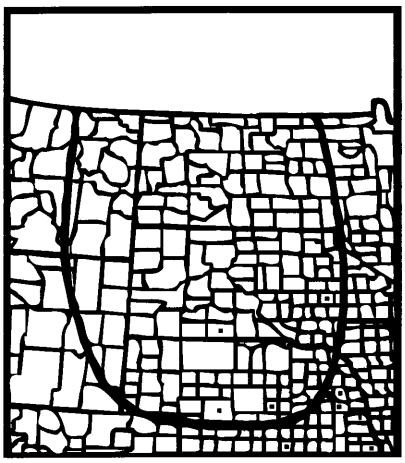
Fronds oblong to elliptic or somewhat ovoid, 1-2.5 mm long, symmetric or slightly asymmetric at the base, pale green, obscurely 1-nerved (the nerve often nearly obsolete), thin, with only 1 layer of air spaces, hyaline around the margin, flat to slightly convex on both surfaces, sometimes with a few low papillae on the upper surface. **Turions** not produced. **Root sheath** not winged; root tip pointed. **Fruit** not winged, 1-seeded. Rare, w NE Sandhills; (w U.S. and S.Amer.; intro. in Europe). *L. minima* Phil., *L. minuta* H.B.K.

This species is sometimes included in *L. valdiviana* Phil., a primarily coastal entity that has been recorded no closer to us than e KS. *L. valdiviana* differs in having longer, more prominently 1-nerved fronds which are strongly asymmetric at the base.



5. *Lemna obscura* (Austin) Daubs

Quite similar to *L. minor* and differing mainly as follows: **Fronds** obovate to oblong-orbicular, 1.5-3(3.5) mm long, slightly asymmetric, often reddish beneath, obscurely 3-nerved; **upper surface** flat to slightly convex, with a prominent **papilla** at the apex, the **lower surface** convex. Uncommon, s and se SD, e and c NE; (e and s U.S. and Mex., also HI).



6. *Lemna perpusilla* Torr.

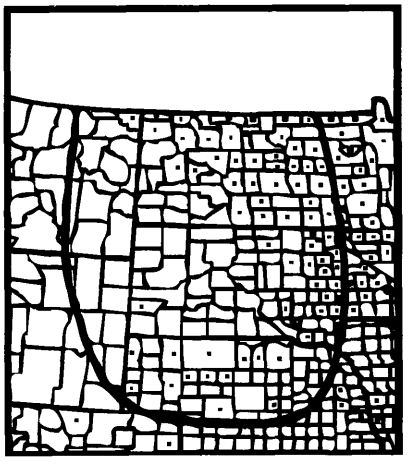
Fronds obovate to elliptic, 1-3.3 mm long, oblique at the apex and asymmetric at the base, light green, not reddish, obscurely 3-nerved; **upper surface** slightly convex, with a prominent apical papilla and very often with 1 or 2 others along the midnerve; **lower surface** flat to slightly convex, with large air spaces in 1 layer. **Turions** not produced. **Root sheath** with lateral wings; root tip sharply pointed. **Fruit** obliquely attached in the pouch; **seeds** whitish, with 35-60 faint ribs, not escaping the fruit wall when ripening. Rare, barely entering the s part, with 1 collection from Hall Co., NE; otherwise KS and s; (e N.Amer., from MA to NE, s to FL, TX, AZ and into Mex.).

This species flowers and fruits more freely than other duckweeds. It probably occurs in this region only temporarily.



7. *Lemna trisulca* L. — Star duckweed

Fronds usually several to many, attached to form star-shaped colonies, often dense and tangled to form submersed mats, floating at the surface only when flowering, individual fronds oblong-elliptic to oblong-lanceolate, denticulate toward the apex, 5-20 mm long including the slender stipitate base, the stipe often as long as the main body and attached to the parent frond, shorter on flowering specimens; **frond body** symmetrical, dark to pale green and translucent, often reddish or blackish, faintly 3-nerved, flat on both surfaces, the air spaces small and obscure. **Turions** not produced. **Root** deciduous and thus often lacking on some fronds, the sheath not winged, root tip pointed. **Fruit** 1-seeded. Common except in the w and extreme s parts; (Temperate zones of the N. Hemisphere).



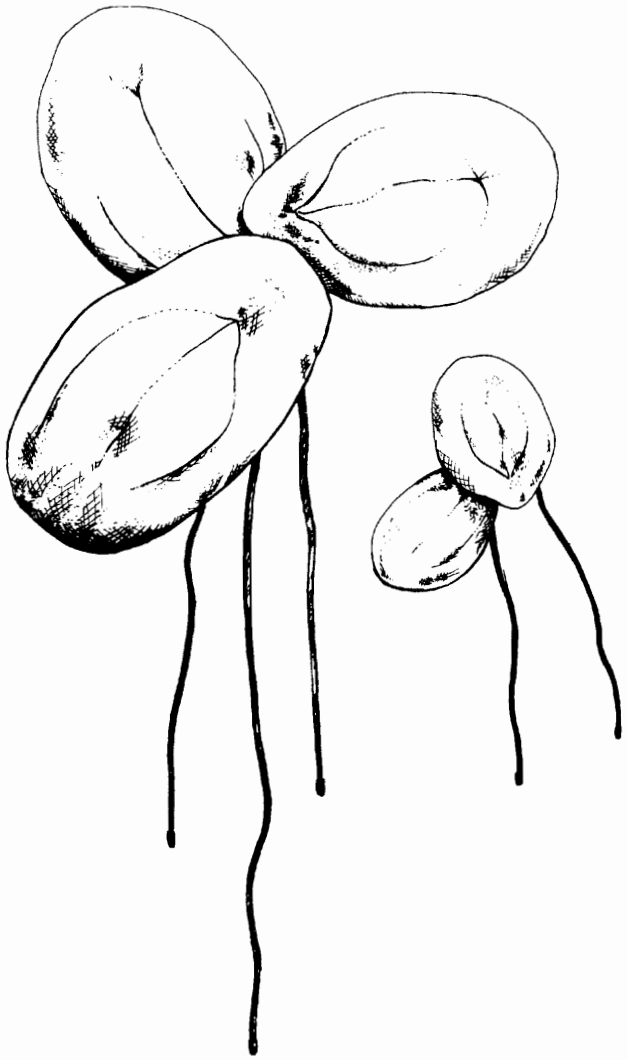


Lemna trisulca.

8. *Lemna turionifera* Landolt

Very similar to *L. minor* and often difficult to distinguish from it, differing mainly as follows: **Fronds** often somewhat asymmetric and falcate, broadest toward the apex, often red-tinged beneath and sometimes red-mottled above; **upper surface** with several papillae of about equal size above the midline, these sometimes obscure. **Turions** produced under unfavorable conditions, appearing as small, obovate to orbicular, thick-textured fronds that lack roots, dark green (often strongly reddened) to brown, eventually breaking free of the parent frond and sinking to the bottom. Very common; (c and w N.Amer., c and e Asia).



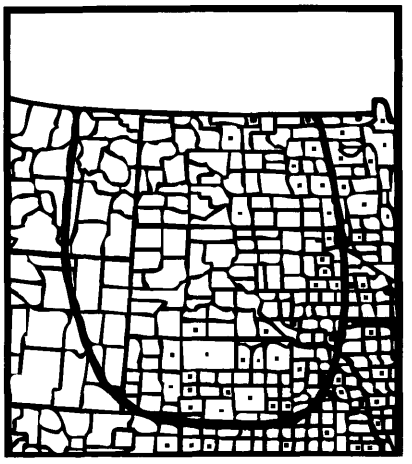


Lemna turionifera.

2. ***Spirodela*** Schleid. — Duck-meat

1. *Spirodela polyrrhiza* (L.) Schleid.

Fronds flat, orbicular to obovate, green above, dark red or purple beneath, floating on the surface, 3-6 mm long, usually in clusters of 2-5. **Roots** mostly 4-9 per frond. **Reproductive pouches** 2, one on each lateral margin of the frond **Flowers** rare, comprised of 2 or 3 stamens (male flowers) and 1 pistil (female flower) in each pouch. **Fruit** small-winged, 2-seeded. Reproduction mainly by budding of new fronds from the reproductive pouches. Stagnant or slow-moving fresh water; frequent from e and c ND to NE; (Cosmopolitan).





Spirodela polyrrhiza.

3. ***Wolffia*** Horkel — Water-meal

Minute, thalloid, rootless plants floating at or just beneath the surface, often abundant and forming a granular scum on the water surface, usually mixed with other Lemnaceae; **fronds** flat on the upper surface (in those included here), solitary or often paired. **Reproductive pouch** 1, near the base of the frond. **Flowers** rare and very minute, consisting of 1 stamen (male flower) and 1 pistil (female flower) in the pouch. **Fruit** globose, 1-seeded. Reproduction mainly by budding.

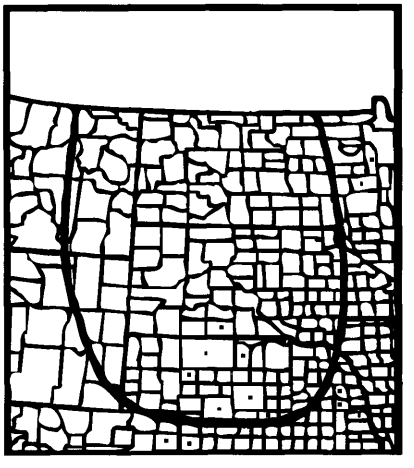
These plants are the smallest of all flowering plants and are easily overlooked in mixed culture with larger duckweeds. The tiny thalli are fairly easily detected by their granular or mealy feel to the touch and their tendency to adhere to the skin as the hand is withdrawn from the water.

1 Fronds ellipsoid to oblong when viewed from above, 1 1/3 - 2X longer than wide, with a raised pointed apex, usually brown-punctate when dried . . . . . 1. *W. borealis*

1 Fronds orbicular to broadly ovoid when viewed from above, 1-1 1/3X longer than wide, not raised and pointed at the apex, not brown-punctate . . . . . 2. *W. columbiana*

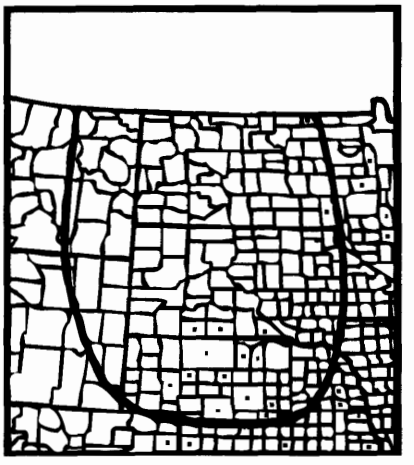
1. *Wolffia borealis* (Engelm.) Landolt

Fronds ellipsoid to oblong when viewed from the upper side, 0.7-1.2 mm long, shaped somewhat like a deep boat when viewed from the side, with a raised pointed apex, dark green on the flat upper surface, lighter green in the thick lower portion, usually brown-punctate when dried. Calm, fresh water; often occurring with the following species; extreme s SD and NE; (NH to Ont., MN and SD, s to FL, TX and CO; also WA, OR and the W. Indies). *W. punctata* Griseb.



2. *Wolffia columbiana* Karst.

Fronds orbicular to broadly ovoid when viewed from above, 0.7-1.4 mm long, with a small, flattened upper surface, otherwise nearly globose or ovoid when viewed from the side, not raised and pointed at the apex, green throughout and not brown-punctate. Calm, fresh water; extreme e ND, s SD and NE; (ME to Ont. and ND, s through the e and c U.S. and into Mex. and n S.Amer.; also CA).



61. **Juncaceae**, the Rush Family

1. ***Juncus*** L. — Rush

Tufted or rhizomatous grasslike plants, mostly perennial; **culms** elongate, simple, erect; rhizomes often strongly developed. **Leaves** cauline or mainly basal, alternate and usually 3-ranked, reduced to sheathing at the base of the culm in some spp.; **blades**, if present, terete and often nodulose-septate, or flat to involute; **sheaths** broader than the blades, commonly with a pair of auricles at the summit. **Inflorescence** a compact to open cyme of few to many flowers, subtended by 1-few leaflike involucral bracts, the **flowers** borne singly on pedicels or grouped into glomerules of few to many; each subtended by 1 or 2 **bracteoles**. **Flowers** perfect, regular; **perianth** of 6 chaffy tepals, these green to purplish-brown, persistent, scalelike; **stamens** 6 or 3; **carpels** 3, united, stigmas 3, ovary superior, 1- or 3-celled, with parietal or axile placentation, ovules numerous. **Fruit** a many-seeded, 3-valved and often 3-angled capsule, 1-locular to completely 3-celled; **seeds** ovoid to oblong, apiculate or with membranous, taillike appendages at both ends.

Reference:

Weigand, K. M. 1900. *Juncus tenuis* Willd. and some of its North American allies. Bull. Torrey Bot. Club 27:511-527.

1 Flowers individually pedicelled, each subtended by a pair of membranous bracteoles; leaves flat to involute or terete and narrowly channeled on the upper side, never septate, or the leaves bladeless, reduced to basal sheaths.

2 Leaves comprised of bladeless basal sheaths; involucral leaf erect, resembling a continuation of the culm, the inflorescence appearing lateral . . . 3. *J. balticus*

2 Leaves with blades; inflorescence terminal.

3 Plants annual; inflorescence making up 1/3 or more of the height of the plant . . . . . 5. *J. bufonius*

3 Plants perennial, often rhizomatous; inflorescence proportionately much smaller.

4 Leaves, except the involucres, all basal or nearly so, arising from well within the lower 1/4 of the stem.

5 Leaf blades terete, narrowly channeled on the upper side; capsule exceeding the perianth; seeds ca. 1 mm long, with a membranous appendage at each end . . . . . 18. *J. vaseyi*

5 Leaf blades flat or involute; capsule shorter than the perianth; seeds 0.3-0.5 mm long, merely minutely apiculate at each end.

6 Auricles flaplike, prolonged 1-5 mm beyond the summit of the sheath . . . . . 16. *J. tenuis*

6 Auricles not flaplike, low and rounded, only to 0.5 mm long.

7 Auricles cartilaginous, drying yellowish; bracteoles obtuse to subacute; leaf sheaths green, usually not reddish . . . . . 8. *J. dudleyi*

7 Auricles membranous, white or spotted with red or brown; bracteoles acute to acuminate or aristate; lower leaf sheaths often reddish . . . . . 11. *J. interior*

4 Leaves cauline as well as basal, some arising from near or within the upper 1/2 of the stem.

8 Capsule equaling or barely surpassing the outer tepals; stamens nearly reaching the summit of the perianth . . . . . 10. *J. gerardii*

8 Capsule much surpassing the outer tepals; stamens reaching the middle of the perianth . . . . . 7. *J. compressus*

1 Flowers grouped into glomerules of few to many, each subtended by a single bracteole; leaves terete or flat, often nodulose-septate.

9 Leaf blades flat, not hollow, not nodulose-septate or with only incomplete septae.

10 Leaves equitant, incompletely cross-septate; plants of moderate to high elevations in the Black Hills and westward . . . . . 9. *J. ensifolius*

10 Leaves not equitant, not at all cross-septate; plants more widespread in our range.

11 Tepals (4)5-6 mm long; stamens 6 . . . . . 12. *J. longistylis*

11 Tepals 2-3.5 mm long; stamens 3 . . . . . 13. *J. marginatus*

9 Leaf blades terete, hollow, nodulose-septate, the septae complete.

12 Glomerules obpyramidal to hemispheric, few- to 12-flowered, the flowers projecting upward.

13 Seeds 0.9-1.8 mm long, with membranous appendages at both ends; stamens 3.

14 Seeds 0.9-1.2 mm long, the body of the seed comprising 3/5 or more of its total length . . . . . 4. *J. brevicaudatus*

14 Seeds 1.2-1.9 mm long, the body of the seed comprising 1/2 or less of its total length . . . . . 6. *J. canadensis*

13 Seeds 0.5 mm or less long, merely pointed at both ends; stamens 6.

15 Inner tepals shorter than the outer ones, blunt to rounded; capsule rounded at the apex; inflorescence narrow, the branches mostly sharply ascending . . . . . 1. *J. alpinus*

15 Inner tepals longer than or about equaling the outer ones, acute to acuminate; capsule acute at the apex; inflorescence open, the branches spreading . . . . . 2. *J. articulatus*

12 Glomerules spherical, densely many-flowered, the flowers projecting outward in all directions at maturity.

16 Stamens 3, opposite the outer tepals.

17 Seeds with white, membranous, taillike appendages at both ends; capsule abruptly tapered to an apiculate tip . . . . . 6. *J. canadensis*

17 Seeds apiculate at both ends, without appendages; capsule gradually tapered to a slender beak ca. 1 mm long . . . . . 15. *J. scirpoides*

16 Stamens 6, opposite both the inner and outer tepals.

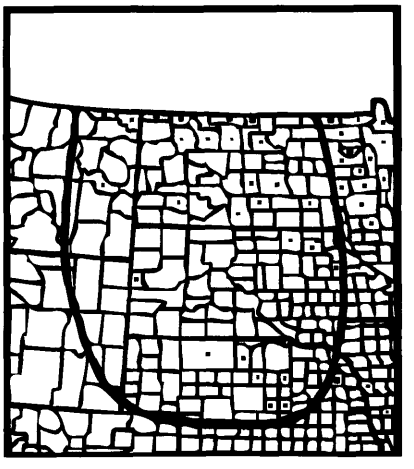
18 Inner and outer tepals equal in length, or nearly so; auricles membranous, yellowish . . . . . 14. *J. nodosus*

18 Outer tepals distinctly longer than the inner tepals; auricles white-hyaline . . . . . 17. *J. torreyi*

1. *Juncus alpinus* Vill. — Alpine rush

Rhizomatous perennial growing in small tufts, 1.5-4 dm tall. **Leaves** mostly basal, 1 or 2 cauline; **blades** terete, hollow, nodulose-septate, 0.5-1(1.5) mm wide when pressed; **sheaths** green or often reddish on basal leaves, the margins membranous, shiny, often yellowish, projecting into **auricles** 0.5-1 mm long at the summit of the sheath. **Inflorescence** slender, 2-15 cm long, sparsely to freely branched, the branches spreading to usually strongly ascending; **glomerules** often rather few, obpyramidal, 3- to 12-flowered. **Flowers** green to light or dark brown, 2-3 mm long; **tepals** acute to obtuse or mucronate, the inner ones shorter, broader and tending to be more obtuse than the outer, their margins scarious; **stamens** 6. **Capsules** oblong, 1-locular, surpassing the perianth, rounded below the apiculate apex; **seeds** cylindric-ellipsoid to ovoid-ellipsoid, pale brown to brown, ca. 0.5 mm long. Jul—Sep. Springs, shores, stream banks, fens and boggy places, where water is fresh; occasional, mainly in the n part and the NE Sand Hills; (Circumboreal, in N.Amer. s to PA, IN, MO, NE, CO, UT, ID and WA).

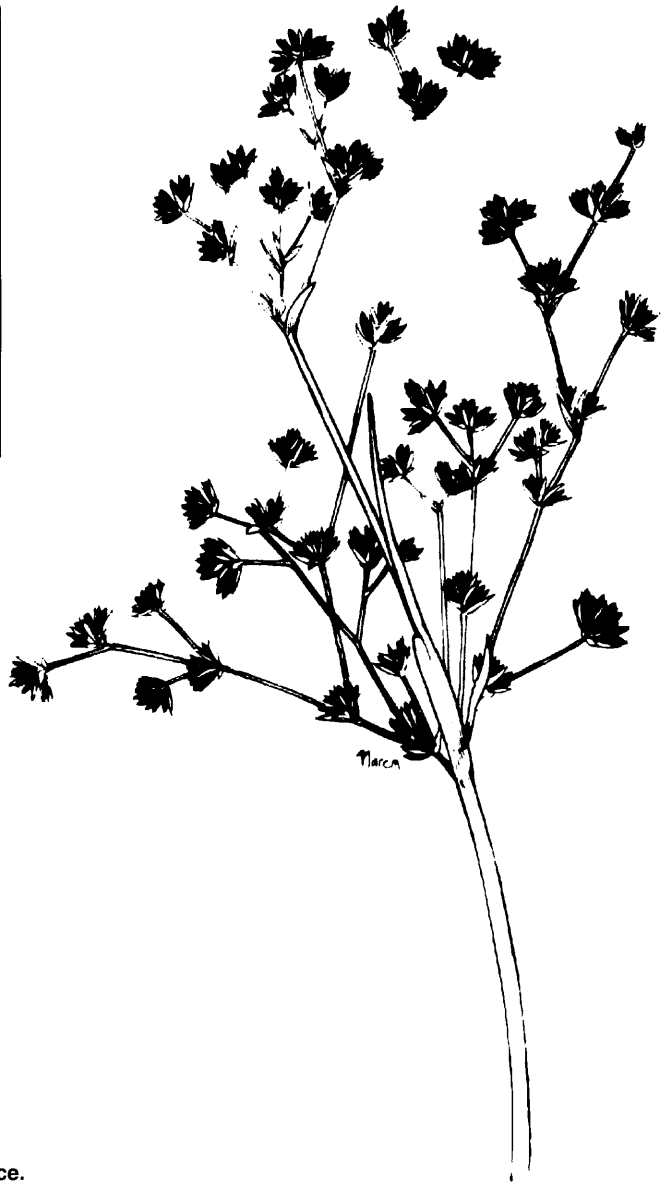
A sterile hybrid between this species and *J. nodosus*, called *J.* X *nodosiformis* Fern., has been found in a series of fens in Deuel Co., SD. It is clearly intermediate between the parental species and has abortive ovules and pollen. It may be expected in other places where *J. alpinus* and *J. nodosus* occur together.



2. *Juncus articulatus* L. — Jointed rush

Usually tufted perennial 2-6 dm tall, with coarse whitish rhizomes. **Leaves** 2-4 per culm, terete, hollow, nodulose-septate, 0.5-2 mm wide when pressed; **sheaths** green or basal ones sometimes reddish, the margins membranous, white or tawny, prolonged as rounded or acutely rolled **auricles** 1-2 mm long. **Inflorescence** ovoid to short and depressed in outline, 2-15 cm long, up to 2X longer than broad, the branches mostly divergent to widely ascending; **glomerules** usually numerous, obpyramidal to nearly hemispheric, 3- to 12-flowered. **Flowers** green to dark brown, mostly 2.5-3 mm long; **outer tepals** acute to acuminate, often mucronate, about equaling or distinctly shorter than the inner ones; **inner tepals** acute, scarious-margined; **stamens** 6. **Capsules** oblong-ovoid, 1-locular, exceeding the tepals, acute or broadly so below the apiculate tip; **seeds** elliptic-ovoid to obovoid, 0.3-0.5 mm long, apiculate at both ends. Jul—Sep. Sandy or gravelly shores, stream banks and spring borders; occasional in the Black Hills and reported for Roberts Co., SD; (Newf. to B.C., s to WV, OH, IN, MN, SD, AZ and CA; also Eurasia and widely intro. elsewhere).





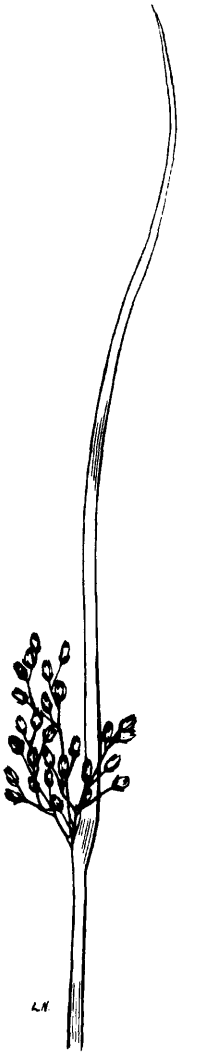
***Juncus articulatus*, inflorescence.**

3. *Juncus balticus* Willd. — Baltic rush

Strongly rhizomatous perennial; **culms** slender and tough, dark green, 3-9 dm tall, appearing leafless, arising in rows from thick, brown to black rhizomes. **Leaves**, except for the involucre, comprised of basal sheaths only, these brown to reddish-brown; involucral leaf terminal, erect, terete, resembling a continuation of the culm. **Inflorescence** appearing lateral, subcapitate and dense to spreading and diffuse, extending outward 1-7 cm; **bracteoles** obtuse to mucronate, 1-2 mm long. **Flowers** borne singly on pedicels, dark brown to purplish-brown, 3.5-5 mm long; **tepals** acute, hyaline-margined, the inner ones slightly to considerably shorter than the outer; **stamens** 6. **Capsules** ovoid, 3-locular, shorter than to surpassing the perianth; **seeds** obliquely ovoid-ellipsoid, grayish-brown, ca. 0.6 mm long, apiculate at both ends. Jun—Aug. Wet meadows, ditches, seepage areas and shores; common, often abundant; (Circumboreal, in N.Amer. s to NY, PA, OH, IN, IL, MO, n TX, NM and CA; also S.Amer.).

Most plants of this region are var. *montanus* Engelm., with the **outer tepals** short-acuminate, the **inner tepals** acute to obtuse and nearly equaling the outer ones, and with the **capsules** shorter than to about equaling the inner tepals. In the eastern part some populations of var. *littoralis* Engelm. are encountered. These plants have the **outer tepals** acuminate and longer than the acute to obtuse inner ones, and the **capsules** exceeding the inner tepals. As expected, plants intermediate between these varieties are also found.



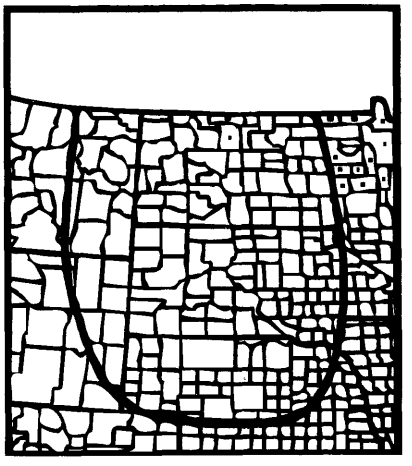


***Juncus balticus*, inflorescence.**

4. *Juncus brevicaudatus* (Engelm.) Fern.

Densely tufted perennial 1.5-5 dm tall. **Leaves** both cauline and basal; **blades** terete, hollow, nodulose-septate, 1-2 mm wide when pressed; **sheaths** green or sometimes reddish on basal leaves, the margins membranous and prolonged as 2 rounded **auricles** 1-2 mm long. **Inflorescence** rather narrow, 2-12 cm long, 1/3 to 1/6 as wide, sparsely to freely branched, the branches strongly ascending; **glomerules** obpyramidal, containing 2-7 flowers. **Flowers** greenish to golden brown or dark brown, 3-4 mm long; **tepals** acute to mucronate, with narrow scarious margins; **stamens** 3. **Capsules** oblong-pyriform to cylindric-ellipsoid, 1-locular, much surpassing the perianth; **seeds** fusiform, brown, 0.9-1.2 mm long, with membranous, taillike appendages at both ends, the body comprising 3/5 or more of the total length. Aug—Sep. Wet meadows, marshes, fens and shores; rare, with records from Bottineau and McHenry Counties, ND; (Que. and N.S. to n Alta., s to MA, WV, PA, MN and ND).

This species may be the basis for earlier reports in ND of the similar *J. brachycephalus* (Engelm.) Buch.



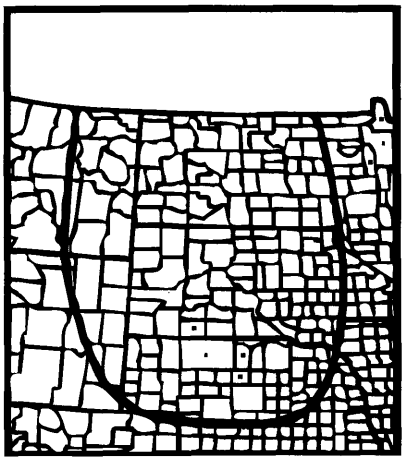
5. *Juncus bufonius* L. — Toad rush

Small, tufted annual 5-20 cm tall. **Culms** usually crowded, typically much shorter than the inflorescence, 1-10 cm to the base of the inflorescence. **Leaves** usually shorter than the culm, the **blades** 0.5-1 mm wide; **basal sheaths** green to suffused with red or brown, white-hyaline along the margins, rounded to truncate at the summit; **auricles** lacking. **Inflorescence** 1/3 to nearly the entire length of the plant, freely branched or sparsely so in diminutive specimens; **bracteoles** obtuse to mucronate, 1-2 mm long. **Flowers** solitary, mostly sessile and secund on the branches, green, 4-6 mm long; **tepals** with hyaline margins, the outer ones acute, the inner acute to obtuse and shorter than the outer ones; **stamens** 6. **Capsules** cylindric-ovoid, 1-locular, shorter than the perianth; **seeds** ovoid, brown, 0.2-0.4 mm long, apiculate at both ends. Jun—Aug. Shores, mud flats, stream banks and other temporarily flooded places; occasional; (Throughout most of N.Amer.; also Eurasia).



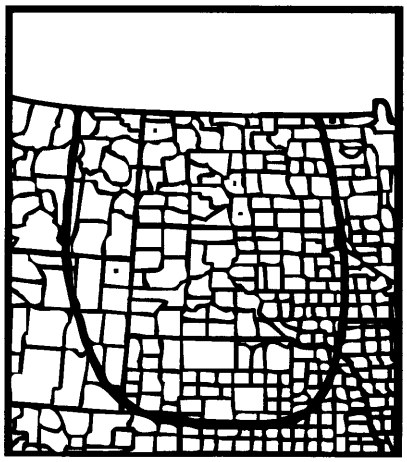
6. *Juncus canadensis* Gay ex Laharpe

Coarse tufted perennial 3-9 dm tall, with stout, rigid culms. **Leaves** 3-4 per culm, terete, hollow, nodulose-septate, 1.5-3 mm wide when pressed; **sheaths** green or basal ones reddish, with narrow, membranous margins, prolonged as acute to rounded **auricles** 1-2 mm long. **Inflorescence** open or congested, 2-20 cm long, the branches ascending; **glomerules** few to many, containing 5-40 or more flowers, obpyramidal to hemispheric when relatively few-flowered, to subglobose when many-flowered. **Flowers** green to brown, (3)4-5 mm long; **tepals** lance-subulate, the inner slightly to distinctly longer than the outer; **stamens** 3. **Capsules** ovoid to oblong, 1-locular, equaling to strongly exceeding the inner tepals, abruptly tapered at the apex to an apiculate tip; **seeds** fusiform, 1.2-1.9 mm long including the white, membranous, taillike appendages at both ends, the body 1/2 or less the total length. Jul—Sep. Sandy shores, marshes and stream banks; rare, s SD and n NE; (Newf. and Que. to MN, s to GA, TN, LA and NE).



7. *Juncus compressus* Jacq.

Perennial from dark brown to black rhizomes, 2-6 dm tall. **Leaves** cauline as well as basal, some arising near or within the upper 1/2 of the stem; **blades** flat, to 2 dm long, 1-2 mm wide; **sheaths** green with broad membranous margins, rounded and entire or cleft into 2 low, rounded auricles at the summit. **Inflorescence** oblong, many-flowered, 2-8 cm long, the branches erect to ascending; **involucral leaf** seldom surpassing the inflorescence; **bracteoles** mostly obtuse to rounded, ca. 1 mm long. **Flowers** solitary, mostly on short pedicels, dark brown, 2-3 mm long; **tepals** blunt and incurved at the tip, the outer ones slightly longer than the inner, the inner ones with a scarious margin toward the tip; **stamens** 6, reaching the middle of the perianth, the anthers ca. 1 mm or less long, scarcely longer than the filaments. **Capsules** obovoid, 1-locular, much surpassing the perianth; **seeds** obliquely cylindric-pyriform, brown, 0.5-0.6 mm long. Jun—Aug. Apparently intro. to N.Amer. from Europe where it is widespread, adventive here from e and s Can.; rare, with records from along the Missouri R. in Emmons, Burleigh and Williams Counties in ND, also ne WY, probably on the increase; (Newf. to N.S. and Que. and w to Man., ND and MT; also Eurasia).



8. *Juncus dudleyi* Wieg. — Dudley's rush

Tufted perennial 2-8 dm tall. **Leaves** mostly basal, arising well within the lower 1/4 of the stem; **blades** typically 1/3 to 1/2 the length of the stem, 0.5-1 mm wide, flat to involute; **sheaths** green or uncommonly faintly reddish, the margins and auricles firm and cartilaginous, drying yellowish, glossy, **auricles** low, rounded, to 0.5 mm long. **Inflorescence** compact to spreading, (1)2-5 cm long; **involucres** 1-3, usually 2, at least one of these exceeding the inflorescence; **bracteoles** obtuse to subacute, nearly transparent, 1-2 mm long. **Flowers** solitary, sessile to short-pedicelled, green to stramineous or light brown, 4-6 mm long; **tepals** acuminate, with narrowly hyaline margins, the outer noticeably longer than the inner; **stamens** 6. **Capsules** ovoid-cylindric to ovoid, 1-locular, shorter than the perianth; **seeds** obliquely ellipsoid, brown, 0.3-0.4 mm long. Jun—Aug. Wet meadows, springy or boggy areas, ditches, shores and stream banks; common; (Newf. to Alta. and WA, s to MD, TN, TX and CO).



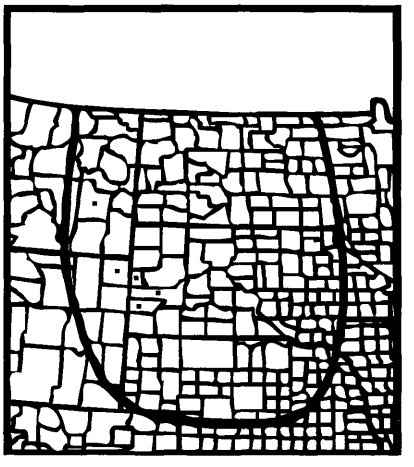


***Juncus dudleyi*, inflorescence.**

9. *Juncus ensifolius* Wikst.

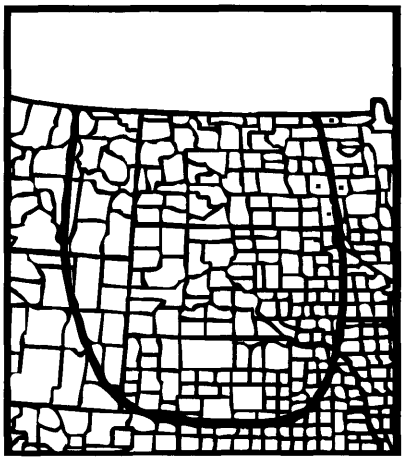
Rhizomatous perennial 1.5-6 dm tall; culms single or loosely clustered. **Leaves** 2-4 per culm, the blade folded along the midrib with the margins united, thus laterally flattened and equitant (with one edge toward the culm), 1.5-6 mm wide, incompletely cross-septate; **sheaths** green or reddish, with broad scarious margins, these often prolonged as low rounded **auricles** to 0.5 mm long. **Inflorescence** short to oblong, usually few-branched with the branches erect or nearly so; **glomerules** (1)2-several (seldom more), hemispheric to subglobose, 5- to many-flowered, to ca. 1 cm across. **Flowers** dark brown, 3-4 mm long; **tepals** lanceolate, the outer tepals acuminate, sharp-pointed, the inner ones shorter, acute, scarious-margined; **stamens** 6(3). **Capsules** oblong, 1-locular, rounded to the short beak, shorter than to exceeding the tepals; **seeds** ellipsoid to fusiform, 0.4-0.6 mm long and apiculate at both ends, or sometimes to 1 mm long with a taillike appendage at one or both ends. Jul—Sep. Margins of springs, streams, ponds and in seepage areas at moderate to high elevations; occasional in the Black Hills and with one record from Custer Co., MT; (SD and MT to AK, s to NM, AZ and CA, also Que. and Ont.).

Our plants, with usually 6 stamens and the anthers about equaling the filaments, are assigned to var. *montanus* (Engelm.) C. L. Hitchc.



10. *Juncus gerardii* Loisel — Saltmeadow rush

Much like *J. compressus*, differing mainly as follows: **Stamens** nearly reaching the summit of the perianth, the anthers 1.5 mm long, much longer than the filaments. **Capsules** ovoid to obovoid, about equaling the perianth. Jun—Aug. Wet meadows, often where saline; rare or possibly extinct in e ND, with 2 old collections from Cass and Richland Counties; (Interruptedly circumboreal, in N.Amer. s along the Atlantic Coast to VA and s along the Pacific Coast to WA, occasional inland).



11. *Juncus interior* Wieg. — Inland rush

Very similar to *J. dudleyi*, differing mainly as follows: **Leaf sheaths** green or often reddish, the auricles and margins membranous, white or suffused faintly with red or brown. **Bracteoles** acute to more often acuminate or aristate. Jun—Aug. Occurring in the same habitats as *J. dudleyi*; common; (IN to WI and WY, s to AR, TX and NM).



12. *Juncus longistylis* Torr.

Rhizomatous perennial 3-7 dm tall. **Leaves** mostly basal, reduced upward, the upper ones coming off 1/2 to 3/4 the distance up the stem; **blades** mostly 1/4 to 3/4 the length of the stem, flat and grasslike, 1-3 mm wide; **sheaths** green, with broad membranous margins extending beyond the sheath to form 2 low, rounded or truncate auricles. **Inflorescence** sparingly branched from the base, comprised of (2)3-5 hemispheric glomerules each containing 3-8 flowers, the glomerules occasionally crowded into one large many-flowered head. **Flowers** brown, 4-6 mm long; **tepals** acute to mucronate, the outer ones mucronate more often than the inner, the margins hyaline and glistening; **stamens** 6. **Capsules** cylindric-ellipsoid, 3-locular, shorter than the perianth, rounded to retuse below the beak; **seeds** cylindric-ellipsoid, 0.3-0.5 mm long, apiculate on the ends. Jun—Aug. Springs, boggy places and shores, where water is fresh; frequent in the n part and the Black Hills, less common s; (Newf. and w Ont. to B.C., s to MI, MN, NE, CO, NM and Sierran CA).



13. *Juncus marginatus* Rostk. — Grassleaf rush

Rhizomatous perennial 2-5 dm tall; **culms** solitary or in small tufts, bulbous-thickened at the base. **Leaves** basal and cauline, 2-5 per culm, the **blades** flat, grasslike, 1-3 mm wide; **sheaths** green, membranous-margined, extended into 2 low, rounded auricles at the summit. **Inflorescence** open and spreading or sometimes narrow and congested, with 4-many hemispheric to subglobose glomerules containing several to many flowers. **Flowers** pale brown, 2-3.5 mm long; **outer tepals** broadly lanceolate, acute to acuminate, often awn-tipped; **inner tepals** elliptic-obovate, broader and longer than the outer ones, with broad, scarious margins, blunt-tipped; **stamens** 3. **Capsules** obovoid, nearly 3-locular, shorter than to equaling the tepals, rounded to retuse and apiculate at the apex; **seeds** ellipsoid or asymmetrically so, 0.3-0.5 mm long, apiculate at the ends. Jun—Sep. Wet meadows, spring borders and stream banks where water is fresh, often where sandy; occasional from sw and s SD through w and c NE; (Newf. to MI and SD, s to FL, TX and AZ).



14. *Juncus nodosus* L. — Jointed rush

Slender rhizomatous perennial 1.5-5 dm tall. **Leaves** cauline and basal, the upper ones and the main involucre usually overtopping the inflorescence; **blades** terete, hollow, nodulose-septate, 0.5-1.5(2) mm wide when pressed; **sheaths** green, the margins green, becoming yellowish and membranous toward the summit; **auricles** membranous, yellowish, 0.5-1.5 mm long. **Inflorescence** usually oblong, 2-6 cm long, sparingly branched, the branches ascending, each branch terminated with a glomerule; **glomerules** (1)2-several, spherical at maturity, many-flowered, 1 cm or less across. **Flowers** greenish to brown, 3-4 mm long; **tepals** attenuate, the margins very narrowly hyaline, the outer and inner equal in length or nearly so; **stamens** 6. **Capsules** subulate, 1-locular, exceeding the perianth, dehiscing from the base and remaining coherent at the tip; **seeds** cylindric-ellipsoid, pale brown to brown, ca. 0.4 mm long, apiculate on the ends. Jul—Sep. Wet meadows, springs, fens, shores and stream banks, where water is fresh; frequent; (Newf. and N.S. to Mack. and B.C., s to VA, OH, IN, IA, NE, CO, NM and CA).

See notes under *J. alpinus* and *J. torreyi*.

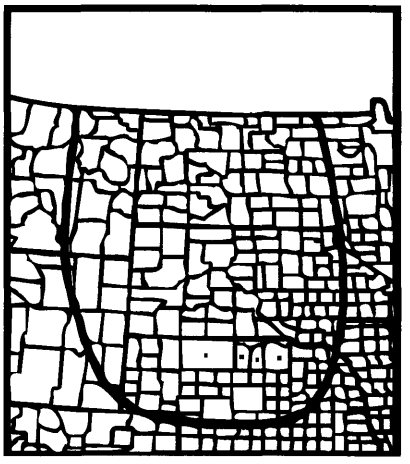




Juncus nodosus. **Photo by James R. Johnson.**

15. *Juncus scirpoides* Lam.

Culms solitary or tufted from stout, whitish rhizomes, 2-8 dm tall. **Leaves** mostly 2-3 per culm, the uppermost leaf not surpassing the inflorescence; **blades** terete, hollow, nodulose-septate, mostly 1-2 mm wide; **sheaths** green or the lower ones reddish, membranous-margined above, prolonged as membranous **auricles** (1)2-3 mm long. **Inflorescence** compact and narrow to open with a few spreading branches, (1)2-12 cm long; **glomerules** (1)2-15, many-flowered, spherical to somewhat lobed, with dense subclusters of flowers, 6-12 mm across. **Flowers** greenish to eventually dull brown, 2.5-4 mm long; **tepals** attenuate, the outer considerably longer and with sharper, more rigid tips than the inner; **stamens** 3. **Capsules** subulate, 1-locular, equaling to slightly exceeding the outer tepals, dehiscing from the base and coherent above; **seeds** ovoid, brown, 0.3-0.5 mm long, apiculate on the ends. Jun—Sep. Sandy wet meadows, shores and stream banks; uncommon in the NE Sand Hills; (NY to MI and n NE, s to FL and TX).



16. *Juncus tenuis* Willd. — Path rush

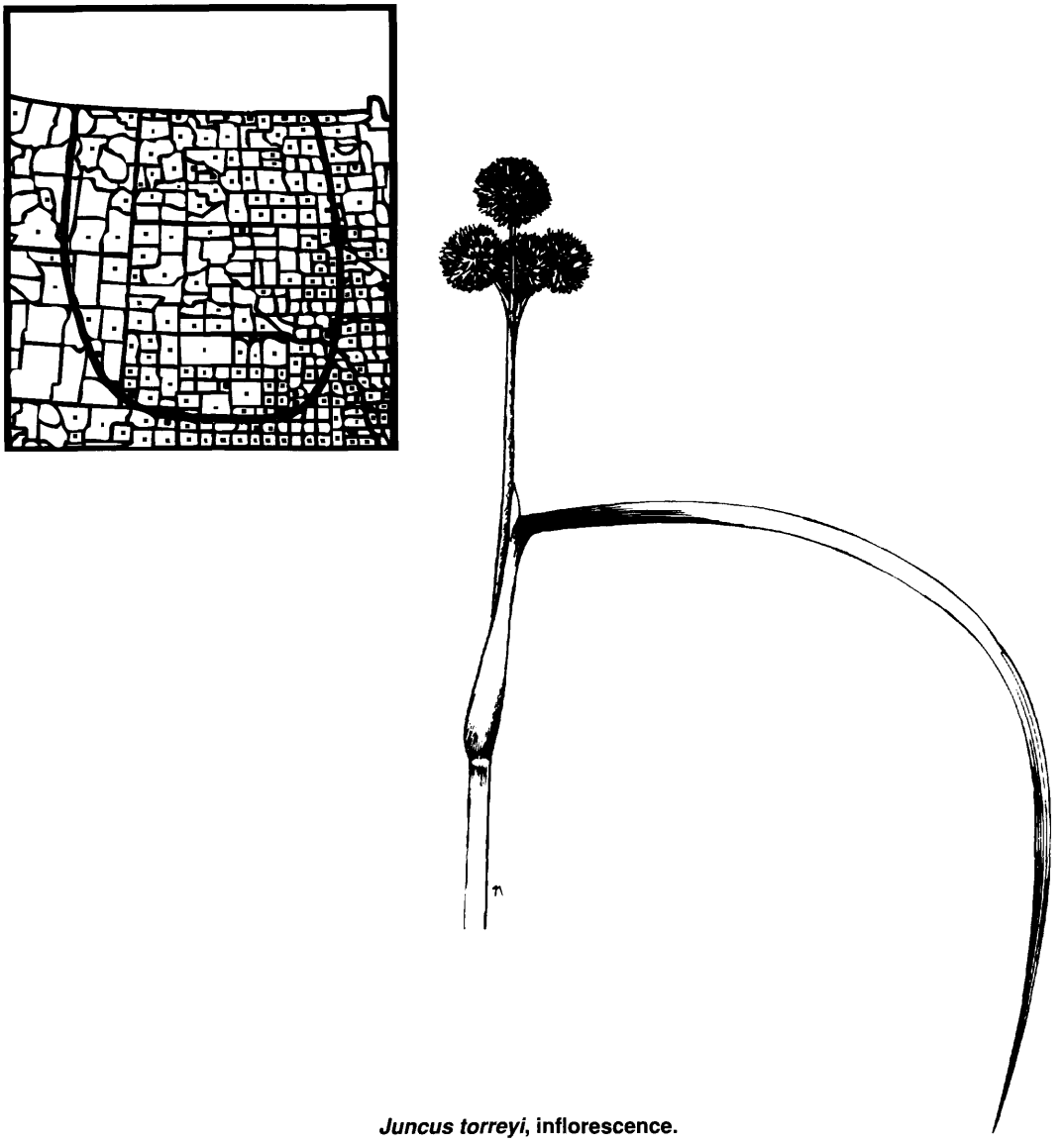
Quite similar to *J. dudleyi* and *J. interior* which are sometimes treated as variants of this species, differing chiefly as follows: **Foliage** dull to bright green and soft-textured; **leaf sheaths** with broad membranous margins which are prolonged as flaplike **auricles** 1-5 mm long. **Inflorescence** variable, from densely flowered and congested to open with sparsely flowered, often secund branches; **bracteoles** acute to acuminate. Jun—Aug. Moist to dry habitats, often where disturbed or where soil is compacted; uncommon and scattered in MT, SD, WY and NE; (se Can. to AK, s throughout most of the U.S., Mex., C. and S.Amer.; also Europe, n Africa, Australia, New Zealand and Japan).



17. *Juncus torreyi* Cov. — Torrey rush

Similar to *J. nodosus* but more robust, 2-8 dm tall, the stems arising singly from tuberiferous rhizomes. **Leaves** mostly cauline, the upper ones frequently overtopping the inflorescence; **blades** terete, hollow, nodulose-septate, 1-3 mm wide when pressed; **sheaths** green, the margins white-hyaline; **auricles** white-hyaline, 1-3(4) mm long. **Inflorescence** of 1-many glomerules, these spherical, densely flowered, mostly 1 cm or more across. **Flowers** greenish to brown, 3-5 mm long; **tepals** attenuate, with narrow, white-hyaline margins, the outer tepals distinctly longer than the inner; **stamens** 6. **Capsules** subulate, 1-locular, about equal to or exceeding the perianth, dehiscing from the base; **seeds** cylindric-ellipsoid, pale brown to brown, ca. 0.4 mm long. Jul—Sep. Shores, stream banks, wet meadows, springs and ditches; common; (ME to B.C., s to KY, AL, TX, CO and CA).

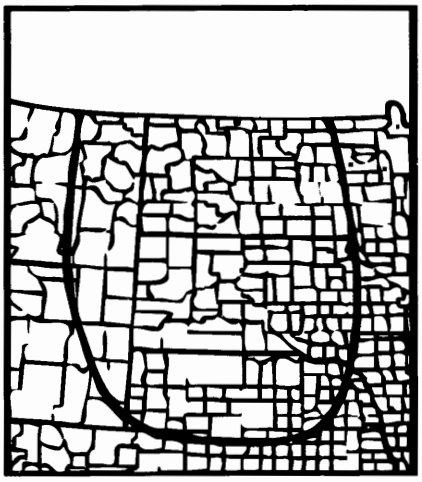
A hymenopteran larva is responsible for the formation of bizarre galls which are often seen in this species and occasionally in *J. nodosus*. The galls appear as clusters of overlapping, bractlike leaves, yellow and red in color, typically in the position of the inflorescence on stunted culms.



***Juncus torreyi*, inflorescence.**

18. *Juncus vaseyi* Engelm.

Tufted perennial 2-6 dm tall. **Leaves** mostly basal, arising from well within the lower 1/4 of the stem; **blades** to 3 dm long, usually not surpassing the stem, 0.5-1 mm wide, terete, solid, not nodulose-septate, narrowly channeled on the upper surface; **sheaths** green or reddish, the margins and auricles membranous, pale green or pale brown. **Inflorescence** rather compact and crowded, 1-4 cm long; **main involucre** shorter than to greatly surpassing the inflorescence; **bracteoles** obtuse, scarious, 1-2 mm long. **Flowers** solitary, sessile or on short pedicels, greenish to light brown, 4-5.5 mm long; **tepals** acute, with narrow hyaline margins, the outer ones averaging only slightly longer than the inner; **stamens** 6. **Capsules** cylindric, almost completely 3-locular, exceeding the perianth; **seeds** fusiform, brown, 0.8-1.3 mm long, including the membranous taillike appendages at both ends. Jul—Aug. Wet meadows and shores; rare, with one collection from Bottineau Co., ND; (N.S. to B.C., s to NY, IN, IA, ND, CO and ID).



62. **Cyperaceae**, the Sedge Family

Mostly perennial, grasslike, rushlike or reedlike plants; **stems** trigonous or less often terete (or compressed), solid or pithy. **Leaves** in 3 vertical ranks or reduced mainly to sheathing at the base of the stem; **leaf blades**, when present, grasslike, elongate and parallel-veined, often strongly keeled; **sheaths** closed around the stem, sometimes splitting with age. **Flowers** much reduced, perfect or unisexual, each subtended by a bract (scale); **perianth** consisting of 1-many (often 6) small bristles or a single perianth scale, or the perianth lacking; **stamens** 3 or sometimes 1 or 2; **ovary** superior, 1-celled, 3-carpellary or less often 2-carpellary, sometimes contained in a saclike covering called the perigynium (*Carex*), ripening into an achene, the style trifid or bifid (stigmas 3 or 2), ovule 1, basally attached. **Flowers** and their subtending scales arranged in **spikelets** (termed **spikes** in *Carex*), the spikelets solitary as a single terminal or lateral spike, or the spikelets few to many and arranged in various types of inflorescences, the inflorescence often subtended by 1-several **involucral bracts**. A large family (third largest in our region) of which most members inhabit wet places.

1 Flowers unisexual; achene enclosed in a saclike perigynium which in turn is subtended by a scale . . . . . 2. *Carex*

1 Flowers perfect or mostly so; achene naked, merely subtended by a scale and the perianth (if present).

2 Scales distichous in the spikelets.

3 Inflorescences terminal; achene not subtended by bristles . . . . 3. *Cyperus*

3 Inflorescences axillary; achene subtended by bristles . . . . . 4. *Dulichium*

2 Scales spirally arranged and overlapping in the spikelets.

4 Style base persistent as a tubercle atop the achene, often swollen, differentiated in color and texture from the achene body, or if the style base appears confluent with and not differentiated from the achene body, then the spikelets solitary on leafless culms.

5 Spikelets solitary on the culms; culms appearing leafless, the leaves reduced to basal sheaths . . . . . 5. *Eleocharis*

5 Spikelets 1-several, culms leafy at the base, the leaves with narrow blades.

6 Fertile flowers or achenes usually only 1 or 2(-5) terminating each spikelet, most of the scales empty; achene lenticular, the tubercle prominent, beaklike, confluent with the achene body . . . . . 10. *Rhynchospora*

6 Fertile flowers or achenes few to several per spikelet, all or nearly all of the scales with flowers or achenes; achene trigonous, the tubercle minute, mammillate, distinct from the achene body . . . . . 1. *Bulbostylis*

4 Style base persistent as a small beak, confluent with the achene body and not differentiated from it, or the style base not persistent on the achene; spikelets usually few to many, or if solitary, then on leafy culms.

7 Perianth of numerous, long, whitish or rufous bristles, greatly surpassing the scales and giving the spikelets a cotton tuft appearance . . . . . 6. *Eriophorum*

7 Perianth of 1-6 small bristles or scales, or the perianth lacking.

8 Perianth of 1-6 small bristles or absent; plants mostly perennial.

9 Perianth absent; style base swollen above the attachment to the achene, readily deciduous . . . . . 7. *Fimbristylis*

9 Perianth of 1-6 bristles, rarely absent; style base not swollen, often partly persistent as a beak on the achene . . . 11. *Scirpus*

8 Perianth of 1 or 3 scales, sometimes absent; plants annual.

10 Perianth of 1 minute scale or sometimes absent; spikelets 5 mm or less long . . . . . 9. *Hemicarpha*

10 Perianth of 3 stalked scales; spikelets more than 5 mm long . . . . . 8. *Fuirena*

1. *Bulbostylis capillaris* (L.) Clarke

Small tufted annual 0.5-3(4) dm tall; **culms** usually many, capillary, usually much surpassing the leaves, longitudinally ribbed, scaberulous. **Leaves** mainly basal, the blades short, filiform, to 0.5 mm wide. **Inflorescence** of (1)2-5 or more spikelets in a capitate or umbelliform cluster usually less than 1 cm long, with 1 spikelet sessile and the others pedicellate; **involucral bracts** 2-3, filiform, the largest usually surpassing the inflorescence; **spikelets** few- to several-flowered, ovoid-oblong, 3-8 mm long; **scales** all or nearly all subtending a flower, spirally arranged, dark reddish-brown with a strong green midrib and membranous margins, ovate, 1.5-2 mm long, blunt-tipped, puberulent, often deciduous before the achene. **Flowers** perfect; **perianth** none; **stamens** 2; **styles** 3-cleft, barely exsert, with a swollen base that persists on the achene as a tubercle. **Achene** ivory to tan, obovoid-trigonous, 0.8-1 mm long, cross-rugulose on the faces; **tubercle** minute, mammillate, darker than the achene body and distinct from it. Late Jun—Sep. Sandy shores, stream banks and alluvial bars; uncommon in c and e NE; (ME and s Que. to MN and NE s to FL, TX and w to CA; also n Mex. and Cuba).



2. *Carex* L. — Sedge

Monoecious or rarely dioecious, cespitose or rhizomatous, grasslike perennials; **culms** simple, acutely to obtusely trigonous, exceeding or shorter than the leaves. **Leaves** grasslike, the blades flat to involute; sheaths hyaline or cross-rugulose ventrally, hyaline, green-and-white mottled or septate-nodulose dorsally. **Inflorescence** terminal, headlike, dense to open, usually consisting of few to many spikes, or less often of a single spike, the spikes usually subtended by leaflike bracts, the lowermost bracts best developed, sometimes much reduced; **spikes** unisexual, or bisexual, when bisexual, the spikes either androgynous (with the staminate flowers above the pistillate) or gynaecandrous (with the pistillate flowers above the staminate). **Flowers** unisexual, each subtended by a scale; **perianth** none; **male flowers** composed of 3 stamens; **female flowers** composed of a single ovary contained within a saclike **perigynium**; **perigynia** trigonous to plano-convex, lanceolate to ovate or suborbicular, strongly beaked to beakless, variously nerved, often winged on the margins when plano-convex, sometimes spongy-thickened at the base; **beak**, when present, entire, obliquely cut or bidentate at the apex; **styles** bifid or trifid (stigmas 2 or 3), the branches protruding from the beak or tip of the perigynium. **Achenes** developing within the perigynium, lenticular or trigonous, the style jointed with the achene or continuous with it.

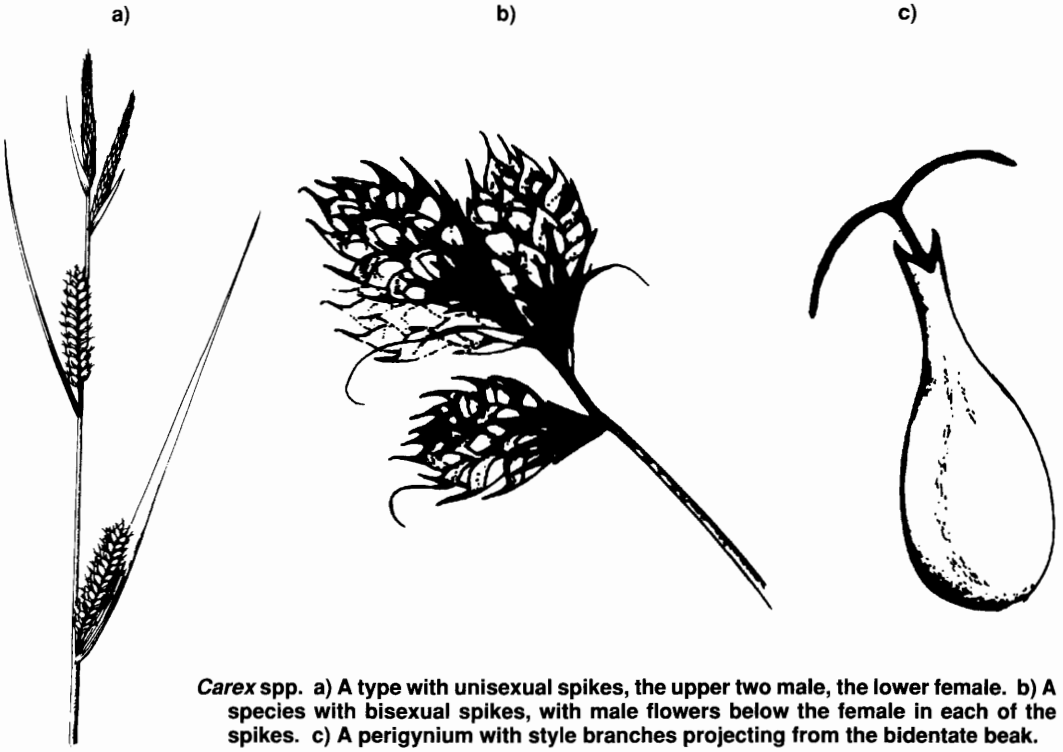
The largest genus of vascular plants in N.Amer.; most spp. characteristic of wet habitats.

References:

Hermann, F. J. 1970. Manual of carices of the Rocky Mountains and Colorado Basin. U.S.D.A. Forest Serv. Handbook No. 374, Washington, D.C.

Kolstad, O. A. 1966. The genus *Carex* of the High Plains, Prairie Plains and associated woodlands in Kansas, Nebraska, South and North Dakota. Unpubl. Ph.D. thesis, Univ. Kans., Lawrence.

Wheeler, G. 1981. A study of the genus *Carex* in Minnesota (Volumes I and II). Unpubl. Ph.D. thesis, Univ. Minn., St. Paul.



***Carex* spp. a) A type with unisexual spikes, the upper two male, the lower female. b) A species with bisexual spikes, with male flowers below the female in each of the spikes. c) A perigynium with style branches projecting from the bidentate beak.**

1 Spikes only one per culm, terminal, continuous, no lateral spikes present. (Those with 2 or more spikes aggregated in a dense spikelike head will key in the next section, as will those with 1- to few- flowered lateral spikes.)

2 Plants tufted; stigmas 3 . . . . . 34. *C. leptalea*

2 Plants rhizomatous; stigmas 2 . . . . . 23. *C. gynocrates*

1 Spikes 2 or more per culm, densely crowded in a spikelike head to widely separated, the lateral spikes occasionally only 1- to few-flowered.

3 Spikes mostly unisexual, the terminal ones usually staminate, the lower ones mostly pistillate.

4 Stigmas 2; achenes lenticular.

5 Perigynia whitish-pulverulent or eventually turning golden orange at maturity; bract of the lowest pistillate spike obviously sheathing the culm; achenes dark brown at maturity.

6 Terminal spikes staminate (rarely slightly pistillate); scales whitish to tawny; perigynia whitish-pulverulent, golden orange at maturity . . . . . 5. *C. aurea*

6 Terminal spikes gynaecandrous or mostly so; scales brown to purplish; perigynia whitish-pulverulent at maturity. . . . 20. *C. garberi*

5 Perigynia green, becoming brown at maturity; bract of the lowest pistillate spike not sheathing the culm, or only barely so; achenes tan to brown at maturity.

7 Beaks of the perigynia shallowly bidentate; perigynia 2-ribbed (with a single strong nerve along each edge), conspicuously nerved between the ribs . . . . . 39. *C. nebraskensis*

7 Beaks of the perigynia entire; perigynia 2-ribbed and faintly nerved or nerveless between the ribs.

8 Perigynia usually obovate, broadest near the apex but not inflated; leaves glaucous, the lower ones with well-developed blades . . . . . 2. *C. aquatilis*

8 Perigynia usually ovate or elliptic, broadest at or below the middle, or if obovate, then inflated at the apex when mature; leaves green, the lower ones bladeless, short and pointed, brown or reddish, sheathing the culm base.

9 Perigynia flattened, ovate to elliptic, not inflated, green at the apex, golden to tawny toward the base, sometimes eventually brown.

10 Basal sheaths disintegrating into ladderlike fibers; ligule at juncture of leaf blade and sheath V-shaped, longer than wide . . . . . 50. *C. stricta*

10 Basal sheaths not ladder-fibrillose; ligule truncate or low-rounded, wider than long . . . . . 19. *C. emoryi*

9 Perigynia inflated at the apex, round-obovate, pale brown, often with darker brown spots . . . . . 25. *C. haydenii*

4 Stigmas 3; achenes trigonous.

11 Beak of the perigynium entire or obliquely cut (bidentulate).

12 Terminal spike staminate, pistillate or gynaecandrous, considerably larger than the lateral spikes.

13 Pistillate scales acuminate, awn-tipped; perigynia 2.5-3.5 mm long . . . . . 10. *C. buxbaumii*

13 Pistillate scales obtuse, acute or mucronate; perigynia 1.5-2.3 mm long . . . . . 24. *C. hallii*

12 Terminal spike usually staminate throughout and smaller than or equal to the lateral spikes.

14 Pistillate spikes drooping on lax, filiform peduncles.

15 Perigynia flattened, the beak less than 0.5 mm long; bract subtending the lowest pistillate spike sheathless or nearly so . . . . . 35. *C. limosa*

15 Perigynia nearly terete, the beak 0.5 mm or more long; bract subtending the lowest pistillate spike with a well developed sheath . . . . . 12. *C. capillaris*

14 Pistillate spikes not drooping.

16 Perigynia distinctly beaked, the beaks 0.5-1 mm long; pistillate spikes sessile or nearly so, the lower ones sometimes very short-peduncled . . . . . 56. *C. viridula*

16 Perigynia obscurely beaked, the beaks nearly obsolete; pistillate spikes mostly peduncled (sessile in *C. crawei*).

17 Perigynia 2-ribbed (with 2 prominent nerves), otherwise nerveless or with fewer than 10 faint nerves.

18 Pistillate spikes closely flowered; perigynia in 6 rows . . . . . 37. *C. meadii*

18 Pistillate spikes loosely flowered; perigynia in 3 rows . . . . . 53. *C. tetanica*

17 Perigynia 2-ribbed, with more than 10 additional strong nerves.

19 Plants tufted; staminate spikes short-peduncled or sessile; upper pistillate spikes aggregate . . . . . 21. *C. granularis*

19 Plants with prolonged rhizomes; staminate spikes long-peduncled; pistillate spikes separate . . . . . 15. *C. crawei*

11 Beak of perigynia bidentate.

20 Spikes on flexuous peduncles, drooping or widely spreading.

21 Perigynia sessile or nearly so, subterete, thin-textured, rather abruptly tapered to the beak, ascending to widely spreading in the spikes; teeth of the perigynium beak straight or nearly so, to 0.8 mm long . . 28. *C. hystericina*

21 Perigynia stipitate, trigonous-flattened, coriaceous and firm, gradually tapered to the beak, mostly reflexed in the spikes at maturity; teeth of the perigynium beak straight or recurved, 0.6-2 mm long.

22 Teeth of the perigynium beak 1.2-2 mm long, ultimately recurved . . . . . 14. *C. comosa*

22 Teeth of the perigynium beak 0.6-1 mm long, straight or nearly so ..... 42. *C. pseudo-cyperus*

20 Spikes on short erect peduncles or sessile.

23 Perigynia pubescent; style jointed with the achene.

24 Leaves flat, 2-5 mm wide ..... 32. *C. lanuginosa*

24 Leaves involute, 2 mm or less wide ..... 33. *C. lasiocarpa*

23 Perigynia glabrous; style continuous with the achene.

25 Pistillate spikes 15-30 mm thick; perigynia 10-20 mm long ..... 36. *C. lupulina*

25 Pistillate spikes 8-15 mm thick; perigynia 3.5-11 mm long.

26 Perigynia strongly 7- to 9-nerved, inflated; style strongly S-curved toward the base.

27 Bracts of the pistillate spikes several to many times longer than the inflorescence; perigynia widely spreading, the lower ones reflexed ..... 43. *C. retrorsa*

27 Bracts of the pistillate spikes shorter than to somewhat exceeding the inflorescence; perigynia ascending to spreading.

28 Perigynia in 8-10 rows, spreading; base of culm spongy-thickened; leaf sheaths strongly nodulose, with conspicuous cross markings between the nerves ..... 44. *C. rostrata*

28 Perigynia in 6-8 rows, ascending; base of culm not spongy-thickened; leaf sheaths not conspicuously nodulose ..... 55. *C. vesicaria*

26 Perigynia with 10 or more nerves, slightly to strongly inflated; style straight.

29 Teeth of the perigynia less than 1 mm long, erect or slightly curved.

30 Mature perigynia conspicuously many-nerved, the nerves elevated; plant base purple-tinged, the lowest leaf sheaths bladeless ..... 30. *C. lacustris*

30 Mature perigynia inconspicuously nerved, the nerves impressed or level with the surface; plant base whitish or brownish, the lowest leaf sheaths with blades ..... 27. *C. hyalinolepis*

29 Teeth of the perigynia 1-3 mm long, straight or recurved.

31 Sheaths pubescent; teeth recurved ..... 3. *C. atherodes*

31 Sheaths glabrous; teeth straight ..... 31. *C. laeviconica*

3 Spikes bisexual.

32 Spikes androgynous.

33 Culms arising singly or few together from axils of leaves on older reclining culms; plants of wet sphagnum bogs ..... 13. *C. chordorrhiza*

33 Culms arising from tufts or rhizomes; plants of various habitats, mostly not found in sphagnum bogs.

34 Beaks of the perigynia entire or obliquely cut.

35 Perigynia rounded on the margins; spikes few-flowered, with 1-6 perigynia and 1 or 2 staminate flowers ..... 18. *C. disperma*

35 Perigynia sharp-edged, at least between the beak and the body.

36 Plants forming colonies by long-creeping rhizomes, the culms arising singly or few together.

37 Leaf sheaths hyaline ventrally, truncate at the summit; ligule inconspicuous.

38 Perigynia blackish-brown at maturity, (2.5)3-4 mm long, the beak 1/2 or more the length of the body; rhizomes and lower leaf sheaths dark brown to black ..... 40. *C. praegracilis*

38 Perigynia chestnut brown at maturity, 1.7-2.8 mm long, the beak 1/5-1/3 the length of the body; rhizomes and lower leaf sheaths light brown ..... 47. *C. simulata*

37 Leaf sheaths green-striate ventrally, prolonged into a conspicuous, hyaline, tubular ligule ..... 45. *C. sartwellii*

36 Plants tufted, forming dense clumps; rhizomes none or very short.

39 Ventral surface of the leaf sheath white-hyaline or only slightly copper-tinged at the mouth; spikes closely aggregated; perigynia shiny ..... 17. *C. diandra*

39 Ventral surface of the leaf sheath copper-colored, at least at the mouth; lower spikes more or less separate; perigynia dull .... 41. *C. prairea*

34 Beaks of the perigynia distinctly bidentate at the apex.

40 Spikes single at each node, usually less than 10 in the head; sheaths tight, not cross-rugulose ventrally.

41 Perigynia hidden in the head by scales; scales awn-tipped; leaves 1-2.5 mm wide ..... 26. *C. hookerana*

41 Perigynia conspicuous in the head; scales acuminate to cuspidate; leaves 3-8 mm wide ..... 22. *C. gravida*

40 Spikes 2 or more on a branch at the lower nodes; sheaths usually cross-rugulose ventrally (not cross-rugulose in *C. alopecoidea*).

42 Body of the perigynium gradually tapering into the beak, or if abruptly contracted, then the culms winged and flattened under pressure; culms 1.5-3.5 mm wide when pressed.

43 Perigynia ovate, rounded at the base, contracted into the beak; sheaths not cross-rugulose ventrally ..... 1. *C. alopecoidea*

43 Perigynia truncate-rounded at the base, tapering into the beak; sheaths cross-rugulose ventrally ..... 49. *C. stipata*

42 Body of the perigynium abruptly contracted into the beak; culms not winged or flattened under pressure, 0.5-1.5 mm wide .... 57. *C. vulpinoidea*

32 Spikes gynaecandrous or only the terminal spike gynaecandrous (or rarely staminate in *C. interior*), the lateral ones then pistillate.

44 Perigynia filled to the margins by the achene; the margins at most sharp-edged, not thin-winged.

45 Lower spikes (when 3 or more) overlapping or nearly so in the head; perigynia widely spreading or the lower ones reflexed at maturity, spongy-thickened at the base, the achene occupying mainly the upper 2/3 of the perigynium body.

46 Teeth of the perigynium beak obscure, not exceeding 0.25 mm long; scales obtuse; common species ..... 29. *C. interior*

46 Teeth of the perigynium beak sharp, 0.3-0.5 mm long; scales acute to short-cuspidate; rare species ..... 48. *C. sterilis*

45 Lower spikes usually widely separated in the head; perigynia ascending to spreading-ascending at maturity, not spongy-thickened at the base, the achene essentially filling the body of the perigynium.

47 Perigynia 5-10 per spike, ultimately loosely spreading, with a distinct beak ca. 0.4 mm long or more; leaves 1-2.5 mm wide, green ..... 9. *C. brunnescens*

47 Perigynia 10-30 per spike, ascending, with a minute beak 0.2 mm or less long; leaves 2-4 mm wide, grayish-green to glaucous ..... 11. *C. canescens*

44 Perigynia filled only in the central portion by the achene, the margins thin-winged at least on the upper 1/2.

48 Lower bracts of the inflorescence many times longer than the heads.

49 Perigynia ca. 6X longer than wide ..... 51. *C. sychnocephala*

49 Perigynia ca. 3X longer than wide ..... 4. *C. athrostachya*

48 Lower bracts of the inflorescence little, if at all, longer than the heads, often not evident.

50 Perigynium beaks slender, subterete, slightly serrulate toward the tip, obliquely cut dorsally; plant of moderate elevations in the Black Hills ..... 38. *C. microptera*

50 Perigynium beaks flattened, winged, serrulate to the tip, bidentate; plants more widespread.

51 Sheaths of principal leaves green-striate ventrally except for a V-shaped hyaline area at the mouth; leaf blades 3-7 mm wide.

52 Spikes globose or subglobose, the tips of the perigynia widely spreading to reflexed at maturity ..... 16. *C. cristatella*

52 Spikes oblong-ovoid, the tips of the perigynia appressed to ascending ..... 54. *C. tribuloides*

51 Sheaths of principal leaves with a nerveless, white-hyaline band on the ventral side; leaf blades 0.5-4.5 mm wide.

53 Perigynia subulate to narrowly ovate-lanceolate, 2.5-4X longer than wide, the marginal wings narrow their entire length ..... 46. *C. scoparia*

53 Perigynia ovate-lanceolate, ovate or orbicular, not more than 2X longer than wide, the marginal wings broad their entire length.

54 Perigynia ovate-lanceolate or narrowly ovate, (2.2)2.1 mm wide or less.

55 Spikes usually loosely arranged in drooping, moniliform heads, at least the lower spikes usually not overlapping in the head; perigynia stramineous at maturity, the ventral surface nerved . . . . . 52. *C. tenera*

55 Spikes aggregated into compact heads, strongly overlapping; perigynia brown at maturity, the ventral surface nerveless . . . . . 6. *C. bebbii*

54 Perigynia suborbicular or orbicular, (2)2.2 mm wide or wider.

56 Perigynia (4)5-7 mm long, membranous, thin except where distended by the achene, conspicuously nerved ventrally and dorsally . . . . . 7. *C. bicknellii*

56 Perigynia 3-4.5 mm long, firm-textured, thickened, plano-convex; nerveless or obscurely few-nerved ventrally, faintly nerved dorsally . . . 8. *C. brevior*

1. *Carex alopecoidea* Tuckerm.

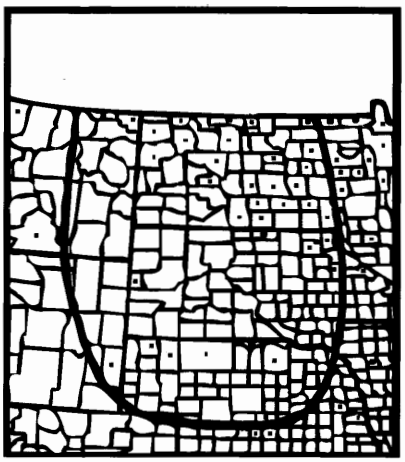
Tufted; **culms** stout, soft, 4-10 dm long, trigonous and sharply winged, flattened when pressed, 1.5-3 mm wide. **Leaves** 3-8 mm wide; sheaths tight, purple-dotted, not cross-rugulose ventrally. **Spikes** bisexual, androgynous, aggregated in heads 1.5-5 cm long; **pistillate scales** acuminate to cuspidate. **Perigynia** brownish-yellow at maturity, plano-convex, ovate, 3-4.5 mm long, rounded and spongy-thickened at the base, contracted into the beak which is 2/3 to as long as the body; **achenes** lenticular, 1.5-2 mm long; **stigmas** 2. Jun—Jul. Swamps, springs and stream banks; uncommon and local in e and n ND and e SD; (Que. and ME to Man., s to NJ, IN and IA).



2. *Carex aquatilis* Wahl. — Water sedge

Tufted in large or small clumps, with long slender rhizomes; **culms** slender, erect, 2-10 dm long, exceeding the leaves, obtusely trigonous below to sharply trigonous above, usually roughened below the head. **Leaves** glaucous, 2-7 mm wide, the lower ones with well-developed blades; **sheaths** septate-nodulose dorsally, thin and usually ruptured ventrally, whitish or purplish-dotted. **Spikes** 3-5, the upper staminate, peduncled, the middle and lower ones pistillate or often androgynous, 2-5 cm long; **pistillate scales** acute to acuminate. **Perigynia** pale green to tawny, often marked or tinged with reddish-brown, usually obovate, broadest near the apex but not inflated, 2-3 mm long; **beak** minute, entire or oblique; **achenes** lenticular, ca. 1.5 mm long; **stigmas** 2. Jun—Aug. Wet meadows, marshes, shores, stream banks, springs, bogs and fens; common in the n part, occasional s; (Circumboreal, in N.Amer. s to NJ, IN, IA, KS, NM and CA).

Plants of this region belong to var. *altior* (Rydb.) Fern.

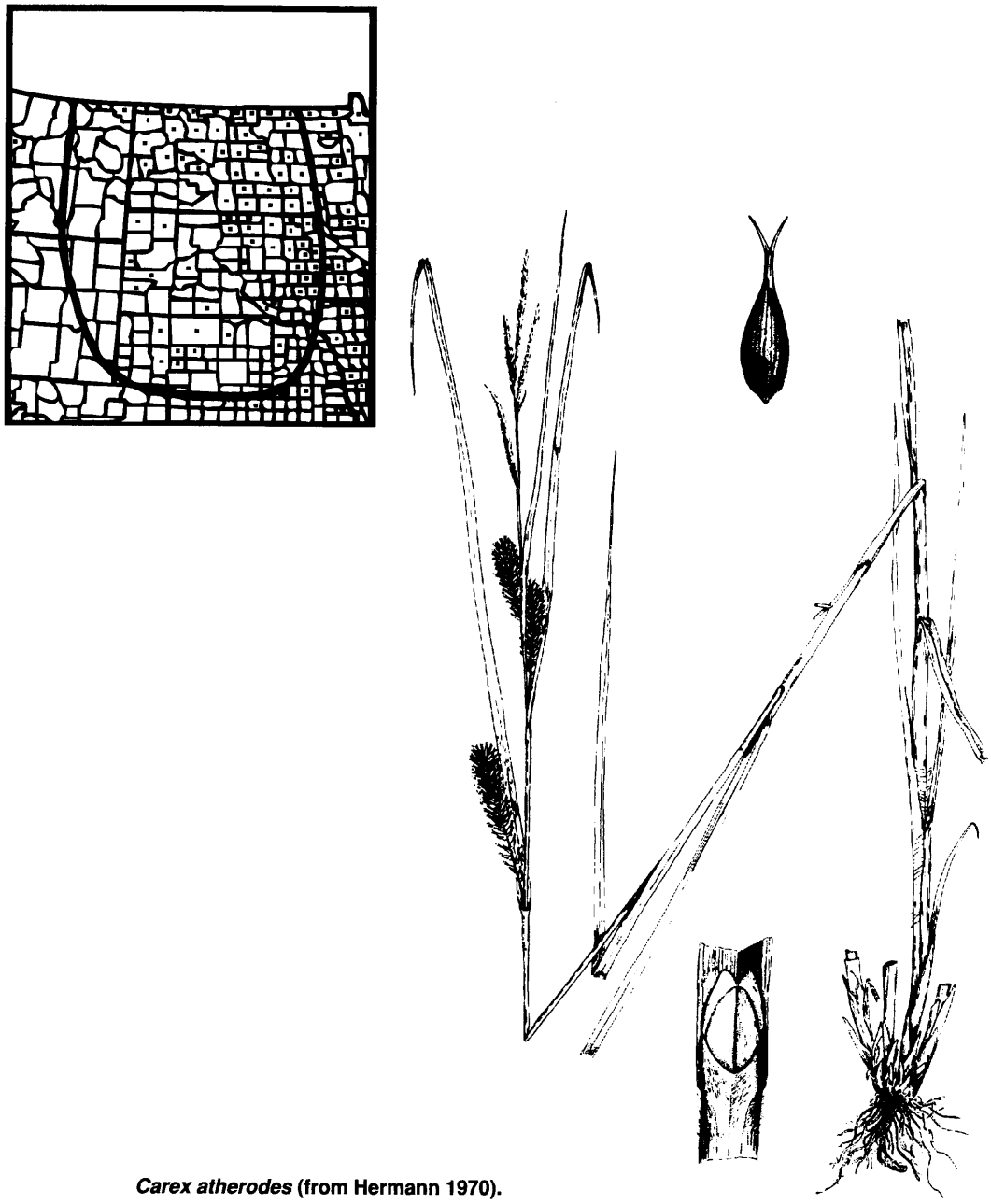




Carex aquatilis **(from Hermann 1970).**

3. *Carex atherodes* Spreng. — Slough sedge

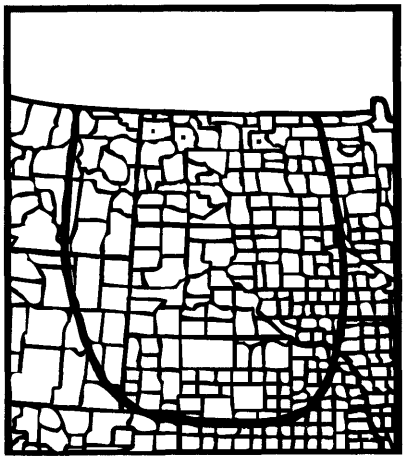
Loosely tufted from long scaly rhizomes; **culms** erect, trigonous, 5-12 dm long. **Leaves** 3-12 mm wide; **sheaths** softly pubescent to puberulent dorsally, brown to purple-tinged at the mouth, the lower ones shredding into filaments. **Spikes** unisexual, sessile or short-peduncled, densely flowered; staminate spikes terminal, 2-6; pistillate spikes 2-4, remotely spaced, cylindric, 2-11 cm long; **bracts** leaflike, exceeding the culm; **scales** thin, hyaline or pale brown, shorter than the perigynium, the midvein prolonged into a slender awn. **Perigynia** ovoid, long-tapering into a smooth beak, 6-11 mm long, strongly many-nerved, the beak teeth smooth, recurved, 1.2-3 mm long; **achenes** trigonous, 2-2.5 mm long; **stigmas** 3. Jun—Jul. Marshes, wet meadows, ditches, stream and pond margins, usually in shallow water; common except in the w part, often abundant; (Circumboreal, in N.Amer. s to NY, MO, NE, CO, UT and OR).



Carex atherodes **(from Hermann 1970).**

4. *Carex athrostachya* Olney

Densely tufted, lacking rhizomes; **culms** trigonous, 1.5-10 dm long. **Leaves** shorter than the culms, 1.5-4 mm wide, the lowest leaves bladeless; **sheaths** hyaline ventrally, brownish-tinged at the base. **Spikes** several, bisexual, gynaecandrous, 4-10 mm long, borne in ovoid to globose-ovoid heads 1-2 cm long; **1-3 of the lowest bracts** below the inflorescence prolonged beyond the head, occasionally merely equaling the head, other bracts reduced and inconspicuous; **pistillate scales** brownish except for the green midrib, longer to shorter than the perigynia, acute to cuspidate. **Perigynia** flattened to slightly plano-convex, narrowly ovate to lanceolate, 2.5-4.5 mm long, ca. 3X longer than wide, faintly several-nerved dorsally, fewer nerved or nerveless ventrally, wing-margined to the base, the beak obliquely cut, serrulate below; **achenes** lenticular, 1.1-1.6 mm long; **stigmas** 2. Jul—Aug. Wet meadows and low prairie; uncommon in nc and nw ND; (ND and Sask. to AK, s to CO and CA).



5. *Carex aurea* Nutt. — Golden sedge

Loosely tufted from rhizomes; **culms** erect, trigonous, 0.5-2(3) dm long. **Leaves** 1-4 mm wide; **sheaths** membranous ventrally, concave at the mouth. **Spikes** 2-5 per culm, ascending, the lower ones peduncled; terminal spikes totally staminate (rarely slightly pistillate at the apex), 3-18 mm long; lateral spikes pistillate, aggregate to widely spaced, 7-15(20) mm long; **bract** of the lowest spike short-sheathing the culm, surpassing the inflorescence; **pistillate scales** whitish to tawny, with a green midvein, ovate to round-ovate, acute to nearly rounded, cuspidate, shorter than the perigynia. **Perigynia** whitish-pulverulent, especially at the apex, becoming golden orange at maturity (drying pale), somewhat flattened, elliptic to obovate, beakless or with a very short tubular beak, several-ribbed, (1.5)2-2.5(3) mm long; **achenes** dark brown to blackish, lenticular, 1-1.5 mm long; **stigmas** 2. Jun—Jul. Wet meadows, low prairie, springs, moist woods and along shores, often where sandy; occasional; (Newf. to AK, s to CT, PA, IN, MN, NE, NM and CA).

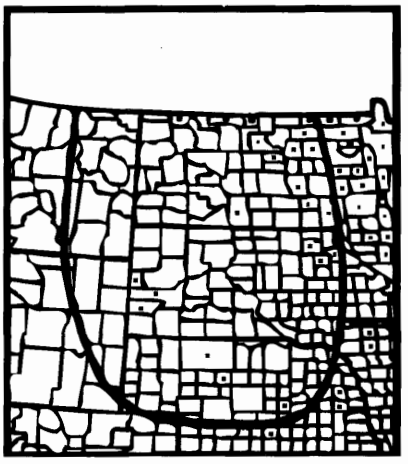




Carex aurea **(from Hermann 1970).**

6. *Carex bebbii* Olney ex Fern.

Tufted; **culms** sharply trigonous, 1.5-8 dm long. **Leaves** shorter to slightly longer than the culms, 1.5-4.5 mm wide; **sheaths** white-hyaline ventrally. **Spikes** bisexual, gynaecandrous, 5-10, ovoid to subglobose, 5-8 mm long, closely aggregate in an ovoid head 1.5-2.5 cm long; **bracts** of the inflorescence reduced and inconspicuous; **pistillate scales** acute to acuminate, narrower and slightly shorter than the perigynia. **Perigynia** green to brown, plano-convex, ovate, 2.5-3.5 mm long, finely nerved dorsally, nerveless ventrally, narrowly wing-margined to the base; beak ca. 1/3 to 1/2 the entire length of the perigynium, serrulate, shallowly bidentate; **achenes** lenticular, 1-1.5 mm long; **stigmas** 2. Jun—Aug. Wet meadows, marshes, stream banks, floodplains, ditches and other wet places; frequent in the e part and the Black Hills, less so in the c; (Newf. to B.C., s to NJ, OH, IL, NE and CO).

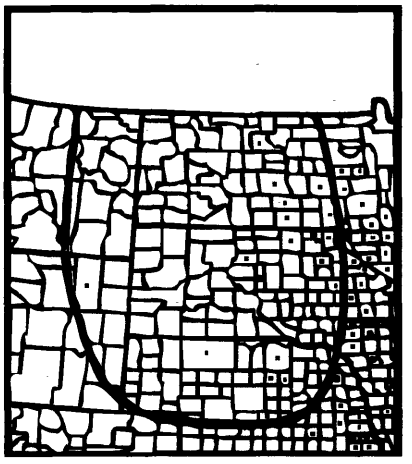




Carex bebbii **(from Hermann 1970).**

7. *Carex bicknellii* Britt. — Bicknell's sedge

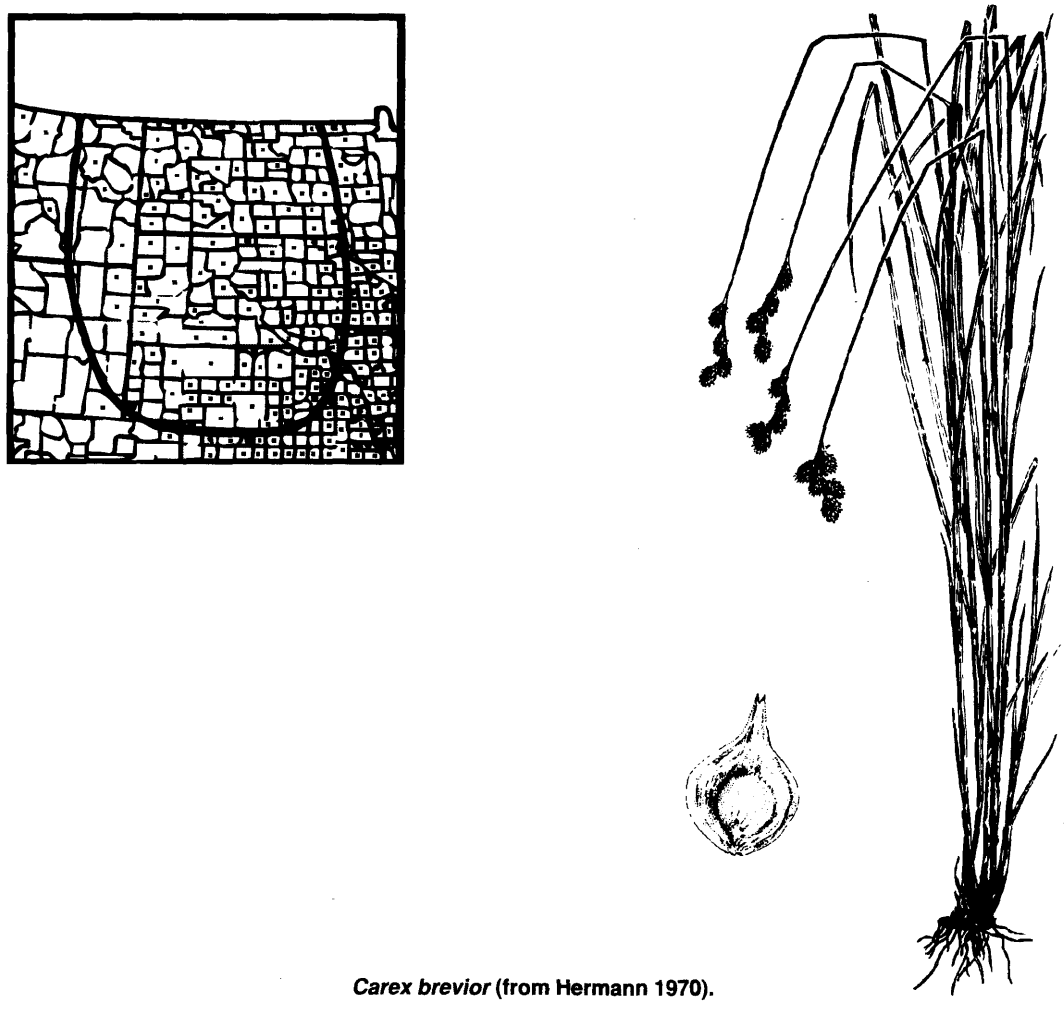
Tufted from short rootstocks; **culms** erect, sharply trigonous, 3-12 dm long, overtopping the leaves. **Leaves** 2-4.5 mm wide; **sheaths** white-hyaline ventrally. **Spikes** bisexual, gynaecandrous, usually 3-7, globose to ovoid above the narrower male portion, 10-18 mm long, aggregate to separate in an ovoid to linear head 1.5-6 cm long; **bracts** much reduced; **pistillate scales** obtuse to acute, shorter and much narrower than the perigynia. **Perigynia** stramineous, membranous, thin except where thickened by the achene, broadly ovate, 4-7 mm long, 1/2 to 3/4 as wide, several-nerved on both faces (fewer ventrally), broadly wing-margined to the base, abruptly contracted to the serrulate, bidentate beak which is 1/4 to 1/3 the entire length of the perigynium; **achenes** lenticular, 1.7-2 mm long; **stigmas** 2. Jun—Jul. Wet meadows, low prairie, ditches and shores; occasional in the e and c parts, rare w; (ME to Sask., s to DE, OH, MO, OK and NM).



8. *Carex brevior* (Dewey) Mack. ex Lunell — Fescue sedge

Tufted from short rootstocks; **culms** sharply trigonous, 3-10 dm long, exceeding the leaves. **Leaves** 1-4 mm wide; **sheaths** white-hyaline ventrally, entirely green to green-and-white mottled or white-hyaline between the nerves dorsally. **Spikes** bisexual, gynaecandrous, 2-8, subglobose to ovoid, the lateral ones rounded to clavate at the base, 5-15 mm long, aggregate to somewhat separate in oblong to slender heads 1.5-5 cm long; **bracts** much reduced, inconspicuous or the lowest seldom exceeding the head; **pistillate scales** obtuse or acute, shorter and narrower than the perigynia. **Perigynia** green to pale brown, firm-textured, plano-convex, broadly ovate (the body suborbicular), 3-4.5 mm long, 3/5 to 3/4 as wide, several-nerved dorsally, nerveless or obscurely few-nerved ventrally, wing-margined to the base, abruptly contracted or somewhat tapered to the serrulate, bidentate beak which is 1/4 to nearly 1/2 the entire length of the perigynium; **achenes** lenticular, 1.7-2 mm long; **stigmas** 2. Jun—Jul. Wet meadows, low to mesic prairie, ditches, shores and stream banks; common; (ME to B.C., s to DE, TN, AR, TX, NM and OR). *C. molesta* Mack.

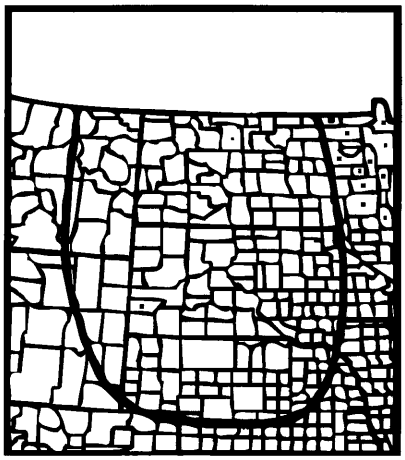
After thoroughly studying northern Great Plains material, I am not convinced of the occurrence of *C. molesta* in this region. Authors differ on the criteria used to distinguish *C. molesta* from *C. brevior*, and the characteristics used to make the distinction seem to be weakly or not at all correlated in our material. I am thus excluding *C. molesta* from this treatment under the assumption that the species either does not occur here, or it is not sufficiently distinct from *C. brevior* to warrant recognition.



Carex brevior **(from Hermann 1970).**

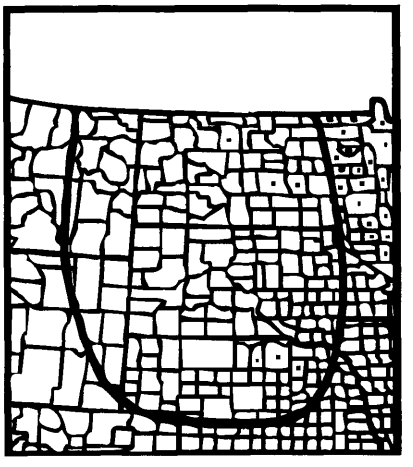
9. *Carex brunnescens* (Pers.) Poir.

Densely tufted from a short, fibrillose rootstock; **culms** slender, sharply trigonous, 0.7-6 dm tall, smooth or slightly roughened below the head, usually surpassing the leaves. **Leaves** deep green, 1-2.5(5) mm wide; **sheaths** tight, hyaline ventrally. **Spikes** 5-10, all gynaecandrous, ovoid, 4-8 mm long, each with 5-10(15) perigynia, the lower spikes usually widely separated in a head (1.5)3-5 cm long; **lowermost bract** setaceous, shorter than to exceeding its subtended spike, the remaining bracts shorter, scalelike; **pistillate scales** ovate, obtuse or acute, somewhat shorter than the perigynia. **Perigynia** filled to the margins by the achene, not winged or sharp-edged, 1.7-2.7 mm long, 1-1.5 mm wide, lightly nerved on both sides, not spongy-thickened at the base, tapered at the apex into a short, minutely bidentate beak 0.4-0.7 mm long, the beak and the upper portion of the perigynium minutely serrulate on the margins and whitish-puncticulate; **achenes** lenticular, 1.2-1.5 mm long, ca. 1 mm wide; **stigmas** 2. Late May—Jul. Wet woods and bogs; rare, with records from McHenry Co., ND and Custer Co., SD; (Circumboreal, in N.Amer. s to NJ, GA, TN, OH, MI, MN, n ND, CO, UT and OR).



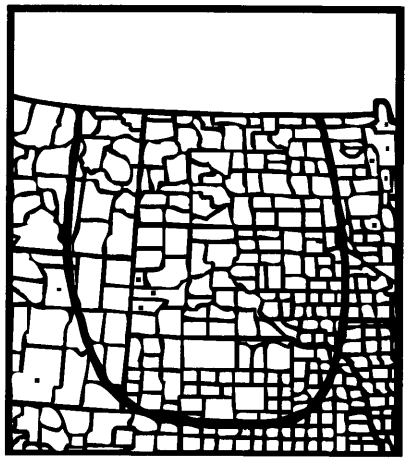
10. *Carex buxbaumii* Wahl.

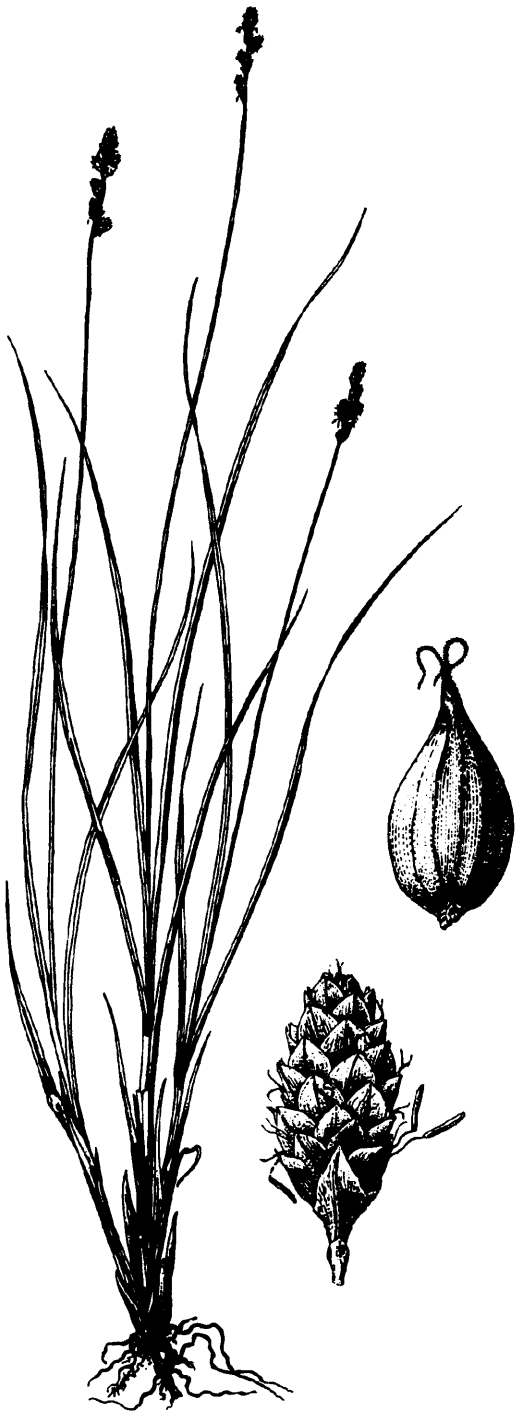
Loosely tufted from long rhizomes; **culms** arising singly or few together, lateral to previous year's shoots, trigonous, 3-10 dm long, roughened above, reddish toward the base. **Leaves** 1-3 mm wide, the lowest ones bladeless; **lower sheaths** shredding into filaments, the upper ones membranous and purple-dotted ventrally. **Spikes** 2-5, close together or rather remote; **terminal spike** gynaecandrous, slightly to considerably larger than the lateral ones, 1-3 cm long; **lateral spikes** pistillate, short-cylindric, sessile or nearly so; **bracts** leaflike, the lowest shorter than to seldom surpassing the head; **scales** dark brown, acute to acuminate, awn-tipped. **Perigynia** light green, golden toward the base, flattened or distended by the achene, elliptic, 2.5-3.5 mm long, slightly more than 1/2 as wide, 2-ribbed, with 6-8 faint nerves on each face; **beak** minute, bidentulate; **achenes** trigonous, 1.4-2 mm long; **stigmas** 3. Late May—Jun. Wet meadows, springs and fens; rare, c ND and nc NE; (Circumboreal, in N.Amer. s to NC, KY, AR, KS, CO, UT and CA).



11. *Carex canescens* L.

Quite similar to *C. brunnescens*, differing as follows: **Foliage** glaucous; **leaf blades** 2-4 mm wide. **Spikes** 4-8, ovoid to oblong-cylindric, each containing 10-30 perigynia. **Perigynia** 1.8-3 mm long, 1.3-1.7 mm wide, with a beak 0.4 mm or less long, not noticeably serrulate on the margins. Jun—Jul. Wet mountain meadows, stream banks and boggy places in coniferous forest; uncommon in the Black Hills, otherwise more common in mountains farther w; (Circumboreal, in N.Amer. s to VA, OH, MN, SD, AZ and CA).



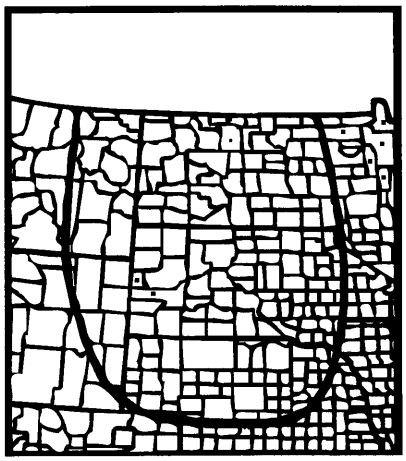


Carex canescens **(from Hermann 1970).**

12. *Carex capillaris* L.

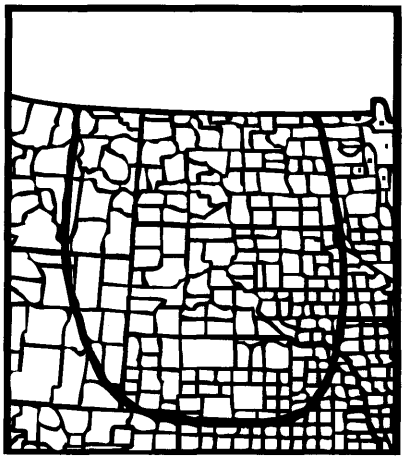
Densely tufted; **culms** slender, trigonous, 1.5-4 dm long. **Leaves** mainly basal, much shorter than the culms, 0.7-2.5 mm wide; **sheaths** tight, truncate at the summit. **Spikes** unisexual; terminal spike staminate, 4-8 mm long; lateral spikes 1-4, remote, loosely flowered, short-cylindric, 5-15 mm long, borne on filiform, spreading to drooping peduncles 5-15 mm long; **bract** subtending the lowest pistillate spike with a well-developed sheath to 25 mm long; **scales** white-hyaline marginally, greenish or light brown in the middle, obtuse or acute, shorter but often wider than the perigynium, deciduous. **Perigynia** shiny brown to olive-green, nearly terete, ovoid-ellipsoid, 2.2-3.5 mm long, 2-ribbed, otherwise nerveless, tapered to an obliquely cut, hyaline-tipped beak ca. 0.5 mm or more long; **achenes** trigonous with concave sides, 1.2-1.5 mm long, jointed to the style; **stigmas** 3. Jun—Jul. Boggy places and swamps, usually where wooded; rare, with records from the Turtle Mts., ND, and the Black Hills, SD; (Circumboreal, in N.Amer. s to NY, MI, MN, SD, NM, UT, NV and OR).

The phase of *C. capillaris* in this region is var. *elongata* Olney.



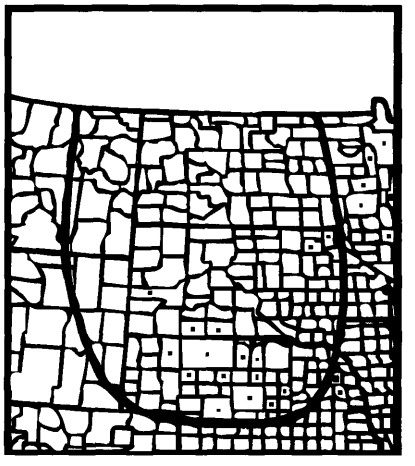
13. *Carex chordorrhiza* Ehrh. ex L.f.

Culms arising singly or few together from the axils of dried leaves on older, reclining culms, the old, sterile culms elongate, smooth and wiry, fertile culms erect or nearly so, obtusely trigonous, 1-3 dm tall. **Leaves** 1-3 well-developed on each culm, the lower ones tending to be bladeless, blades 1-5 cm long on the fertile culms, to much longer on the sterile ones, 1-2 mm wide; sheaths hyaline ventrally. **Spikes** 3-8, bisexual, androgynous, ovoid, crowded in an oblong to ovoid head 5-15 mm long; **bracts** none; **pistillate scales** deep brown, ovate, acuminate, about equaling the perigynia. **Perigynia** brown, compressed-ovoid, 2-3.5 mm long, coriaceous, many-nerved on both faces, obscurely margined; beak short, emarginate; **achenes** lenticular; **stigmas** 2. Jun—Aug. Wet sphagnum bogs; rare, with a record from Bottineau Co., ND; (Circumboreal, in N.Amer. s to VT, NY, IN, n IA, n ND, Sask. and B.C.).



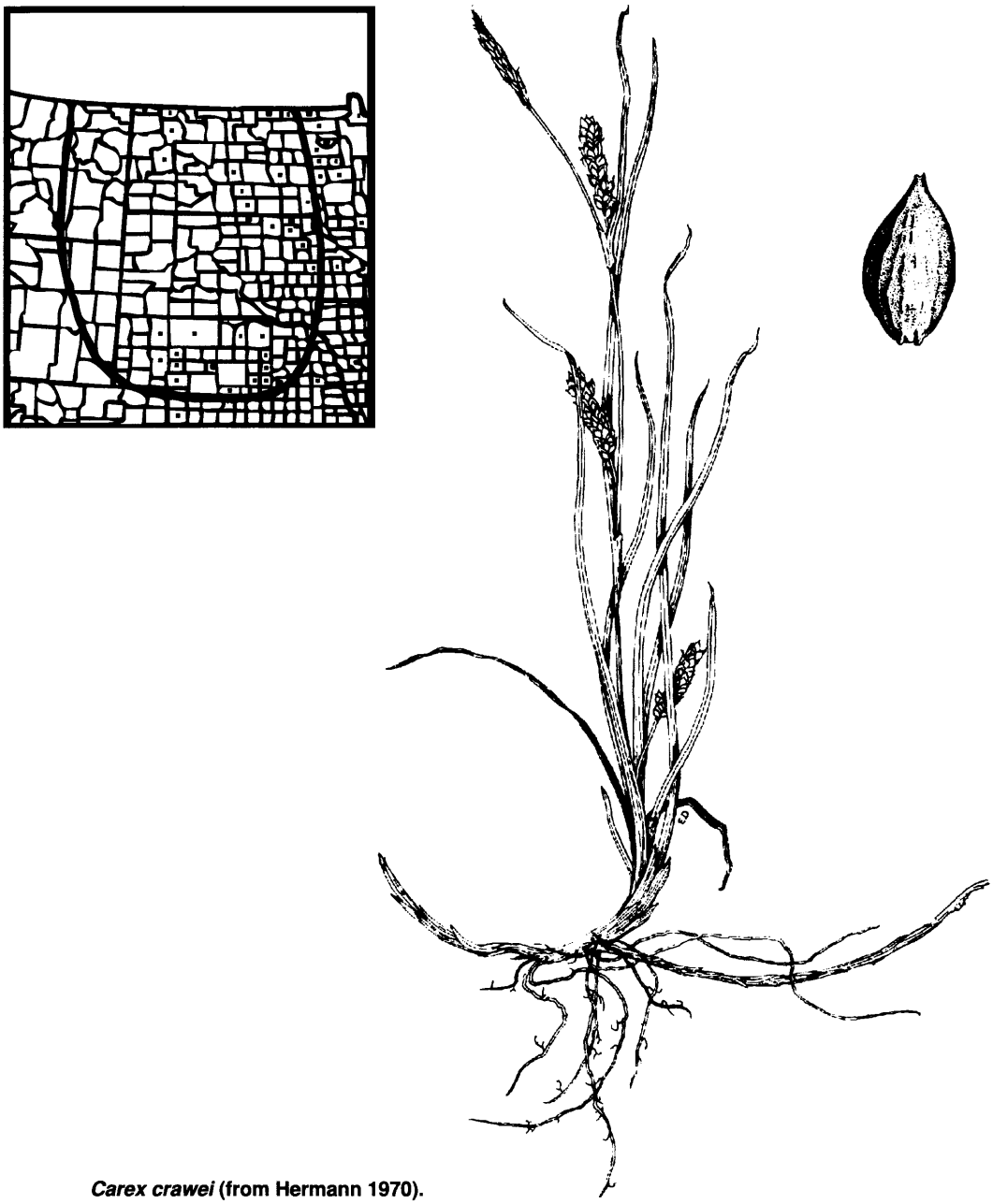
14. *Carex comosa* F. Boott

Densely tufted, often forming large clumps; **culms** stout, sharply trigonous, 5-15 dm long. **Leaves** 5-12 mm wide; sheaths hyaline ventrally, conspicuously septate-nodulose dorsally. **Spikes** unisexual, the terminal one staminate, 3-7 cm long; lateral spikes pistillate, 3-5, cylindric, 3-8 cm long, 9-12 mm thick, the lower spikes longer-peduncled and eventually drooping; **bracts** leaflike, much surpassing the inflorescence; **pistillate scales** with a small hyaline-margined body, tapered into a long, rough awn longer than the body. **Perigynia** numerous, reflexed at maturity, flattened-trigonous, lanceolate with a stipitate base, 5.7-7.7 mm long, firm and shiny, strongly 12- to 17-nerved, tapering to the smooth, slender beak 2-3 mm long, the teeth recurved-spreading, 1.2-2 mm long; **achenes** trigonous, 1.5-2 mm long, continuous with the style; **stigmas** 3. Late Jun—Aug. Fresh marshes, swamps and spring-fed streams; rare in ne and the Black Hills, SD; frequent in the Sand Hills, s SD to c and e NE; (Que. to MN and SD, s to FL and TX; also WA and n ID to CA).



15. *Carex crawei* Dewey

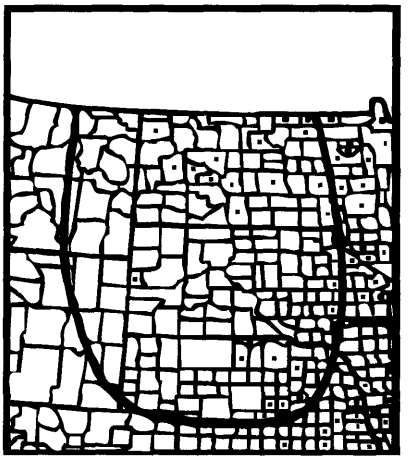
Culms arising singly or few together from long-creeping rhizomes, weakly trigonous, 0.6-4 dm long. **Leaves** 1-4 mm wide; **sheaths** tight, hyaline ventrally. **Spikes** unisexual, cylindric, terminal one staminate, lateral ones pistillate, 2-5, remote, the lowest nearly basal, compactly flowered, 1-3 cm long; **bracts** leaflike with well-developed sheaths, the lowest one best developed, with the sheath 5-15 mm long, the blade not exceeding the terminal spike; **scales** reddish-brown with a pale or greenish midrib, shorter and narrower than the perigynia. **Perigynia** green to brown, ellipsoid to ovoid-ellipsoid, 2.3-3.5 mm long, many-nerved; beak absent or to 0.4 mm long, entire to bidentulate; **achenes** trigonous, 1.3-1.7 mm long; **stigmas** 3. Jun—Jul. Wet meadows, ditches and seepage areas; occasional, n ND to e SD and most of NE; (Que. to se B.C., s to NJ, AL, MO, OK, WY and UT).



Carex crawei **(from Hermann 1970).**

16. *Carex cristatella* Britt.

Tufted from short rootstocks; **culms** sharply trigonous, 3-10 dm long, slightly shorter to exceeding the leaves. **Leaves** 3-7 mm wide; **sheaths** loose, green-striate dorsally and ventrally except for the V-shaped hyaline area at the mouth. **Spikes** bisexual, gynaecandrous, 5-12, globose or subglobose, 4-8 mm long, crowded in an ovoid to oblong head 2-3.5 cm long; **bracts** much reduced, inconspicuous; **pistillate scales** acute to acuminate, shorter than the perigynia. **Perigynia** widely spreading to reflexed at maturity, green to pale brown, plano-convex, ovate to lanceolate, 2.5-4 mm long, 1/3 to 1/2 as wide, faintly nerved on both sides, strongly winged above the middle, narrower-winged below the middle, tapered to the serrulate, bidentate beak which is 1/3 to 1/2 the total length of the perigynium, often notched or wrinkled at the base; **achenes** lenticular, 1-1.5 mm long; **stigmas** 2. Late Jun—Aug. Wet meadows, floodplains, shores and stream banks; frequent in the e part, less so in the c and w, primarily along river and stream courses; (NH and w Que. to se Man. and ND, s to VA, MO and NE).



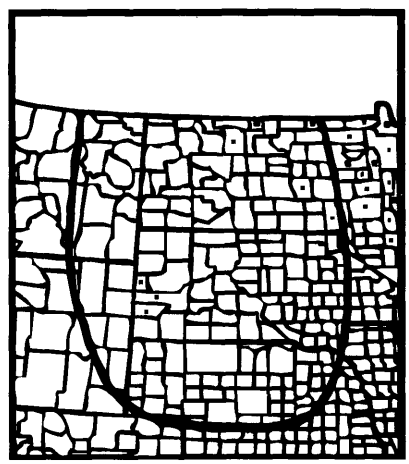
17. *Carex diandra* Schrank

Densely tufted; **culms** sharply trigonous, 3-8 dm long, usually exceeding the leaves. **Leaves** 1-3 mm wide; **sheaths** pale-striate, white-hyaline ventrally or only slightly copper-tinged at the mouth, prolonged into a ligule 1-3 mm long. **Spikes** bisexual, androgynous, aggregate, continuous or nearly so in ovoid to subcylindric heads 1-4 cm long; **bracts** reduced, inconspicuous, usually shorter than the spikes; **pistillate scales** brownish, acute to cuspidate, about equaling the perigynia. **Perigynia** brown, shiny, unequally biconvex, deltoid-ovate, truncate-rounded at the base, 2-3 mm long, ca. 1/2 as wide, few-nerved dorsally, nerveless ventrally, tapering to the serrulate, entire to bidentulate beak which is 1/4 to 1/2 the entire length of the perigynium; **achenes** lenticular, ca. 1 mm long; **stigmas** 2. Jun—Jul. Wet meadows, springs and fens; rare, nc ND and nc and w NE; (Circumboreal, in N.Amer. s to NJ, IN, MO, NE, CO, UT and CA).



18. *Carex disperma* Dewey

Loosely tufted or single from slender rhizomes; **culms** slender, weak, trigonous, 1-4 dm long, shorter than to exceeding the leaves. **Leaves** soft and spreading, 1-2 mm wide, the sheaths tight, hyaline ventrally. **Spikes** bisexual, androgynous, 2-5, sessile, few-flowered and very small, with 1-6 perigynia and 1 or 2 staminate flowers, to 5 mm long, remote or the upper spikes close together in interrupted heads 1.5-2.5 cm long; **bracts** sheathless, inconspicuous, resembling the pistillate scales or filiform and to 2 cm long; **pistillate scales** white-hyaline except for the midrib, acuminate or mucronate, mostly 2/3 as long as the perigynium. **Perigynia** unequally biconvex to nearly terete, ellipsoid, 2-3 mm long, strongly nerved and rounded on the margins, otherwise obscurely to plainly many-nerved, the beak minute, oblique; **achenes** lenticular, elliptic, 1.4-1.7 mm long; **stigmas** 2. May—Jun. Swamps, bogs and springs; rare in e and nc ND, frequent in the Black Hills; (Circumboreal, in N.Amer. s to NJ, IN, SD, NM, UT and OR).



19. *Carex emoryi* Dewey

Loosely tufted from long scaly rhizomes; **culms** trigonous, 4-10 dm long, exceeding the leaves, smooth to rough. **Leaves** green, 2-5 mm wide, the lower ones bladeless, merely sheathing the base of the culms; **leaf sheaths** white-hyaline ventrally, white to yellow-tinged dorsally, the lower ones dark red to brown, not shredding into ladderlike fibers; ligule at juncture of blade and sheath truncate to rounded, as wide as or wider than long. **Spikes** 3-7, the terminal 1 or 2 staminate, 2-4.5 cm long, the lateral ones pistillate or androgynous, 2-10 cm long; **lowest bract** leaflike, sheathless; **pistillate scales** blunt to acuminate, narrower than the perigynia. **Perigynia** light green, becoming stramineous at maturity, whitish-papillate only at the apex, biconvex, elliptic or ovate-elliptic, 1.6-2.9 mm long, 1/2 to 3/5 as wide; beak to 0.2 mm long, entire; **achenes** lenticular, ca. 1.5 mm long; **stigmas** 2. Late May—Jul. Shores, stream banks, wet meadows and seepage areas; frequent; (NY and NJ to Man., s to FL, TX and NM).

See note under *C. stricta*.

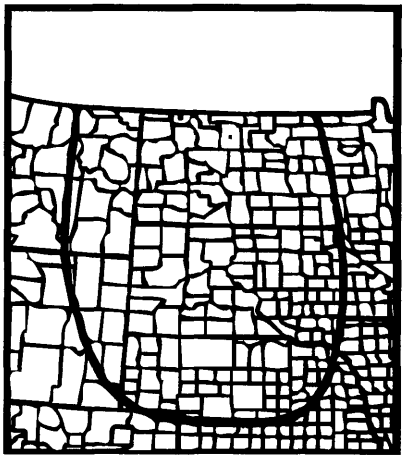




Carex emoryi **(from Hermann 1970).**

20. *Carex garberi* Fern.

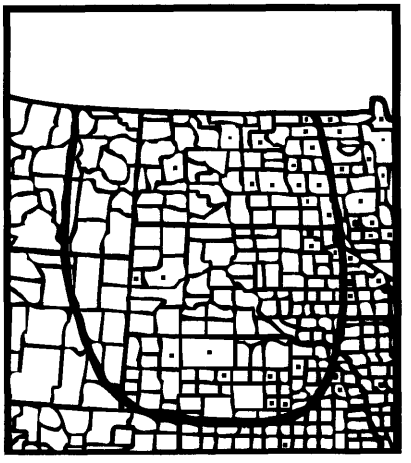
Much like *C. aurea* and perhaps only a variant of it. **Culms** mostly solitary from slender rhizomes, erect, trigonous, 1.5-3 dm long, exceeding the leaves. **Leaves** 2-3 mm wide; **sheaths** white-hyaline ventrally, concave at the mouth. **Spikes** 2-4 per culm, ascending, the lower ones peduncled; terminal spikes gynaecandrous or some staminate, 8-30 mm long; lateral spikes pistillate, closely spaced or separate, 7-15 mm long; **bract** subtending the lowest spike short-sheathing the culm and surpassing the inflorescence; **pistillate scales** brown to purplish with a green midvein, blunt, somewhat shorter than the perigynia. **Perigynia** whitish-pulverulent at maturity, not turning golden orange, obovoid, 2-3 mm long, 2-ribbed, otherwise inconspicuously nerved, beakless or with a minute tubular beak; **achenes** lenticular, ca. 1.5 mm long; **stigmas** 2. Jun—Jul. Wet meadows, seepage areas and boggy places; rare, with records from Burke and McHenry Counties, ND; (Que. to B.C., s to VA, ND and OR).



21. *Carex granularis* Muhl. ex Willd. — Meadow sedge

Tufted from very short rhizomes; **culms** obtusely trigonous, 1-5 dm long. **Leaves** often exceeding the culms, 3-13 mm wide; **sheaths** membranous ventrally, septate-nodulose dorsally. **Spikes** unisexual, the terminal one staminate, sessile or subsessile, the lateral ones pistillate, aggregated around the staminate spike; **bracts** considerably overtopping the inflorescence, short-sheathing; **pistillate scales** brownish, acuminate to cuspidate, 1/2 as long as the perigynia. **Perigynia** crowded in several rows, green or olive to brownish, ellipsoid to obovoid, 2-2.5(4) mm long, 1/2 to 2/3 as wide, 2-ribbed with more than 10 additional strong nerves; beak minute or obsolete, entire to slightly bidentulate; **achenes** trigonous, 1.3-1.7 mm long; **stigmas** 3. Jun—early Jul. Wet meadows, stream banks, pond margins, springs and seepage areas; frequent in e and c ND, ne and the Black Hills, SD, and c and e NE; (Que. and ME to Sask., s to FL, LA and TX).

Most of plants in this region are var. *haleana* (Olney) Porter, with **perigynia** narrowly ovoid or ellipsoid, 2-2.8 mm long, 1-1.5 mm wide, ascending in the spikes. This variety is most characteristic of open habitats. The var. *granularis* has **perigynia** obovoid to subglobose, 2.5-4 mm long, 1.5-2.5 mm wide, spreading at maturity; occurring mostly in wet, wooded habitats. Distinction of the two varieties is often difficult.



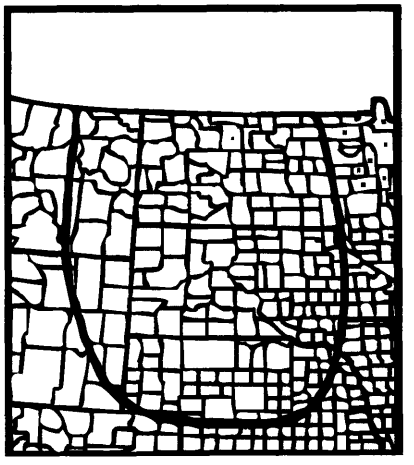
22. *Carex gravida* Bailey — Heavy sedge

Tufted from stout rootstocks; **culms** erect or leaning, sharply trigonous, 3-11 dm long, roughened above. **Leaves** 3-8 mm wide; **sheaths** whitish and conspicuously septate-nodulose dorsally, white-hyaline ventrally, not cross-rugulose. **Spikes** bisexual, androgynous, single at each node, usually less than 10, in dense, ovoid to oblong heads 1-3.5 cm long; **bracts** usually inconspicuous, setaceous, seldom exceeding the head; **pistillate scales** green to brown, acuminate to cuspidate, shorter than the perigynia. **Perigynia** conspicuous in the head, not hidden by the scales, green and pale to yellowish-brown, shiny, plano-convex, ovate, 4-5 mm long, ca. 1/2 as wide, obscurely nerved dorsally, nerveless ventrally, contracted to the serrulate, bidentate beak which is ca. 1/3 the total length of the perigynium; **achenes** lenticular, 1.8-2.2 mm long, about as wide; **stigmas** 2, the style base enlarged. Jun—Jul. Wet meadows, stream banks, floodplains and prairie swales, but more often in moist woods and thickets; frequent; (Ont. to MT, s to OH, KY, TX and CO).



23. *Carex gynocrates* Wormskj. ex Drej.

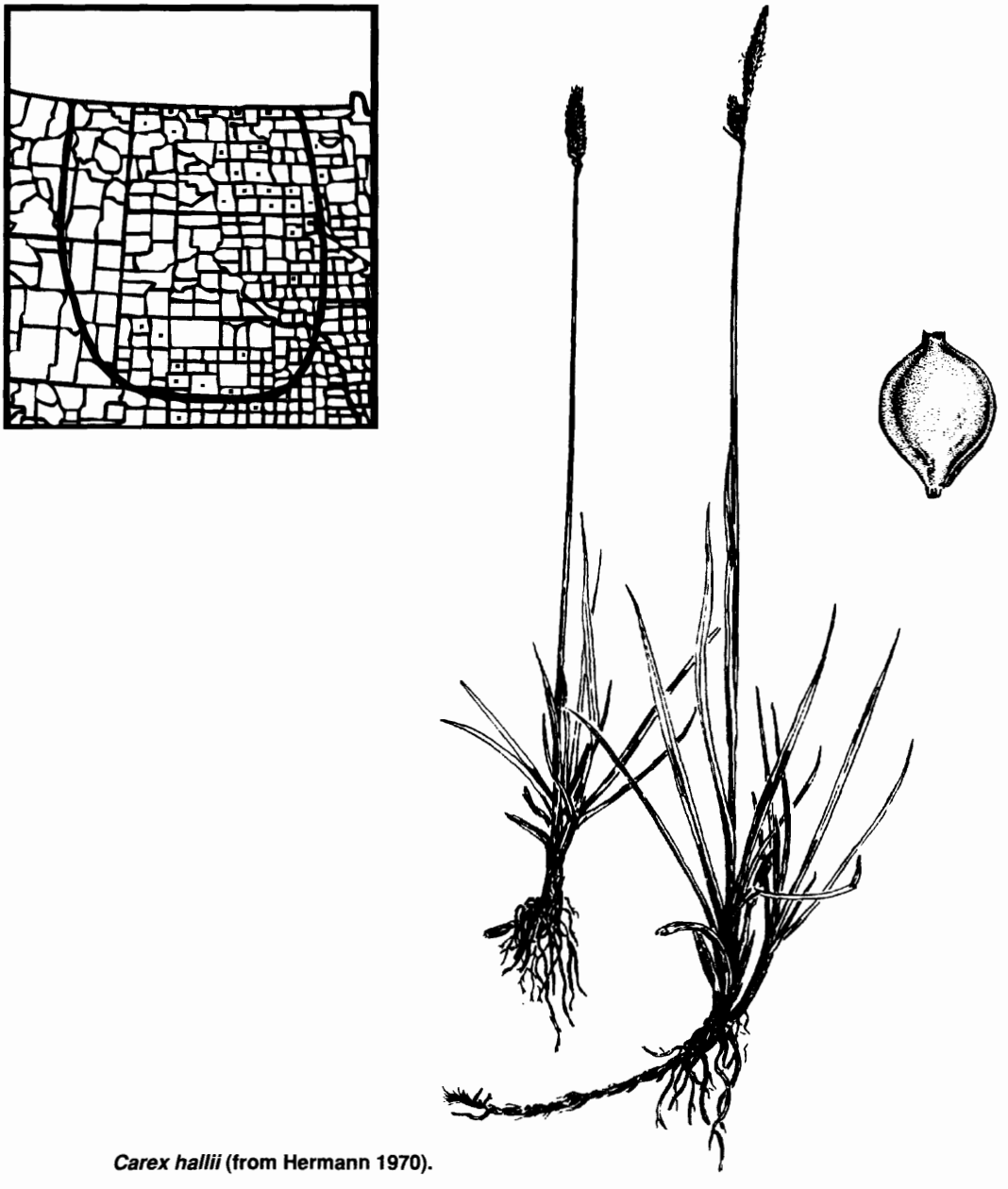
Culms single or few together from long, very slender rhizomes, slender but stiff, 0.4-3 dm long, smooth, usually exceeding the leaves, brown and sheathed at the base by the previous year's leaves. **Leaves** clustered near the base, the blades narrowly involute and filiform, 0.4-0.9 mm wide. **Spikes** only 1 per culm, all staminate or all pistillate or bisexual and androgynous, 0.5-2 cm long, the staminate spike or portion linear-cylindric, the pistillate spike or portion short-cylindric; **bract** obsolete; **pistillate scales** brown or reddish, oblong-ovate, acute or acuminate, shorter than but wider than the perigynium. **Perigynia** 4-10, widely spreading or somewhat reflexed, yellowish to brownish-black and shiny, plump, oblong-ovate, 2.5-4 mm long, 1/2 as wide, spongy at the base, finely many-nerved dorsally, obscurely nerved ventrally, abruptly contracted to the beak; beak nearly entire to obliquely cut, 0.5 mm long; **achene** lenticular, 1.5 mm long; **stigmas** 2. Jun—Jul. Sphagnum bogs and wet, peaty soils; rare, with one record from McHenry Co., ND; (Greenl. to Yuk., s to Newf., PA, MI, MN, n ND, CO, UT and OR; also Siberia).



24. *Carex hallii* Olney

Loosely tufted from short rootstocks, also producing long rhizomes; **culms** weakly trigonous below to sharply trigonous above, 1.5-4 dm long. **Leaves** mainly basal, 1/4 to nearly as long as the culms, 1-3 mm wide; previous year's leaves commonly persistent at the base. **Spikes** 1-5, the terminal one staminate, pistillate or gynaecandrous, 1-2.5 cm long; lateral spikes usually present, all pistillate, smaller than the terminal spike; **bracts** obsolete to setaceous, not exceeding the head; **pistillate scales** brown with a green midvein and scarious margins, obtuse to cuspidate, equaling to slightly exceeding the perigynia. **Perigynia** green to brown, obovate, 1.5-2.3 mm long, abruptly short-beaked, the beak 0.2-0.4 mm long, entire to bidentulate, papillate and spinulose; **achenes** unequally trigonous, 1.2-1.7 mm long; **stigmas** 3. Jun—Jul. Wet meadows, springs and seepage areas; occasional, nw, c and e ND, e SD and c NE; (s Man., s to NE and CO).

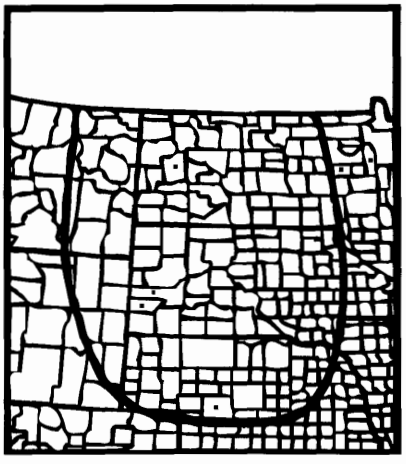
Reports of *C. parryana* Dewey in ND are based on misidentifications of *C. hallii*.



Carex hallii **(from Hermann 1970).**

25. *Carex haydenii* Dewey

Loosely tufted from short rhizomes; **culms** arising from the previous year's tufts of leaves, enveloped at the base by the dried leaves, trigonous, 3-10 dm long, usually surpassing the leaves, roughened above. **Leaves** green, 2-5 mm wide, the lower ones bladeless, merely sheathing the base of the culm; **leaf sheaths** white to yellowish-hyaline ventrally, green dorsally. **Spikes** 3-6, the upper 1-3 staminate, the terminal one largest, 2-5 cm long, the others much smaller, the lower 2-3 pistillate or androgynous, 1-3 cm long; **lowest bract** leaflike, sheathless, usually shorter than the head; **pistillate scales** acuminate, longer than the perigynia. **Perigynia** pale brown at maturity, often with darker brown spots, biconvex, round-obovate, inflated at the apex, 2-2.5 mm long, 3/5 to about as wide; **beak** minute; **achenes** lenticular, ca. 1 mm long; **stigmas** 2. Late May—Jul. Wet meadows, marshes and stream banks; rare, with records from Dunn Co., ND, Pennington and Custer Counties, SD, and Lincoln Co., NE; (N.B. to ND, s to PA, IN, MO and NE).



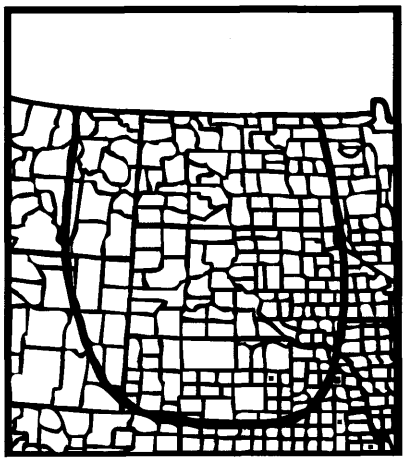
26. *Carex hookerana* Dewey

Densely tufted from short rootstocks; **culms** slender, rather lax, trigonous, 1.5-6 dm long, exceeding the leaves. **Leaves** 1-2.5 mm wide; **sheaths** tight, white-hyaline and not cross-rugulose ventrally, green and not septate-nodulose dorsally. **Spikes** bisexual, androgynous, single at each node, usually less than 10, lower ones usually separate, in heads 1.5-5 cm long; **bracts** obsolete or much reduced and setaceous; **pistillate scales** green to reddish-brown with broad scarious margins, especially the lower ones awn-tipped, about as long and as wide as the perigynia. **Perigynia** hidden in the head by the scales, brownish, plano-convex, ovate-lanceolate, 2.7-3.5 mm long, membranous-thin and nerveless where distended over the achene, abruptly contracted into a bidentate, serrulate beak which is 1/4 to 1/3 the total length of the perigynium; **achenes** lenticular, 1.5-1.7 mm long; **stigmas** 2. Jun—Jul. Wet meadows, boggy places, moist woods and prairie; uncommon in n ND; (w Ont. to Alta., s to ND).



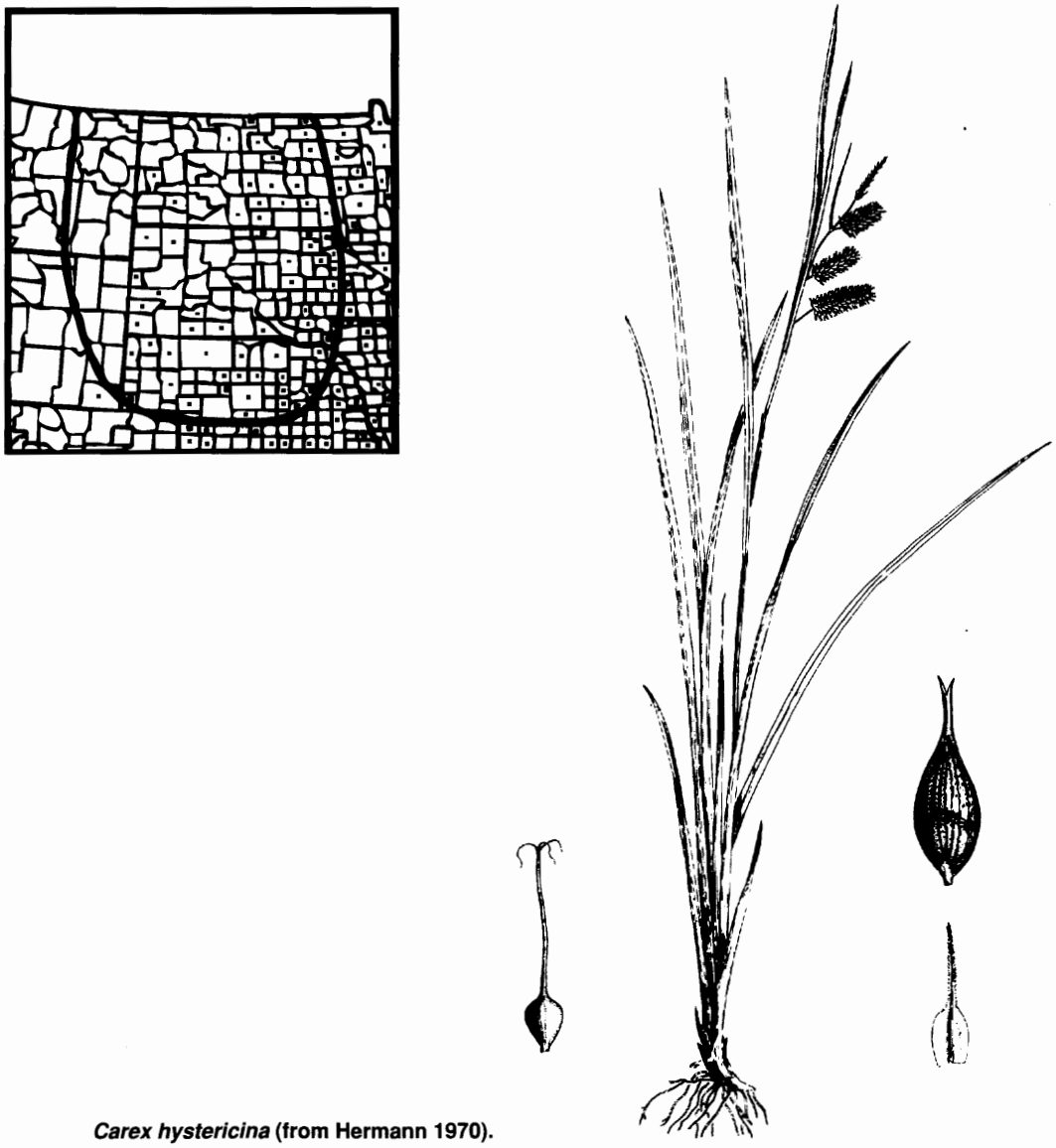
27. *Carex hyalinolepis* Steud. — Thinscale sedge

Quite similar to *C. lacustris* and sometimes treated as a variety of it, differing chiefly as follows: **Lower leaf sheaths** whitish to pale brown, not red-tinged, rarely breaking into fibers. **Perigynia** 5-8 mm long, with numerous very faint nerves which are slightly elevated or impressed. Wet meadows, marshes and swamps; rare in e and c NE; (NJ to s Ont. and NE, s to FL and TX). *C. lacustris* Willd. var. *laxiflora* Dewey.



28. *Carex hystericina* Muhl. ex Willd. — Bottlebrush sedge

Tufted, often in large clumps, with short rhizomes; **culms** erect or leaning, trigonous, 2-10 dm long, usually surpassing the leaves. **Leaves** yellow-green, 3-8 mm wide; **sheaths** white-hyaline ventrally, green to yellowish or reddish dorsally, the lower sheaths eventually breaking into filaments. **Spikes** unisexual, the terminal one staminate, 1-5 cm long, usually short-peduncled and often subtended by a bract; lateral spikes pistillate or occasionally slightly androgynous, 1-4, short-cylindric, 1-5 cm long, 0.8-1.5 cm thick, separate or aggregate, the lower ones usually nodding on filiform peduncles, the upper ones shorter-peduncled and ascending; **pistillate scales** inconspicuous, narrow and much shorter than the perigynia, rough-awned. **Perigynia** spreading or ascending, greenish-stramineous, nearly terete at maturity, ovoid, 5-7.5 mm long, strongly 12- to 17-nerved, abruptly contracted to the slender beak which is ca. 1/2 the total length of the perigynium; beak teeth 0.4-1 mm long, erect or nearly so; **achenes** trigonous with concave sides, 1.4-1.7 mm long; **stigmas** 3. Jun—Jul. Shores, stream banks, wet meadows, springs, swamps and fens; common in the e part, the Sand Hills and Black Hills, otherwise less common w; (N.B. to WA, s to VA, KY, AR, TX, NM and CA).



Carex hystericina **(from Hermann 1970).**

29. *Carex interior* Bailey

Densely tufted; **culms** slender, sharply trigonous, 1-6 dm long, about equaling to exceeding the leaves. **Leaves** 1-2 mm wide; **sheaths** tight, hyaline ventrally. **Spikes** 2-4, the terminal one gynaecandrous or rarely staminate, the lateral ones pistillate, or seldom gynaecandrous, globose, ca. 5 mm in diameter, overlapping or nearly so in heads 0.8-2.5 cm long, the terminal spike often more remote than the lateral ones; **bracts** much reduced or obsolete; **pistillate scales** obtuse, much shorter than the perigynium. **Perigynia** brownish-green to brown, concavo-convex, ovate, filled to the margins by the achene, sharp-edged but not wing-margined, 2-3 mm long, 1/2 to 2/3 as wide, several-nerved dorsally, nerveless or few-nerved at the base ventrally, spongy at the base so that the achene fills mainly the upper 2/3 of the perigynium body, truncate-rounded at the base, contracted to a serrulate beak which is 1/4 to 1/3 the entire length of the perigynium; beak teeth obscure, not exceeding 0.25 mm long; **achenes** lenticular, 1.2-1.5 mm long, about as wide; **stigmas** 2. Late May—Jul. Wet meadows, shores, stream banks, springs, fens and boggy places; frequent from n ND to e SD, also the Black Hills and Sand Hills; (Labr. and Newf. to B.C., s to PA, IN, MO, KS and into n Mex.).

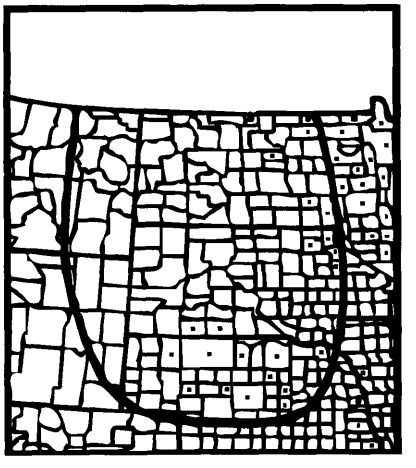




Carex interior **(from Hermann 1970).**

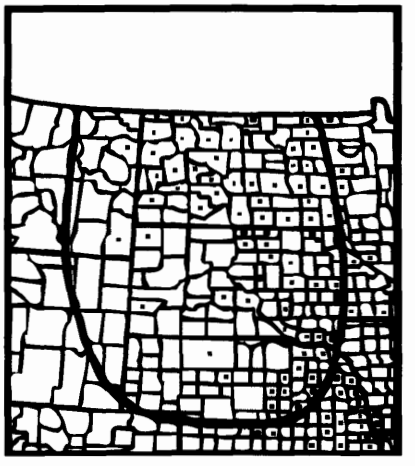
30. *Carex lacustris* Willd.

Tufted from prolonged scaly rhizomes; **culms** stout, erect, trigonous, 6-13 dm long, roughened. **Leaves** about equaling or slightly exceeding the culm, 6-15 mm wide; **sheaths** often partly red-tinged, the lower ones disintegrating into a network of fibers. **Spikes** unisexual, the upper 2-4 staminate, sessile, 4-7 cm long, the lower 2-4 pistillate, erect, usually separate, sessile or short-peduncled, cylindric, 3-10 cm long, 3-15 mm thick; **bracts** leaflike, some or all exceeding the inflorescence; **pistillate scales** awned or acuminate, the body shorter than the perigynia, hyaline to pale brown on the sides. **Perigynia** olive, flattened-subterete, slenderly ovoid, 5.5-7 mm long, with more than 10 strong, elevated nerves, tapering to a smooth beak ca. 1 mm long, the beak teeth 0.4-0.8 mm long, erect or slightly curved; **achenes** trigonous, 2-2.5 mm long; **stigmas** 3, the lower portion of the style straight and persistent. Jun—early Jul. Swamps, marshes, and springs, usually in shallow water; scattered and locally abundant from nc and e ND to ne SD, also the Sand Hills and e NE; (Que. to Sask., s to FL and TX).



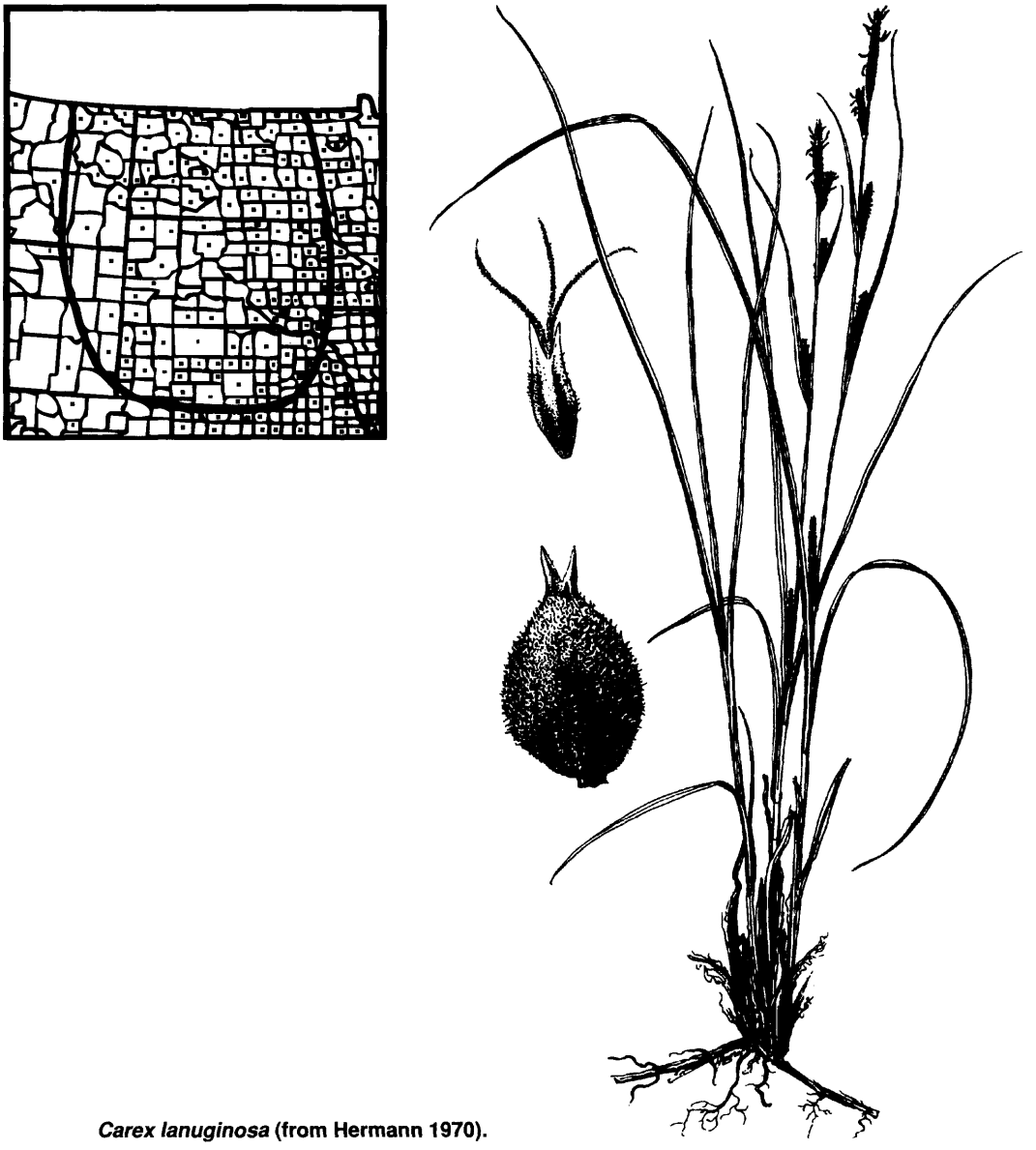
31. *Carex laeviconica* Dewey — Smoothcone sedge

Loosely tufted from prolonged scaly rhizomes; **culms** stout, trigonous, 3-12 dm long. **Leaves** shorter than to surpassing the culm, 2-8 mm wide; **sheaths** glabrous, often purple-tinged below and splitting into a network of fibers. **Spikes** unisexual, the upper 2-6 staminate, 1-4 cm long, the lower 2-4 pistillate, erect, remote, sessile to short-peduncled, cylindric, 3-10 cm long, 6-10 mm thick; **bracts** leaflike, equaling to surpassing the inflorescence; **pistillate scales** acute to aristate, the body shorter than the perigynium, hyaline or brown on the sides. **Perigynia** greenish-yellow, subterete, inflated, broadly ovoid, 4.5-9 mm long, strongly many-nerved, tapering to a slender beak 1.5-2 mm long, the beak teeth 1-2 mm long, straight; **achenes** trigonous, 2-2.5 mm long; **stigmas** 3, the lower portion of the style straight and persistent on the achene. Jun—Jul. Wet meadows, marshes, shores, stream banks, ditches, springs and low wooded areas; e MT, ND s to sc NE, most common n; (Man. and Sask., s to MO, KS and MT).



32. *Carex lanuginosa* Michx. — Woolly sedge

Extensively colonial from scaly rhizomes; **culms** trigonous, 2-10 dm long. **Leaves** 2-5 mm wide; sheaths hyaline ventrally, the lower ones often purple-tinged dorsally, disintegrating and leaving a loose network of fibers. **Spikes** unisexual, the upper 1-3 (usually 2) staminate, 2-6 cm long, the lower 1-3 pistillate, remote, sessile or nearly so, cylindric, 1-4 cm long; **bracts** leaflike, the lowest one usually surpassing the inflorescence; **pistillate scales** brown to purplish-brown on the sides, acuminate to awned, shorter to longer than the perigynia. **Perigynia** brownish to yellowish-green to grayish-brown, or sometimes purplish, subterete, oblong-ovoid, 2.5-4(5) mm long, densely pubescent, many-nerved, contracted into the beak which is 1/4 to 1/3 the entire length of the perigynium, the beak teeth 0.3-0.8 mm long, divergent; **achenes** trigonous with concave sides, 1.7-2 mm long; **stigmas** 3, the style jointed with the achene. Jun—Jul. Wet meadows, marshes, shores, stream banks, springs, ditches and other wet places; common, often abundant; (N.B. and Que. to B.C., s to VA, TN, AR, TX and CA). *C. lasiocarpa* Ehrh., in part.

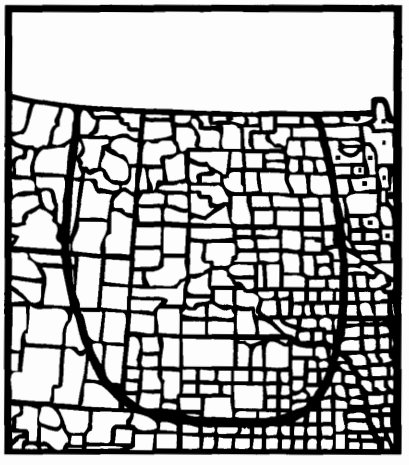


Carex lanuginosa **(from Hermann 1970).**

33. *Carex lasiocarpa* Ehrh.

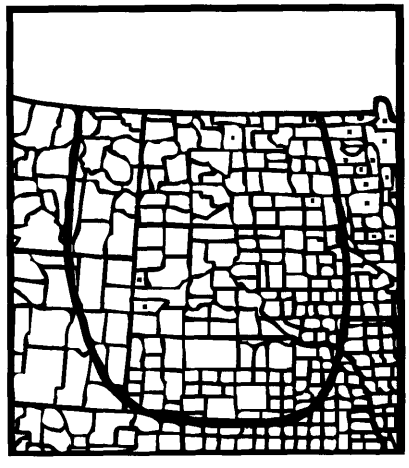
Very similar to *C. lanuginosa* but clearly distinguished from it by the long, attenuate **leaves** which are strongly involute, 2 mm or less wide as folded. Bogs and wet peaty soils; rare, with a record from Bottineau Co., ND; (Circumboreal, in N.Amer. from Newf. to AK s to NJ, OH, IA, n ND, n ID and WA).

North American plants are recognized as var. *americana* Fern.



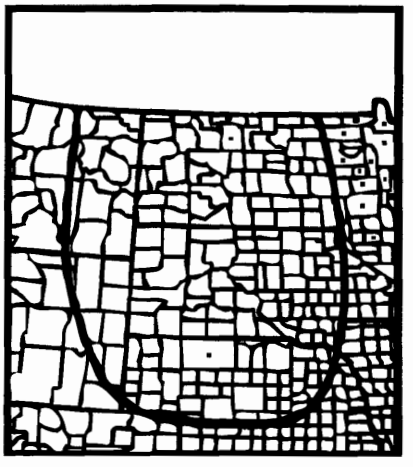
34. *Carex leptalea* Wahl.

Densely tufted; **culms** slender, obtusely trigonous, 1-7 dm long, equaling or exceeding the leaves. **Leaves** 0.5-1.25 mm wide; **sheaths** tight, white-hyaline ventrally. **Spikes** solitary on the culms, bisexual, androgynous, few-flowered, 5-15 mm long; **bracts** none; **staminate scales** obtuse to acute, overlapping around the rachis; **pistillate scales** obtuse to cuspidate, shorter than the perigynia, or the tip of the lowest scale sometimes prolonged beyond the perigynium. **Perigynia** yellowish-green, nearly terete or somewhat flattened, oblong to narrowly elliptic, 2.5-5 mm long, finely many-nerved, beakless or short-beaked, the orifice entire; **achenes** trigonous-obovoid, 1.5-2 mm long; **stigmas** 3. Jun—Jul. Bogs and wet woods; rare, with records from McHenry, Pembina and Ransom Counties, ND, Lawrence and Custer Counties, SD; (Labr. to AK, s to FL, MO, ND, NM and CA; also TX).



35. *Carex limosa* L.

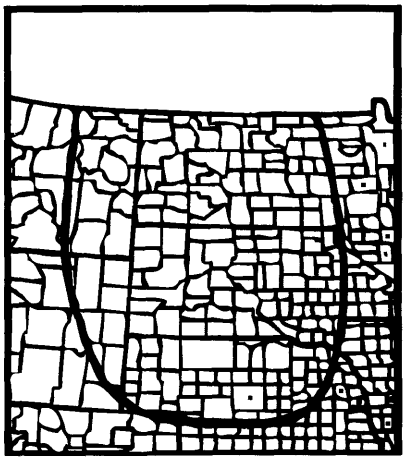
Loosely tufted from long scaly rhizomes; **culms** sharply trigonous, usually roughened above, 3-5 dm long, exceeding the leaves. **Leaves** 1-3 mm wide; **sheaths** hyaline ventrally, shredding into filaments below. **Spikes** unisexual, the terminal one staminate, 1-3 cm long, the lower 1-3 spikes pistillate, drooping on lax, filiform peduncles 1-3 cm long, ovoid to short-cylindric, 1-2 cm long; **scales** brown, obtuse to cuspidate, about equaling the perigynia in length and width. **Perigynia** glaucous-green, elliptic-ovoid, flattened except where distended by the achene, 2.5-4.2 mm long, 1/2 as wide, strongly 2-ribbed with a few more obscure nerves on each side; beak minute, entire; **achenes** trigonous, ca. 2.2 mm long; **stigmas** 3. Jun—Jul. Bogs and fens; rare, with records from Bottineau and McHenry Counties, ND, and Cherry Co., NE; (Circumboreal, in N.Amer. s to NJ, OH, IA, n NE, MT, ID and CA).



36. *Carex lupulina* Willd. — Hop sedge

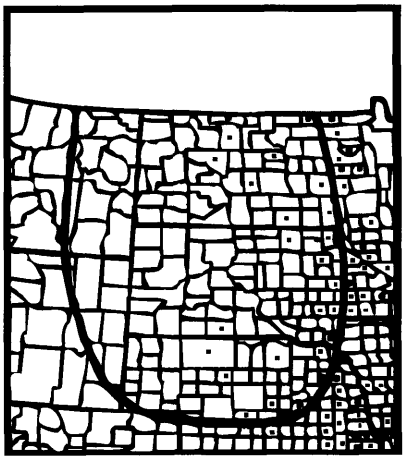
Loosely tufted with rhizomes; **culms** stout, trigonous, 3-12 dm long. **Leaves** much surpassing the inflorescence, 4-15 mm wide; **sheaths** white hyaline ventrally, the lower ones brownish. **Spikes** unisexual, the upper one staminate, short-peduncled, 2-5 cm long; pistillate spikes 2-6, aggregated or at least overlapping, the lowermost sometimes remote, 2.5-6 cm long, 2-3.5 cm thick; **bracts** leaflike and spreading, sheathing at the base, much surpassing the inflorescence; **pistillate scales** ovate-lanceolate, acuminate to short-awned, much shorter than the perigynia. **Perigynia** many, ascending to appressed-ascending, greenish-brown, dull, lance-ovoid and inflated, 10-20 mm long, 4-7 mm wide, many-nerved, acuminate to the slender beak which is 1/2 or more of the total length, the teeth 0.7-2 mm long; **achenes** trigonous, 3-4 mm long; **stigmas** 3, the style bent or twisted below the middle and persistent on the achene. Jun—Aug. Wet woods, swamps, wet meadows, marshes, ditches and shores; rare in c and e NE; (N.S. to MN and NE, s to FL and TX).

C. intumescens Rudge is a similar plant that occurs as a rarity in moist woodland and perhaps along springs and streams in the Black Hills (Pennington and Custer Counties, SD). It differs from the above in the relatively few, uncrowded perigynia which are olive-green and glossy, plus the straight to loosely contorted style.



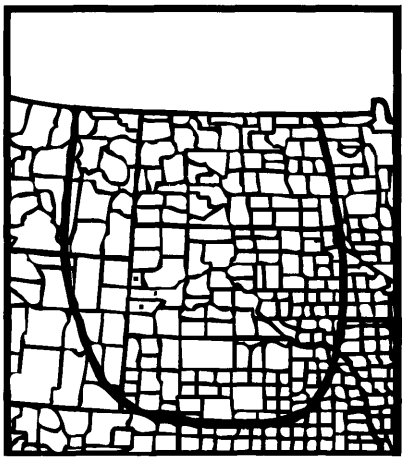
37. *Carex meadii* Dewey — Mead's sedge

Tufted from long rhizomes; **culms** stiff, trigonous, 1.5-5 dm long. **Leaves** 2-7 mm wide; **sheaths** tight, hyaline ventrally, concave at the mouth. **Spikes** unisexual; terminal spike staminate, 1-3 cm long; lateral spikes pistillate, usually remote, at least the lower ones short-peduncled, short-cylindric, usually closely flowered, 16-30 mm long, 4-7 mm thick, with 6 rows of perigynia; **bracts** sheathing, the blades usually not exceeding the culm; **pistillate scales** purplish-red or brown on the margins with a prominent green midvein, obtuse or short-awned, as wide but shorter than the perigynia. **Perigynia** yellowish-green or brown, obscurely trigonous, obovoid, 2-3.5 mm long, 2-ribbed, with fewer than 10 additional faint nerves, rounded at the tip, the beak short-tubular and bent, sometimes obsolete; **achenes** trigonous with concave sides, 1.5-2 mm long; **stigmas** 3. Jun—Jul. Moist meadows and prairie; uncommon, scattered in the e and c parts; (NJ to Sask., s to NC, GA, AR and TX).



38. *Carex microptera* Mack.

Tufted with short rootstocks; **culms** sharply trigonous, 3-10 dm long, surpassing the leaves. **Leaves** 2-6 mm wide; sheaths white hyaline ventrally. **Spikes** bisexual, gynaecandrous, 4-10, closely aggregated in an oblong to ovoid or suborbicular head 10-22 mm long; bracts much reduced, awn-tipped; **pistillate scales** light to dark brown with a light midrib, acute to obtuse, narrow and shorter than the perigynia. **Perigynia** light green to light brown, membranous, plano-convex, ovate-lanceolate to lanceolate, 3.5-5 mm long, 1-2 mm wide, several-nerved dorsally, few- to several-nerved near the base ventrally, strongly wing-margined to the base, tapering to the dark brown beak; beak terete, serrulate, ca. 1/2 the entire length of the perigynium, obliquely cut dorsally, bidentulate; **achenes** lenticular, 1-1.5 mm long; **stigmas** 2. Jun—Jul. Wet meadows, stream banks and springs at moderate elevations in the Black Hills where it is common; (Alta. to B.C., s to SD, NM and CA; Mexico).





Carex microptera **(from Hermann 1970).**

39. *Carex nebraskensis* Dewey — Nebraska sedge

Loosely to densely tufted from long rhizomes; **culms** stout, erect, 2.5-12 dm long, trigonous, shorter than to exceeding the leaves. **Leaves** glaucous, 3-8 mm wide, the lower ones with well-developed blades; **sheaths** septate-nodulose dorsally, hyaline and often yellow-brown tinged ventrally. **Spikes** unisexual or an occasional 1 or 2 androgynous, the upper 1-2(4) staminate, the terminal one largest, 1.5-4 cm long; lateral spikes pistillate or occasionally 1 or 2 androgynous, 2-5, erect, separate, sessile or the lower ones short-peduncled, 1-5 cm long; **pistillate scales** brown to nearly black, obtuse to acuminate, mostly about equaling the perigynia. **Perigynia** ascending to spreading, brown or stramineous at maturity, plano-convex or biconvex, oblong-obovate, 3-3.5 mm long, ca. 1/2 as wide, 2-ribbed, conspicuously nerved between the ribs; beak 0.3-0.5 mm long, shallowly bidentate; **achenes** lenticular, 1.5-2 mm long; **stigmas** 2. Jun—Jul. Wet meadows, marshes, streams and springs; e MT to sc ND, s to NE and e CO, especially common in the Sand Hills and the Black Hills; (ND to B.C., s to KS, NM and CA).

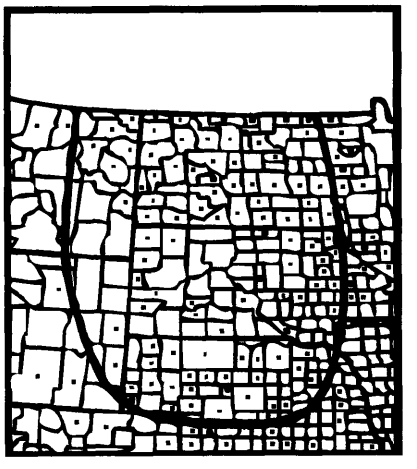




Carex nebraskensis **(from Hermann 1970).**

40. *Carex praegracilis* W. Boott — Clustered field sedge

Colonial from long black rhizomes; **culms** arising singly or few together, trigonous, 1.5-7 dm long, surpassing the leaves. **Leaves** 2-3 mm wide, coming off the lower portion of the culm; **sheaths** white-hyaline ventrally, truncate at the summit, ligule inconspicuous. **Spikes** bisexual and androgynous or nearly all staminate or pistillate, 4-8 mm long, the upper ones crowded, the lower ones more separated, in narrowly ovoid to linear-oblong heads 1-4 cm long; **bracts** obsolete; **pistillate scales** brown, shiny, shorter than to equaling the perigynia. **Perigynia** greenish-brown to eventually blackish-brown, plano-convex, ovate to ovate-lanceolate, (2.5)3-4 mm long, ca. 1/3 as wide, sharp-edged, nerveless ventrally, obscurely few- to many-nerved dorsally, spongy at the base, tapering into the serrulate beak which is 1/2 or more the length of the body, obliquely cut; **achenes** lenticular, 1.2-1.8 mm long; **stigmas** 2. Jun—Aug. Wet meadows, low prairie, shores, stream banks, ditches and other wet or moist places; very common; (n MI to Yuk., s to MO, OK, n Mex. and CA).

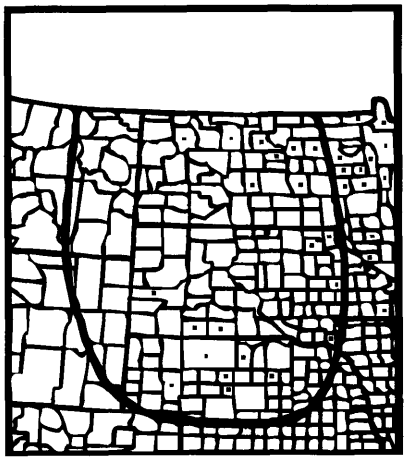




Carex praegracilis **(from Hermann 1970).**

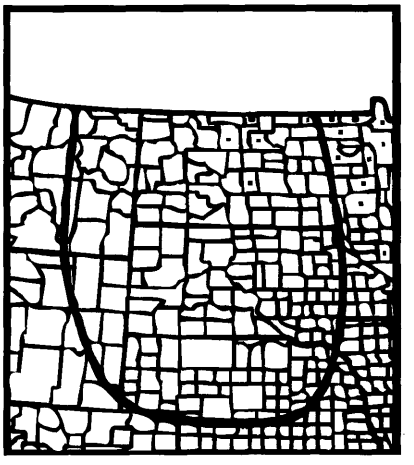
41. *Carex prairea* Dewey

Tufted, forming dense clumps from short rootstocks; **culms** sharply trigonous, 5-10 dm long, somewhat exceeding the leaves. **Leaves** 2-3 mm wide; **sheaths** hyaline ventrally, copper-colored at least at the mouth, prolonged 2-3 mm beyond the base of the blade. **Spikes** bisexual, androgynous, ovoid, 4-7 mm long, the lower ones usually separate, in oblong to linear-oblong heads 3-8 cm long; **bracts** much reduced, occasionally exceeding the spike; **pistillate scales** reddish-brown, acuminate, as long as and mostly concealing the perigynia. **Perigynia** brown, dull, plano-convex, lanceolate-ovoid, (2)2.4-3 mm long, 1/2 as wide, few-nerved at the base ventrally, truncate at the base, tapering to a serrulate, obliquely cut beak which is ca. 1/2 the total length of the perigynium; **achenes** lenticular, 1-1.2 mm long; **stigmas** 2. Jun—Jul. Springs, fens, fresh wet meadows and boggy places; scattered from e and c ND to c and w NE; (N.S. to B.C., s to NJ, OH, IA and NE). *C. prarisa* Dewey.



42. *Carex pseudo-cyperus* L.

Tufted in large clumps from short rootstocks; **culms** stout, trigonous, 3-10 dm long, roughened. **Leaves** 5-15 mm wide; **sheaths** hyaline ventrally, yellow-tinged dorsally. **Spikes** unisexual, the terminal one staminate, 1.5-7 cm long; lateral spikes pistillate, 2-6, cylindric, 3-8 cm long, ca. 1 cm thick, slender-peduncled, the lower ones drooping; **bracts** much exceeding the inflorescence; **pistillate scales** with a very small body, rough awned, the awn shorter to longer than the perigynium. **Perigynia** spreading to reflexed, flattened-trigonous, slenderly ovoid, 4-6.2 mm long, firm and shiny, strongly 12- to 17-nerved, tapering to the smooth beak which is 1-1.5 mm long, the teeth 0.5-1 mm long, straight; **achenes** trigonous, 1.5-1.7 mm long; **stigmas** 3. Jul—Aug. Cold springs, bogs and swamps; rare in ne and c ND; (Newf. to Sask., s to PA, IN, MN and ND).



15. *Potamogeton pusillus* L. — Small pondweed, baby pondweed

Stems terete to subterete, 0.1-0.7 mm thick, simple to freely branching, 2-15 dm long. **Leaves** all submersed, linear, 0.9-6.5 cm long, 0.2-2.5 mm wide, 1- to 3(5)-nerved, acute to obtuse or apiculate at the tip, tapered to the sessile base; **stipules** free, brownish-green, 3-9 mm long, delicate and nonfibrous, soon decomposing; **glands** usually present at the base of the stipules. **Winter buds** sometimes produced, lateral or terminal, 0.9-3.2 cm long; **inner leaves** rolled into an indurate fusiform structure; **outer leaves** 1-3 per side, acute to obtuse, without corrugations at the base. **Spikes** short-cylindric to cylindric, 1.5-10 mm long; **floral whorls** 1-3(4), 1.2-4.7 mm apart; **peduncles** filiform to cylindric, 0.5-6 cm long. **Fruits** green to brown, obliquely obovoid, 1.5-2.2 mm long, rounded on the back, often concave on the sides. Jun—Aug. Shallow to deep water of lakes, ponds, marshes, ditches and streams, where water is fresh to brackish; common and often abundant; (Newf. to N.W.Terr., s throughout most of the U.S. and into Mex.; also Eurasia).

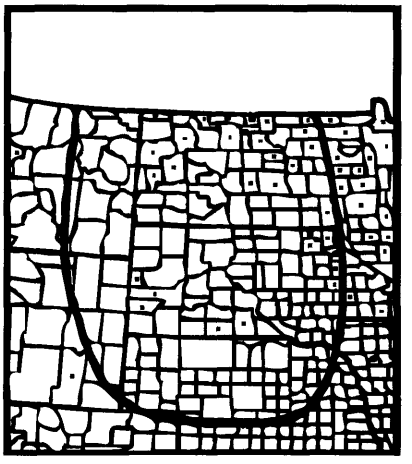
Two varieties, var. *tenuissimus* Mert. & Koch (*P. berchtoldii* Fieb.) and var. *pusillus*, occur in the region. By far the prevalent form is var. *pusillus*, characterized as follows: **Leaves** with up to 2 rows of lacunae along the midrib, apex acute, rarely apiculate; **stipules** mostly connate. **Spikes** usually of 2-4 verticels; **peduncles** filiform to cylindric, usually 1-3 per plant. **Mature fruit** widest above the middle, the sides concave, the beak positioned forward.

The var. *tenuissimus* is of limited occurrence in this region, occurring infrequently in the e part. It differs from var. *pusillus* as follows: **Leaves** with 1-5 rows of lacunae along the midrib, apex acute to obtuse; **stipules** mostly convolute. **Spikes** mostly of 1-2 adjacent verticels; **peduncles** cylindric, usually more than 3 per plant. **Mature fruit** mostly widest at or below the middle, the sides rounded, the beak positioned centrally.



44. *Carex rostrata* Stokes ex With. — Beaked sedge

Densely tufted from short rootstocks, also with long rhizomes; **culms** bluntly trigonous, 3-12 dm long, spongy-thickened at the base. **Leaves** strongly septate-nodulose, 4-12 mm wide; ligule about as wide as long; **sheaths** white-hyaline ventrally, conspicuously septate-nodulose dorsally, usually not ladder-fibrillose. **Spikes** unisexual, the upper 2-5 staminate, well above the pistillate spikes, the terminal one 3-6 cm long; lower 2-5 spikes pistillate or occasionally 1 or 2 androgynous, usually remote, cylindric, 1.5-10 cm long, 8-12 mm thick, the upper ones sessile or short-peduncled, lower ones peduncled, erect; **bracts** shorter than to somewhat exceeding the inflorescence; **pistillate scales** acute to awned, shorter than, or with awn, to longer than the perigynia. **Perigynia** ascending to ultimately spreading in 8-10 rows in the spike, yellowish-green to brown, shiny, subterete, ovoid, inflated, 3.5-8 mm long, 1/2 to 2/3 as wide, strongly 7- to 9-nerved, contracted to the slender smooth beak 1-2 mm long, the teeth 0.5-0.7 mm long, mostly straight; **achenes** trigonous, 1.7-2 mm long; **stigmas** 3, the style strongly S-curved toward the base. Jun—Aug. Wet meadows, marshes, fens, swamps, shores and springs; n and w ND to ne SD, also the Black Hills and Sand Hills; (Circumboreal, in N.Amer. s to DE, MD, IN, IA, NE, NM and CA).



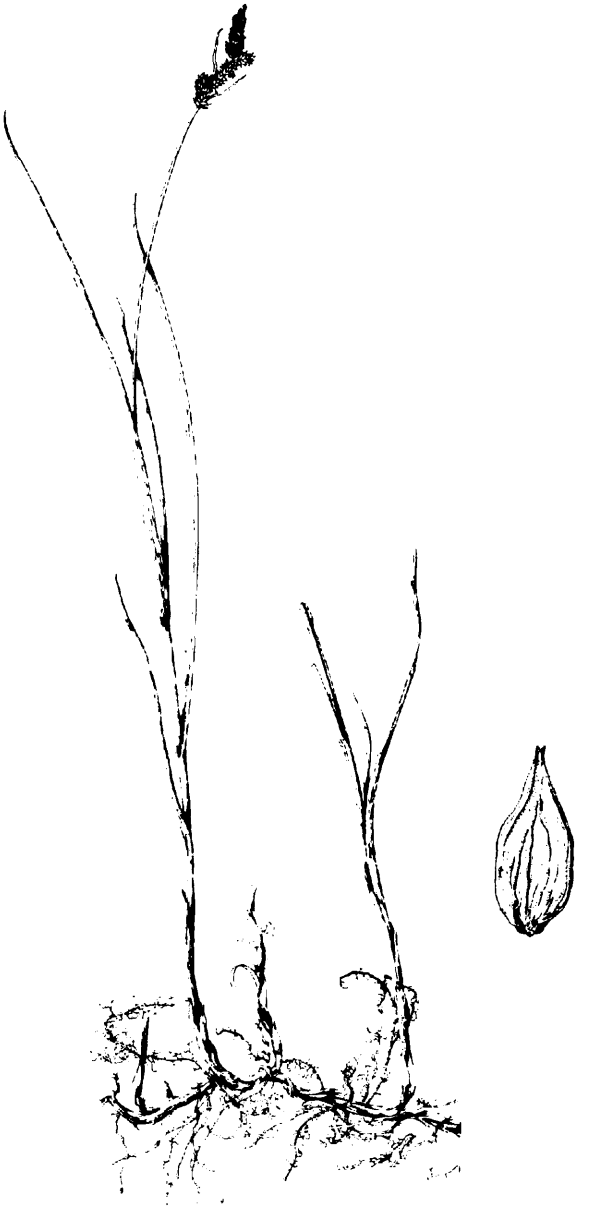


Carex rostrata **(from Hermann 1970).**

45. *Carex sartwellii* Dewey

Colonial from long, black rhizomes; **culms** arising singly or few together, stiff, sharply trigonous, 3-8 dm long, exceeding the leaves. **Leaves** 2.5-4 mm wide, few per culm, the lowest much reduced, lacking blades; **sheaths** green-striate ventrally, prolonged into a conspicuous hyaline, tubular ligule. **Spikes** bisexual or the upper ones often staminate, otherwise androgynous, aggregate or the lower ones separate, ovoid, 5-10 mm long, in heads narrowly oblong to conic, 3-6 cm long; **bracts** reduced, the lower ones sometimes setaceous and exceeding the spike; **scales** brown with a prominent green midvein, acute to cuspidate, about equaling the perigynia. **Perigynia** tan to brown, planoconvex, ovate, 2.5-3.5 mm long, ca. 1/2 as wide, finely nerved on both sides, sharp-edged, tapered into the serrulate, oblique to minutely bidentate beak which is ca. 1/4 the length of the entire perigynium; **achenes** lenticular, 1-1.5 mm long; **stigmas** 2. Jun—Jul. Wet meadows, marshes, shores, stream banks and ditches; frequent in the n and e parts, uncommon w; (NY and Ont. to B.C., s to IN, MO, NE and CO).

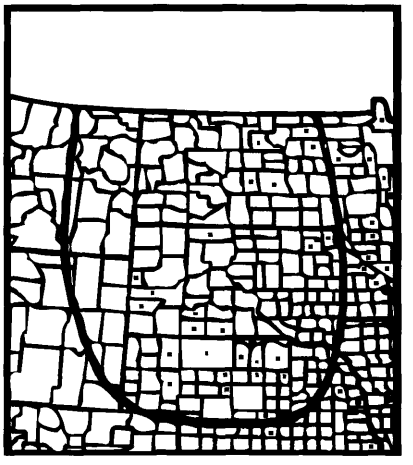




Carex sartwellii **(from Hermann 1970).**

46. *Carex scoparia* Schkuhr ex Willd. — Broom sedge

Densely tufted, sometimes stoloniferous; **culms** sharply trigonous, usually exceeding the leaves, 2-10 dm long. **Leaves** 1-3 mm wide; **sheaths** tight, white-hyaline ventrally. **Spikes** bisexual, gynaecandrous, 4-10, ovoid to fusiform, 6-12 mm long, closely aggregate to separate, in an ovoid to linear-oblong head 1-5 cm long; **bracts** reduced, the lowest often setaceous; pistillate scales acuminate, slightly shorter than the perigynia. **Perigynia** greenish-white, flat, subulate to narrowly lanceolate, (3)4-6.5 mm long, 1/4 to 1/3 as wide, strongly to slightly several-nerved on both sides, narrow-winged for the entire length, gradually tapered to the serrulate, obscurely bidentate beak which is ca. 1/3 the length of the entire perigynium; **achenes** lenticular, 1-1.5 mm long; **stigmas** 2. Jun—Jul. Wet meadows, shores, springs, fens and swamps; scattered from e and c ND, s to NE where it is frequent; (Newf. to B.C., s to FL, AR, KS, NM and OR).





Carex scoparia **(from Hermann 1970).**

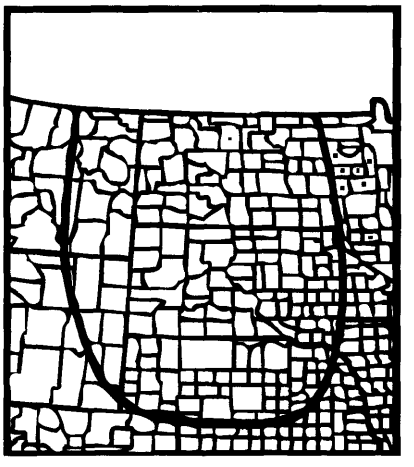
47. *Carex simulata* Mack.

Culms arising singly or few together from slender, brown rhizomes with fibrillose scales, (1)3-6(9) dm tall, light brown at the base, sharply trigonous, roughened above, usually surpassing the leaves. **Leaves** 2-5 per culm, 1-4 mm wide, flat or nearly so; sheaths tight, hyaline ventrally. **Spikes** all staminate or all pistillate or bisexual and androgynous, 5-15 crowded in an ovoid to oblong head 1-3 cm long; **bracts** inconspicuous and like the scales; **pistillate scales** brown with hyaline margins and a pale midvein, ovate-triangular, cuspidate, wider and longer than the perigynia and concealing them. **Perigynia** yellowish-brown to brown, shiny, unequally biconvex, broadly ovate, 1.7-2.8 mm long, ca. 1.5 mm wide, nerveless or weakly nerved on the dorsal side, nerveless or with a few short nerves ventrally, firm-textured and closely enveloping the achene, winged and serrulate on the margins above, abruptly narrowed to a short beak which is 1/5 to 1/3 the length of the body (0.2-0.5 mm long); **achenes** lenticular, 1.2-1.5 mm long; **stigmas** 2. Jun—Jul. Wet meadows and swamps; rare, with one record from McHenry Co., ND; (Sask. and n ND to WA, s to NM, UT and CA).



48. *Carex sterilis* Willd.

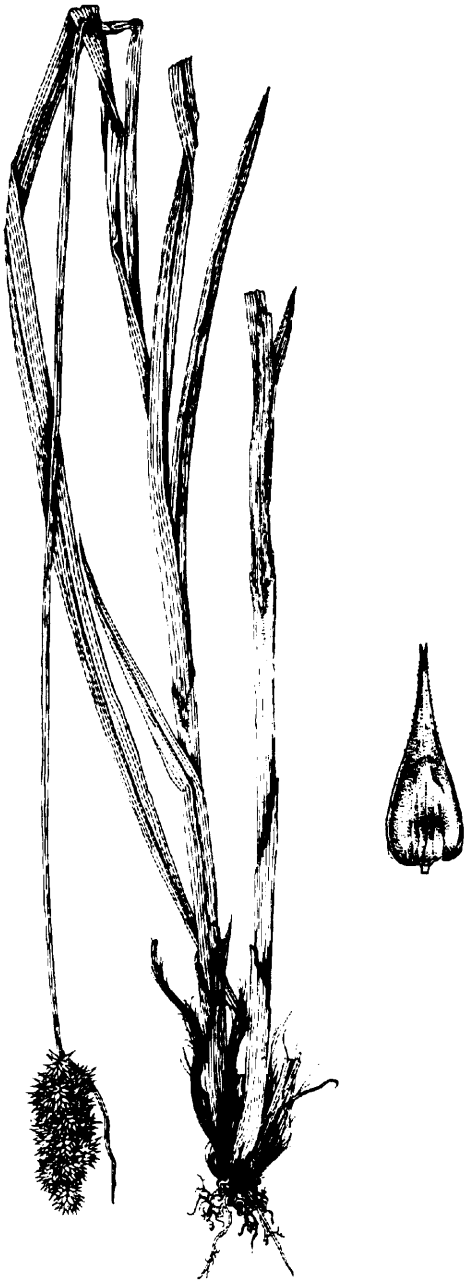
Very similar to *C. interior*, differing mainly as follows: **Leaves** 1-4 mm wide. **Spikes** 3-7; **pistillate scales** acute to cuspidate, about equaling the perigynium body. **Perigynium beak** prominent, rough, ca. 1/3 the length of the entire perigynium, the teeth sharp, 0.3-0.5 mm long. Late May—Jul. Fens and permanently wet meadows; rare, with records from McHenry Co., ND; (Newf. to ND, s to NJ and IL). *C. muricata* L. var. *sterilis* (Carey) Gl.



49. *Carex stipata* Muhl. ex Willd. — Saw-beak sedge

Densely tufted; **culms** concave-trigonous, slightly winged, 2-12 dm long. **Leaves** 4-8 mm wide; sheaths cross-rugulose ventrally, conspicuously septate-nodulose dorsally. **Spikes** bisexual, androgynous, aggregate or the lowest ones often separate, in oblong heads 3-10 cm long; **bracts** reduced, occasionally setaceous and exceeding the spike; **pistillate scales** acuminate to cuspidate, 1/2 to 3/4 as long as the perigynia. **Perigynia** yellowish-green to dull brown, plano-convex, ovoid-lanceolate, 3.5-5 mm long, 1/4 to 2/5 as wide, strongly several-nerved dorsally, strongly few-nerved ventrally, truncate-rounded at the base, tapering to a serrulate, bidentate beak which is 1/2 to 2/3 the length of the entire perigynium; **achenes** lenticular, 1.5-2 mm long; **stigmas** 2. Jun—Jul. Wet meadows, shores, stream banks and swamps; frequent in e and nc ND, e and s SD and most of NE; (Newf. to s AK, s to FL, TX and CA).



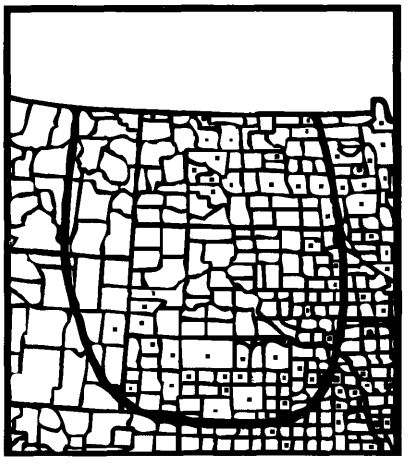


Carex stipata **(from Hermann 1970).**

50. *Carex stricta* Lam.

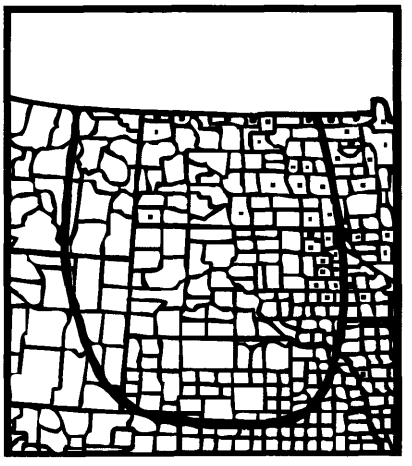
Loosely tufted from long scaly rhizomes; **culms** trigonous, 3-10 dm long, exceeding the leaves, rough. **Leaves** green, 2-6 mm wide, the lower ones bladeless, merely sheathing the base of the culm; sheaths white to reddish-brown and hyaline ventrally, green dorsally, the lower ones breaking into ladderlike filaments; ligule at juncture of blade and sheath V-shaped and pointed, longer than wide. **Spikes** unisexual or mostly so, the upper 1-3 staminate, the terminal one 1.5-5 cm long, the lower 2-5 pistillate or some androgynous, 2-8 cm long; **lowest bract** leaflike, sheathless; **pistillate scales** obtuse to acuminate, about equaling to exceeding the perigynia in length but narrower. **Perigynia** green at the tip and margins, golden to tawny toward the middle and base, whitish-papillate from the tip to below the middle, eventually turning brown, biconvex to nearly flat, ovate to elliptic, 1.5-2.7 mm long, 1/2 to 3/5 as wide, 2-ribbed with few weak nerves on both sides; beak tubular, 0.2-0.3 mm long; **achenes** lenticular, 1.3-1.7 mm long; **stigmas** 2. Jun—Jul. Wet meadows, marshes, shores, stream banks, springs and fens; see note below on regional distribution; (NJ to Man., s to FL, TX and CO).

This species is probably not as common in this region as current distribution records (and the map) indicate because many collections identified as *C. stricta* in regional herbaria are actually *C. emoryi*. *C. stricta* in the narrower sense may well be restricted to the e part. Some authors lump *C. emoryi* with *C. stricta* recognizing it as *C. stricta* var. *elongata* (Boeckl.) Gl.



51. *Carex sychnocephala* Carey

Tufted from fibrous roots (often acting as an annual); **culms** often numerous and crowded, obtusely trigonous, 0.5-6 dm long. **Leaves** 1.5-4 mm wide; sheaths tight, white-hyaline ventrally. **Spikes** bisexual, gynaecandrous, densely aggregate in ovoid heads 1.5-3 cm long; **bracts** leaflike, 2-4 per head, the longest ones many times longer than the heads; **pistillate scales** hyaline with a green midvein, acuminate or cuspidate, mostly 2/3 as long as the perigynia. **Perigynia** green to stramineous, flat, scale-like, lanceolate, 5-6.5 mm long, 1/6 as wide, slightly nerved dorsally and ventrally, narrowly wing-margined to the base, spongy below the achene at maturity, tapering or contracted to the slender, serrulate beak which is 3-4.5 mm long, slenderly bidentate; **achenes** lenticular, 1-1.5 mm long; **stigmas** 2. Jun—Sep. Wet meadows, shores, mud flats and stream banks; occasional from n and e ND to e SD; (NY and Ont. to Alta., s to WI, IA, SD and MT).

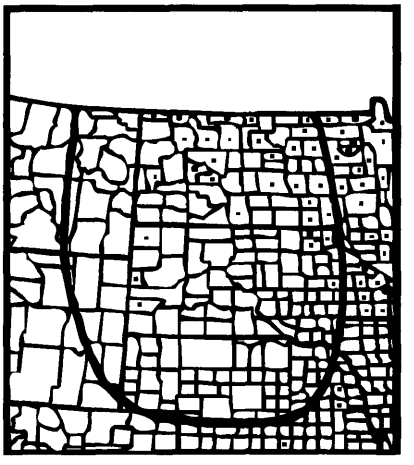


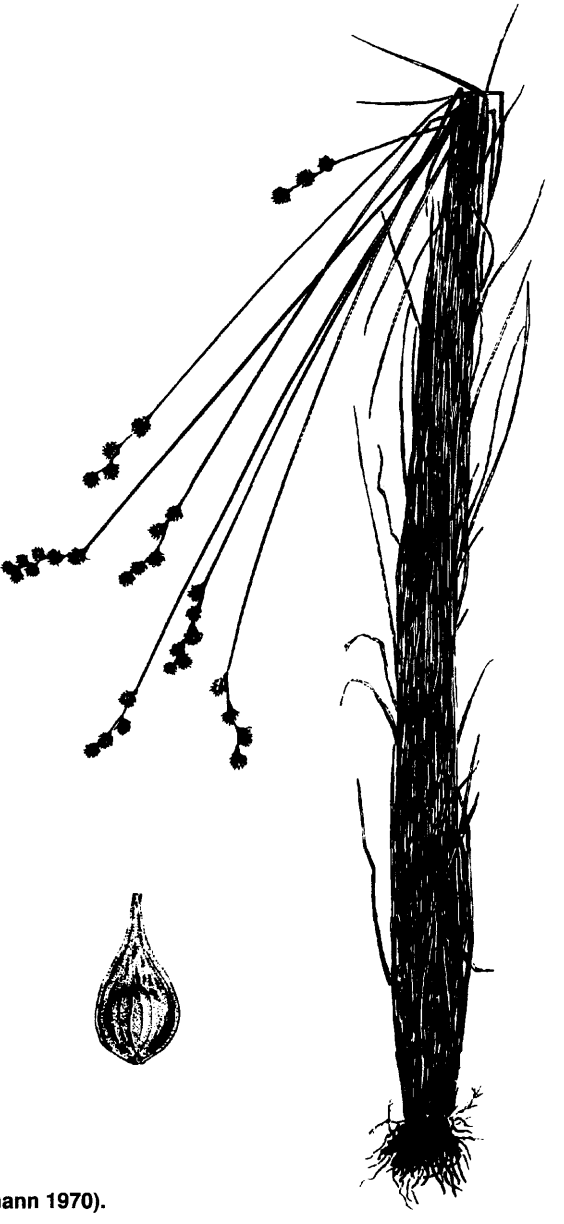


Carex sychnocephala **(from Hermann 1970).**

52. *Carex tenera* Dewey

Tufted from short rootstocks; **culms** slender, sharply trigonous, 3-8 cm long, exceeding the leaves, rough above. **Leaves** 0.5-3 mm wide; sheaths white-hyaline between the nerves or green-and-white mottled dorsally, white-hyaline ventrally. **Spikes** bisexual, gynaecandrous, 4-8, ovoid to subglobose, 4-10 mm long, usually loosely arranged in moniliform, flexuous or nodding heads 2.5-5 cm long; **bracts** reduced, occasionally setaceous and exceeding the spike; **pistillate scales** acute to subacuminate, slightly shorter than the perigynia. **Perigynia** stramineous at maturity, plano-convex, ovate, 2.6-4 mm long, ca. 1/2 as wide, strongly several-nerved dorsally, few-nerved ventrally, wing-margined to the base, tapered or contracted to the serrulate, bidentate beak which is 1/3 to 1/2 the length of the entire perigynium; **achenes** lenticular, 1.2-1.7 mm long; **stigmas** 2. Jun—Aug. Wet meadows, springs, stream banks, floodplains, moist woods and thickets; frequent in ND, less common s; (Que. and ME to Alta., s to NC, OH, MO, NE and MT).





Carex tenera **(from Hermann 1970).**

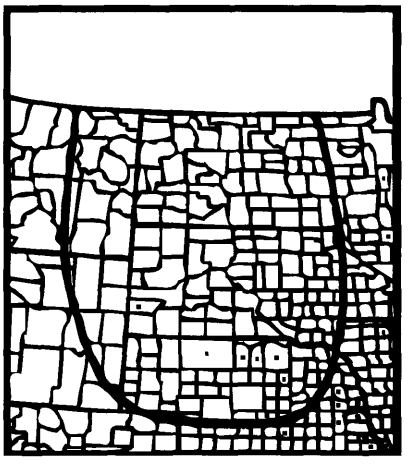
53. *Carex tetanica* Schkuhr

Tufted from slender rhizomes; **culms** trigonous, 1-6 dm long, rough above. **Leaves** 1-5 mm wide; **sheaths** tight, white or yellowish-hyaline ventrally. **Spikes** unisexual, terminal spike staminate, 1-3 cm long; lateral spikes pistillate, usually widely separated, the lower ones peduncled, short-cylindric, loosely flowered, 6-30 mm long, 3-5 mm thick, with perigynia in 3 rows; **bracts** sheathing, the blades usually not exceeding the inflorescence; **pistillate scales** purplish-brown on the margins, obtuse to acute or short-awned, as wide but shorter than the perigynia. **Perigynia** green, obscurely trigonous, obovoid-fusiform, 2-4 mm long, ca. 1/2 as wide, 2-ribbed, with fewer than 10 additional faint nerves; beak minute, bent; **achenes** trigonous with concave sides, 2-2.5 mm long; **stigmas** 3. Jun—Jul. Wet meadows, low prairie and boggy or springy places; occasional from n ND to e SD, where common; also s SD and NE; (MA to Alta., s to NJ, VA, MO and NE).



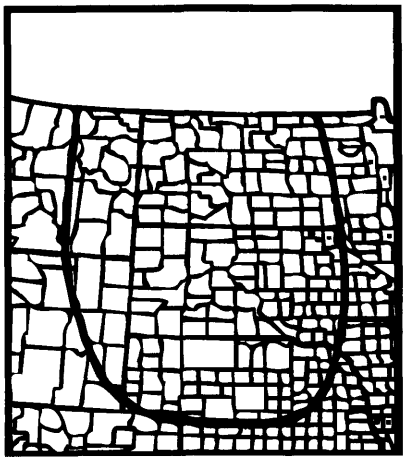
54. *Carex tribuloides* Wahl.

Tufted from short rootstocks; **culms** sharply trigonous, 3-9 dm long, exceeding the leaves. **Leaves** rather stiff, mostly 3-7 mm wide; **sheaths** loose, green-striate and firm ventrally except for the V-shaped hyaline area at the mouth. **Spikes** bisexual, gynaecandrous, 5-15, oblong-ovoid, 6-13 mm long, blunt-tipped, rounded to clavate at the base, densely to loosely aggregated into an ovoid to oblong head 2-5 cm long; **bracts** much reduced, inconspicuous; **pistillate scales** acute to acuminate, shorter than the perigynia. **Perigynia** with tips appressed to ascending in the spikes, light green to pale brown, much flattened except where distended by the achene, lanceolate, (3.5)4-6 mm long, 1-1.8 mm wide, short-stipitate at the base, broadly winged near the middle but nearly wingless around the achene, tapered to the serrulate, bidentate beak which is 1/3 to 1/2 the entire length of the perigynium; **achenes** lenticular, ca. 1.5 mm long; **stigmas** 2. Jun—Jul. Floodplains, wet meadows, shores and ditches; occasional in n, c and e NE; (N.S. to Ont. and MN, s to FL, LA and OK).



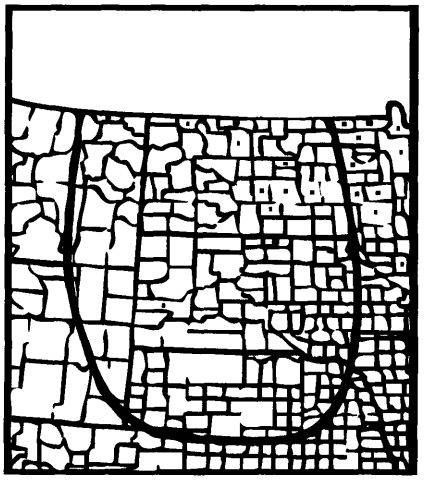
55. *Carex vesicaria* L.

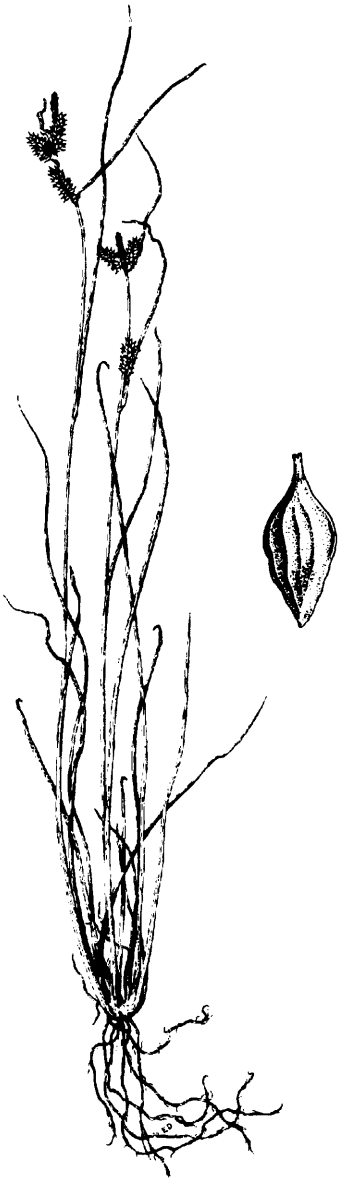
Tufted from stout rootstocks, lacking long rhizomes; **culms** sharply trigonous and roughened below the head, 3-10 dm long, not spongy-thickened at the base. **Leaves** not conspicuously septate-nodulose, 2-7 mm wide; ligule much longer than wide; sheaths white-hyaline ventrally, not conspicuously septate-nodulose dorsally, the lowest often breaking into ladderlike fibers. **Spikes** unisexual, the upper 2-4 staminate, well above the pistillate, mostly 2-4 cm long; **lower 1-3 spikes** pistillate, separate, cylindric, 1.5-8 cm long, 4-15 mm thick, sessile or short-peduncled, erect; **lowest bract** usually exceeding the inflorescence; **pistillate scales** acute to awned, shorter than to as long as the perigynia. **Perigynia** ascending and imbricate in 6-8 rows in the spike, yellowish-green to brownish, dull, ovoid to globose-ovoid, inflated, 3.5-8 mm long, ca. 3 mm wide, strongly several- to many-nerved, abruptly contracted or tapered to the slender beak 1-2 mm long, the stiff teeth 0.5-1 mm long; **achenes** trigonous, ca. 2.5 mm long; **stigmas** 3, the style strongly S-curved toward the base. Jun—Aug. Wet meadows, marshes and shores; rare, ne SD; (Circumboreal, in N.Amer. from Newf. to B.C., s to DE, IN, MO, SD, NM and CA).



56. *Carex viridula* Michx.

Tufted; **culms** stiff, obscurely trigonous, 0.5-4 dm long, exceeding the leaves. **Leaves** 1-3 mm wide; **sheaths** thin, white-hyaline ventrally. **Spikes** unisexual or mostly so, the terminal one staminate or with a few perigynia at the tip or near the middle, 3-15 mm long, short-peduncled or sessile, surpassing the pistillate spikes or concealed among them; lateral spikes pistillate, 2-6, some often compound, ovoid to short-cylindric, 5-10 mm long, aggregate and sessile or nearly so above, the lower ones often remote and short-peduncled; **bracts** leaflike, short-sheathing or sheathless, usually erect, much exceeding the heads; **pistillate scales** brownish on the sides, obtuse to cuspidate, about equaling the perigynia. **Perigynia** yellowish-green to brown, obtusely trigonous, obovoid, 2-3.6 mm long, 2-ribbed, with a few other conspicuous nerves, tapered or contracted to the slightly bidentate beak 0.5-1 mm long; **achenes** trigonous with concave sides, 1-1.2 mm long; **stigmas** 3. Jun—Jul. Calcareous wet meadows, fens, springs, seepage areas and boggy places; occasional from n ND and ne MT to n SD, rare in the Black Hills; (Newf. to AK, s to CT, IL, MN, SD and NM).



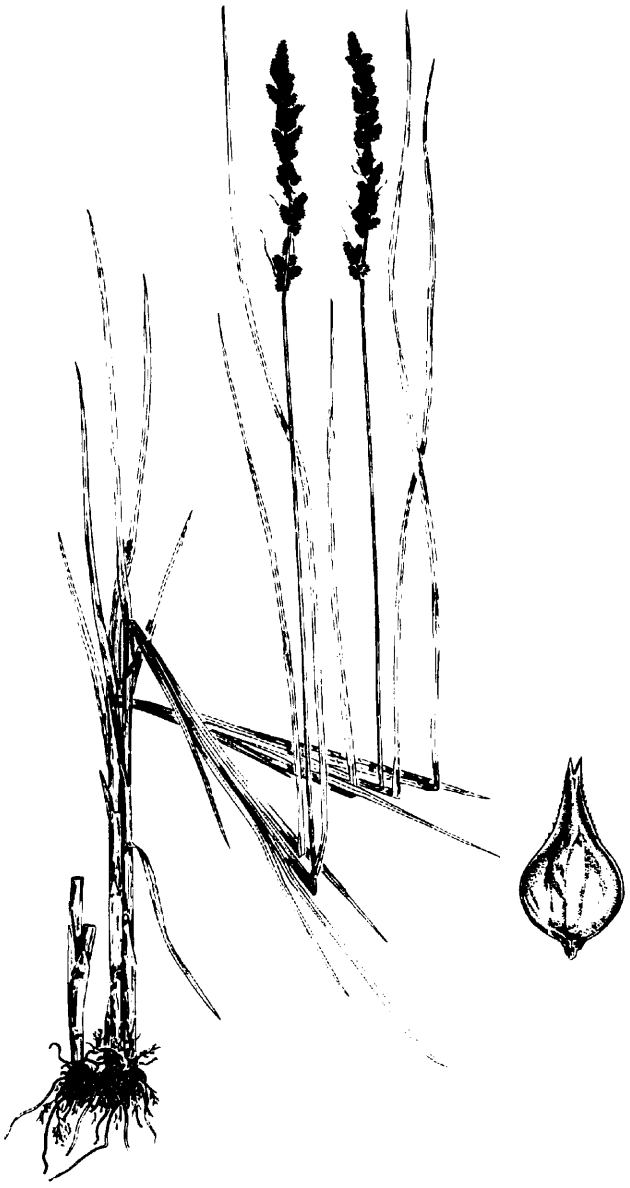


***Carex viridula* (from Hermann 1970).**

57. *Carex vulpinoidea* Michx. — Fox sedge

Densely tufted from short rootstocks; **culms** stiff, sharply trigonous, not winged nor flattened under pressure, 3-9 dm long, shorter than to exceeding the leaves. **Leaves** 2-4 mm wide; **sheaths** tight, cross-rugulose and hyaline ventrally, green or green-and-white mottled dorsally. **Spikes** bisexual, androgynous, more than 10, closely aggregate or separate in the lower part, in oblong to cylindric heads 3-9 cm long, with 2-several spikes per branch at the lower nodes; **bracts** setaceous, slightly to much exceeding the spikes, often 5 cm or more long; **pistillate scales** aristate, the awns about equaling to much exceeding the perigynia. **Perigynia** yellowish-green, becoming stramineous or brown at maturity, plano-convex, ovate to suborbicular, 2-3 mm long, ca. 1/2 as wide, finely few- to several-nerved dorsally, nerveless ventrally, abruptly contracted to the smooth to serrulate, bidentate beak which is ca. 1/3 the length of the entire perigynium; **achenes** lenticular, 1-1.5 mm long; **stigmas** 2, the style base swollen above the achene. Jun—Aug. Wet meadows, marshes, shores, stream banks, ditches, springs and other wet places; very common; (Newf. to B.C., s to FL, TX, CO, AZ and OR).





Carex vulpinoidea **(from Hermann 1970).**

3. *Cyperus* L. — Galingale, umbrella sedge

Very small to medium-sized, often tufted, grasslike plants, annual or perennial; **culms** simple, sharply trigonous. **Leaves** (excluding the involucres) mostly basal, the blades flat or conduplicate, grasslike, erect or spreading. **Inflorescence** terminal, umbellate, subtended by few to several foliaceous involucral bracts; **spikelets** numerous, arranged in 1-several hemispheric, subglobose or cylindric spikes, at least one of which (the terminal one) is sessile, the others borne on elongate rays originating from the orifice in the axil of the involucre; **scales and their subtended flowers** arranged in a distichous manner in the spikelets. **Flowers** perfect; **perianth** lacking; **stamens** 1-3; **styles** trifid or bifid, the **achenes** correspondingly trigonous or lenticular.

Reference:

Marcks, B. G. 1974. Preliminary reports on the flora of Wisconsin. No. 66. Cyperaceae II — Sedge Family II. The genus *Cyperus* — the umbrella sedges. Trans. Wisconsin Acad. Sci. 62:261-284.

1 Spikelets overlapping in dense hemispheric to subglobose spikes.

2 Scales with an outwardly curved awn 0.5-1 mm long, conspicuously (5)7- to 9-nerved ..... 2. *C. aristatus*

2 Scales acuminate, curving outward toward the tip, strongly 3-nerved ..... 1. *C. acuminatus*

1 Spikelets loosely arranged in subglobose or cylindric spikes, mostly not overlapping.

3 Achenes lenticular; styles bifid; scales strongly pigmented with purplish-brown; spikes loosely subglobose.

4 Styles exserted ca. 2 mm, persistent, cleft nearly to the base; scales more pigmented near the tip ..... 4. *C. diandrus*

4 Styles exserted less than 1 mm, deciduous, undivided in the lower 1/3; scales more pigmented near the base ..... 3. *C. bipartitus*

3 Achenes trigonous; styles trifid; scales pale to stramineous or brown; spikes cylindric, with the spikelets pinnately disposed on a more or less elongate rachis.

5 Scales not overlapping in the spikelets, the tip of each one not reaching the base of the scale directly above it (on the same side of the rachilla) ..... 5. *C. engelmannii*

5 Scales overlapping in the spikelets, the tip of each one overlapping with the base of the scale directly above it.

6 Scales 1-1.5 mm long, 3- to 5-nerved in the green midstripe, the sides nerveless ..... 6. *C. erythrorhizos*

6 Scales mostly 2-4.5 mm long, with 7-13 well distributed nerves, these sometimes faint.

7 Scales 3-4.5 mm long; achenes less than 1/2 the length of their subtending scales; plants eventually with a hard, cormose base ..... 9. *C. strigosus*

7 Scales 2-2.5 mm long; achenes over 1/2 the length of the scales; plants not cormose at the base.

8 Plants perennial, producing tubers at the ends of underground scaly stolons (these usually evident even if no tubers are collected); rachilla remaining intact as the scales and achenes drop off, eventually the entire rachilla falling off as a whole ..... 7. *C. esculentus*

8 Plants annual, producing fibrous roots only; rachilla disarticulating between the scales at maturity and falling in segments with the scales and achenes ..... 8. *C. odoratus*

1. *Cyperus acuminatus* Torr. & Hook.

Low tufted annual 5-20 cm tall. **Leaves** to as long as the culms or longer, 0.5-2 mm wide; **involucral bracts** similar, to 3 mm wide, surpassing the inflorescence. **Spikelets** crowded in 1-5 hemispheric to globose spikes, the spikes to 1 cm long, often broader than long, one spike sessile and additional ones borne on rays mostly 0.5-2(3) cm long; **spikelets** 3-7 mm long; **scales** 1-2 mm long, acuminate, curving outward toward the tip, pale green, becoming tan at maturity, strongly 3-nerved, the lateral nerves resembling keels; **rachilla** persistent, the scales falling separately; **stamen** solitary; styles trifid. **Achenes** tan to pale brown, trigonous, 0.5-0.9 mm long, ca. 1/2 as wide. Late Jul—Sep. Muddy or sandy stream banks, shores and flats; uncommon, in ND to frequent in NE; (IN to ND, s to GA, LA and TX; also the Pacific Coast).



2. *Cyperus aristatus* Rottb. — Awned cyperus

Low tufted annual with aromatic foliage, often stunted; **culms** slender, (2)3-15 cm tall. **Leaves** to as long as the culms or longer, 0.5-2 mm wide; **involucral bracts** similar to the leaves but often somewhat broader, the principal 2 or 3 surpassing the inflorescence. **Spikelets** overlapping in 1-3(4) dense hemispheric to globose spikes, the spikes generally less than 1 cm long, one spike sessile and others, if present, borne on rays to 3 cm long; **spikelets** 3-7 mm long; **scales** 1.5-2 mm long including the outwardly curved awn 0.5-1 mm long, pale, turning brown at maturity, conspicuously (5)7- to 9-nerved; **rachilla** persistent, the scales falling from it at maturity; **stamen** solitary; **styles** trifid. **Achenes** pale brown, trigonous, 0.6-1 mm long, 1/3 to 1/2 as wide. Late Jul—Sep. Same habitats as the preceding, but more widespread; frequent; (Nearly cosmopolitan). *C. inflexus* Muhl.





Cyperus aristatus.

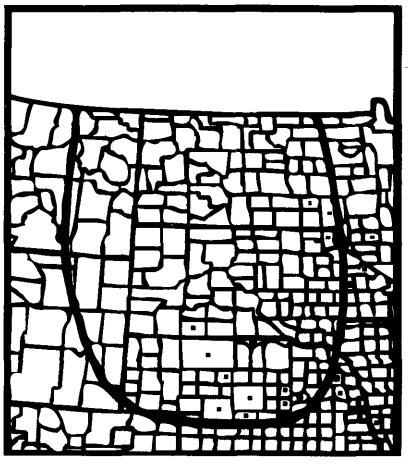
3. *Cyperus bipartitus* Torr. — Shining cyperus, brook cyperus

Very similar to *C. diandrus*, differing mainly as follows: **Leaves** and **involucral bracts** 0.5-2 mm wide. **Scales** of the spikelets closely overlapping, with the achenes usually completely hidden between them, 1.8-2.2 mm long, strongly pigmented (or some lacking pigment or only partially pigmented) with purplish-brown on the sides of the scales, usually darker toward the base, the green keel containing the nerves; **styles** bifid, exserted less than 1 mm, deciduous, undivided in the lower 1/3. Late Jul—Sep. Sandy or muddy shores, stream banks and other wet places; uncommon in se ND, scattered s to NE where frequent; (ME and Que. to ND, s to GA, TX and s to S. Amer.; rare in w U.S.). *C. rivularis* Kunth



4. *Cyperus diandrus* Torr. — Low cyperus

Tufted or solitary annual, the culms spreading to erect, 5-25 cm tall. **Leaves** shorter than to surpassing the culms, 1-3 mm wide; **involucral bracts** similar to the leaf blades, overtopping the inflorescence. **Spikelets** loosely arranged in a subdigitate to pinnate manner to form 1-6 rather open, subglobose spikes; rays to 6 cm long; **spikelets** 4-20 mm long; **scales** loosely overlapping, the achenes usually visible between them, 2-2.5 mm long, strongly pigmented with purplish-brown along the margins, especially toward the tip, the median portion of the sides of the scale scarious and depressed, the green keel containing the nerves; **rachilla** persistent, the scales falling separately; **stamens** 2; **styles** bifid, exserted ca. 2 mm, persistent, cleft nearly to the base. **Achenes** pale brown, lenticular, ellipsoid to narrowly ovoid, 1-1.2 mm long. Late Jul—Sep. Sandy or muddy shores and stream banks; rare in se ND and ne SD, occasional in the Sand Hills; (Que. and ME to se ND, s to VA, MO and KS).



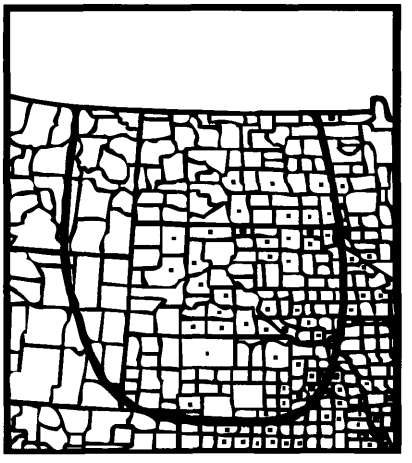
5. *Cyperus engelmannii* Steud. — Engelmann's cyperus

Dwarf and tufted to tall and solitary annual 5-60 cm tall, the culms usually stout and erect. **Leaves** usually not surpassing the culms, the blades 1-4 mm wide; **involucral bracts** often much better developed than the leaves, to 8 mm wide, usually much exceeding the inflorescence. **Spikelets** pinnately disposed on a more or less elongate rachis to form several rather open cylindrical spikes; rays 1-6 cm long; **spikelets** 8-20 mm long; **scales** not overlapping in the spikelets, the tip of each not reaching the base of the scale directly above it (on the same side of the rachilla), 2-2.5 mm long, golden brown to brown, finely several-nerved toward the middle of the back; **rachilla** winged, clasping the achenes, disarticulating between the scales and falling in 1-fruited segments at maturity; **stamens** 3; **styles** trifid. **Achenes** brown, trigonous, linear-oblong, 1-1.5 mm long. Late Jul—Sep. Sandy or muddy shores and stream banks; locally common in ne SD and the n Sand Hills, otherwise rare; (MA to ND, s to VA and MO; widespread in tropical and warm temperate regions of the New World).



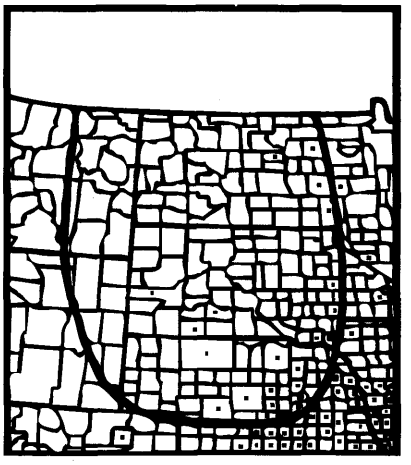
6. *Cyperus erythrorhizos* Muhl. — Red-rooted cyperus

Dwarf and tufted to tall and solitary annual 5-60 cm tall, the culms stout, erect to spreading; roots blood red when fresh, reddish when dried. **Leaves** shorter than to surpassing the culms, the blades 2-6 mm wide; **involucral bracts** better developed than the leaves, to 9 mm wide, usually much exceeding the inflorescence. **Spikelets** pinnately disposed on an elongate rachis to form several to many, rather compact, cylindrical spikes, one or a few spikes nearly sessile, with others on rays to 10 cm long; **spikelets** 2-8 mm long; **scales** overlapping in the spikelets, 1-1.5 mm long, 3- to 5-nerved in the green midstripe of the keel, the sides nerveless, pale to lustrous copper or auburn; **rachilla** persistent, bearing deciduous chaffy wings, the scales falling separately; **stamens** 3; **styles** trifid. **Achenes** ivory white to pale tan, unequally trigonous, ovoid, 0.6-0.8 mm long. Late Jul—Sep. Sandy or muddy shores and stream banks; frequent from se and sc ND to NE; (Widespread in temperate N.Amer., but rare in the Pacific Northwest).



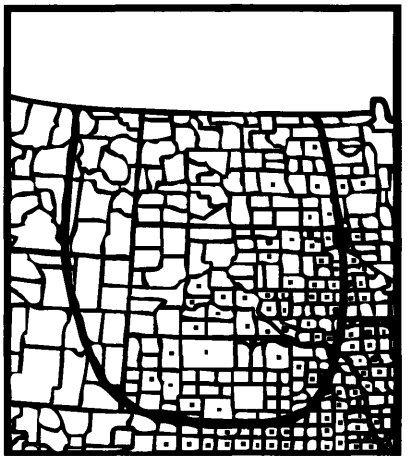
7. *Cyperus esculentus* L. — Yellow nut-sedge, chufa

Robust tuberiferous perennial 20-60 cm tall; **culms** arising singly, stout, erect; hard nutlike tubers produced at the ends of underground scaly stolons (these evident even if no tubers are collected). **Leaves** shorter than to surpassing the culms, the blades 3-12 mm wide, the **involucral bracts** similar to the leaves, often greatly exceeding the inflorescence. **Spikelets** pinnately arranged on an elongate rachis to form several to many rather open, cylindrical spikes, a few of the spikes sessile and others extended on rays mostly 2-8(15) cm long; **spikelets** 4-12 mm long; **scales** overlapping in the spikelets, (1.8)2-2.5 mm long, stramineous to pale brown, with 7-13 well-distributed, often faint nerves; **rachilla** persistent, the scales and achenes dropping off separately, eventually the entire rachilla falling as a whole; **stamens** 3; **styles** trifid. **Achenes** tan to pale brown, trigonous, ellipsoid to obovoid, 1.2-1.5 mm long. Late Jul—Sep. Shores, stream banks and other wet places; uncommon in the e parts of ND and SD, more common s; (Pantropical and temperate, in N.Amer. from ME to ND, s to S.Amer., sparingly intro. to the w; common as a lawn weed in se U.S.).



8. *Cyperus odoratus* L. — Coarse cyperus

Tufted or solitary annual 4-40 cm tall, fibrous-rooted, producing no stolons or tubers, the culms stout, erect to spreading. **Leaves** shorter than to surpassing the culms, the blades 2-6 mm wide, the **involucral bracts** similar, much exceeding the inflorescence. **Spikelets** pinnately disposed on an elongate rachis, forming several to many, rather dense, cylindrical spikes, all of these nearly sessile to form a congested inflorescence, or some of the spikes on rays to 6 cm long; **spikelets** 4-18 mm long; **scales** overlapping in the spikelets, 2-2.5 mm long, reddish-brown, with 7-13 well distributed, often faint nerves; **rachilla** winged, with the margins clasping the achenes, disarticulating between the scales and falling in 1-fruited segments at maturity; **stamens** 3; **styles** trifid. **Achenes** brown, trigonous, obovoid-oblong, 1-1.5 mm long. Late Jul—Sep. Sandy or muddy shores and stream banks; frequent from se ND, s to NE; (Pantropical, in N.Amer. n to MA, WI, MN and ND). *C. speciosus* Vahl, *C. ferruginescens* Boeckl.





Cyperus odoratus.

9. *Cyperus strigosus* L. — Straw-colored cyperus

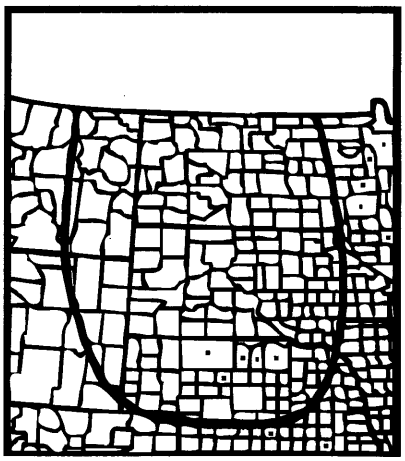
Dwarf and tufted to tall and solitary perennial 1-8 dm tall, sometimes flowering the first year, eventually forming a hard, cormlike base; **culms** slender, sharply trigonous. **Leaves** shorter than to surpassing the culms, the blades 2-10(15) mm wide, the **involucral bracts** leaflike, the largest exceeding the inflorescence. **Spikelets** pinnately arranged and stiffly spreading in several to many cylindrical spikes, often eventually reflexed, the spikes sometimes crowded in dwarf individuals, otherwise mostly on rays 1-12(20) cm long, the longer rays simple (with 1 spike) or often branched above, with few-several spikes in an umbel; **spikelets** 6-18 mm long, golden-brown, sometimes streaked with red, strongly 7-nerved; **rachilla** persistent, the scales and achenes falling separately, eventually the rachilla falling as a whole; **stamens** 3; **styles** trifid. **Achenes** tan to reddish-brown, trigonous, oblong, 1.5-2.3 mm long. Jul—Sep. Shores and stream banks, often where sandy; frequent from s SD through NE; (Que. to MN and SD, s to FL and TX; also the Pacific Coast and s into tropical Amer.).



4. ***Dulichium*** Rich. ex Pers.

1. *Dulichium arundinaceum* (L.) Britt. — Three-way sedge

Extensively rhizomatous perennial; **culms** arising singly, simple or seldom with slender branches from lower nodes, 3-10 dm long, hollow, terete or obtusely trigonous. **Leaves** rather evenly distributed along the culm, those in the lower 1/3 to 1/2 of the culm reduced to sheaths only; **blades** grasslike, rather short, flat, mostly 4-15 cm long, 2.5-8 mm wide; **sheaths** short, usually overlapping only in the upper portion, convex with a narrow brown band at the mouth. **Inflorescences** axillary, continuously produced from the lower or middle nodes upward, each a rather short spike of few-10 spikelets, these pinnately arranged, ascending to spreading, 10-25 mm long, mostly 4- to 10-flowered; **rachilla** winged, disarticulating into 1-fruited segments at maturity; **scales** (and their enclosed flowers) distichous in the spikelets, green to tan with brownish scarious margins, 5-8 mm long, several-nerved, acute to acuminate. **Flowers** perfect; **perianth** of 6-9 retrorsely barbellate bristles; **stamens** 3; **styles** bifid. **Achenes** tan, oblong, 2.5-3.5 mm long, with a stout, stipitate base, slenderly beaked by the persistent style. Aug—Oct. Marshes, wet meadows, shores and stream banks; uncommon in nc NE; (Newf. to B.C. s to FL, AL, e TX, NE, nw MT, n ID and CA).



5. ***Eleocharis*** R. Br. — Spikesedge, spikerush

Short to intermediate rushlike plants, mostly perennial from rhizomes (tufted and annual in *E. obtusa*), often forming extensive, dense, matlike colonies; **culms** slender and scapose, terete or compressed, sometimes angled and grooved. **Leaves** bladeless, reduced to sheathing at the base of the culm, the sheaths truncate to oblique at the summit. **Inflorescence** consisting of a single spikelet terminating the culm, the spikelet often subtended by 1-2(3) sterile scales (reduced bracts); **scales** of the spikelets spirally arranged and imbricate. **Flowers** perfect; **perianth** of usually 6 bristles, but often fewer or more, or the perianth lacking; **stamens** 3; **styles** bifid or trifid, the style base swollen and persistent as a **tubercle** atop the achene (or sometimes confluent with and not always clearly distinct from the achene body). **Achenes** biconvex or trigonous, crowned or beaked by the persistent tubercle.

The predominant spikerushes of regional marshes, meadows, shores and ditches are plants of the *Eleocharis palustris* (L.)R. & S. complex. Although many authors assign these plants to *E. palustris*, I have chosen to follow Harms (1968) in recognizing *E. macrostachya*, *E. erythropoda*, *E. smallii* and *E. xyridiformis* as distinct from the principally Eurasian *E. palustris*. Morphological distinction of these species is sometimes problematic, but cytological evidence lends support to their integrity as species. More study of the *E. palustris* complex is needed on a worldwide basis.

References:

Harms, L. J. 1968. Cytotaxonomic studies in *Eleocharis* subser. *Palustres*: central United States taxa. Amer. J. Bot. 55:966-974.

Svenson, H. K. 1957. *Eleocharis*. North Amer. Flora 18:509-540.

1 Achenes biconvex; styles bifid (often trifid or both trifid and bifid in *E. obtusa*).

2 Tubercles flat, triangular, sharp-edged, tightly fitting to the top of the achene; plants annual, producing fibrous roots only . . . . . 5. *E. obtusa*

2 Tubercles thick, deltoid to conic, not sharp on the angles, constricted at the base where attached to the achene; plants perennial, rhizomatous.

3 Sterile basal scales of the spikelet 2(3), each one not fully encircling the culm.

4 Culms flattened, ribbonlike; tubercles deltoid, abruptly contracted into an attenuate apex . . . . . 11. *E. xyridiformis*

4 Culms terete or subterete; tubercles conic, often mammillate.

5 Basal sheaths sharply oblique at the orifice, with a prominent V-shaped sinus; culms often soft and inflated . . . . . 9. *E. smallii*

5 Basal sheaths truncate to oblique; culms rigid . . . . . 4. *E. macrostachya*

3 Sterile basal scale 1, fully encircling the culm . . . . . 3. *E. erythropoda*

1 Achenes trigonous to nearly terete; styles trifid.

6 Tubercle not obviously differentiated from the achene, nor forming a distinct apical cap.

7 Culms wiry, flattened above, mostly 4-10 dm long, 1-1.4 mm wide, some occasionally arching and rooting at the tip, tufted from a stout erect rootstock, lacking creeping rhizomes; spikelets 6-20 mm long, with 10-20 or more flowers . . . . . 8. *E. rostellata*

7 Culms soft, terete, to 3 dm long, less than 1 mm thick, never rooting at the tip, arising in tufts from slender or filiform, creeping rhizomes; spikelets 2-8 mm long, 2- to 9-flowered.

8 Lowest scale of the spikelet empty; scales mostly 1.5-2(2.5) mm long; achenes 0.9-1.3 mm long . . . . . 6. *E. parvula*

8 Lowest scale of the spikelet subtending a flower; scales mostly 2.5-5.5 mm long; achenes 0.9-2.8 mm long . . . . . 7. *E. pauciflora*

6 Tubercle obviously differentiated from the achene, forming a distinct apical cap.

9 Achenes twice as long as wide, nearly terete, gray, with several longitudinal ridges and many fine crosslines.

10 Scales ca. 3 mm long; culms flattened, mostly 0.7-1.5 mm wide . . . . . 10. *E. wolfii*

10 Scales ca. 2 mm long; culms scarcely flattened, 0.1-0.5 mm wide . . . . . 1. *E. acicularis*

9 Achenes 2/3 to fully as wide as long, trigonous, golden to brown, distinctly roughened or pitted . . . . . 2. *E. compressa*

1. *Eleocharis acicularis* (L.) R. & S. — Needle spikesedge

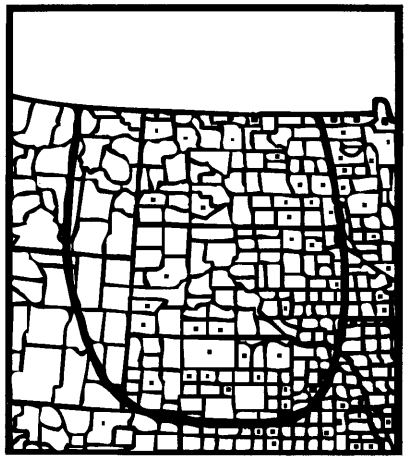
Low, tufted, mat-forming perennial from filiform rhizomes; **culms** filiform, 3-10(20) cm long, scarcely flattened, angled by longitudinal grooves, 0.1-0.5 mm thick, rigid when emersed, flexuous and not flowering when submersed; **sheaths** mostly reddish at the base, membranous, oblique at the summit, often splitting with age. **Spikelets** ovoid, 3-5(8) mm long, 1-1.5 mm thick; **scales** rather few, all floriferous, pale green, mostly marked with reddish or purplish-brown, ovate-lanceolate, with broad scarious margins, ca. 2 mm long; **perianth** of a few bristles or none; **styles** trifid. **Achenes** gray, with several longitudinal ridges and numerous fine crosslines, nearly terete, 0.7-0.9 mm long, ca. 1/2 as wide; **tubercle** turbinate to conic, 1/4 as long as the achene, constricted where attached to the achene. Jun—early Sep. Exposed mud or sand, or in shallow water of shores, stream banks, marshes and springs; common; (Circumboreal, in N.Amer. s to FL, LA and Mex.).



2. *Eleocharis compressa* Sulliv. — Flatstem spikesedge

Sparsely tufted perennial from stout black rhizomes; **culms** flattened (especially obvious toward the base), 1.5-4 dm tall, angled by longitudinal grooves, 0.5-1 mm wide; **sheaths** reddish or purplish at the base, firm, slightly oblique at the orifice. **Spikelets** ovoid, blunt, 4-9 mm long, 3-4 mm thick; **lowermost scale** sterile, encircling the culm; **floriferous scales** many, reddish-brown on the sides, with a pale midvein, ovate-lanceolate, 2-3 mm long, white-hyaline on the margins, bifid or lacerate at the tip with age; **perianth** usually lacking or of 1-4 bristles, these reaching to more than 1/2 the length of the achene; **styles** trifid. **Achenes** golden-yellow to brown, warty or wrinkled on the surface, unequally trigonous, 0.75-1.1 mm long, 2/3 to fully as wide, often persistent after the scales have fallen; **tubercle** deltoid to depressed-deltoid, to 1/4 the length of the achene, constricted at the attachment to the achene. Jun—Aug. Low prairie, wet meadows and seepage areas; frequent, but easily overlooked or dismissed for more common spp.; (Que. and NY to Sask., s to VA, GA, AL, MO, TX and CO).

Reports of the similar *E. verrucosa* (Svens.) Harms [= *E. tenuis* (Willd.) Schult. var. *verrucosa* (Svens.) Svens.] for central NE may be based upon misidentifications of *E. compressa*. Much of the *E. compressa* in our region has more slender, often angular culms suggestive of *E. verrucosa*. The species are otherwise separable on the basis of achene characters. *E. verrucosa* has olivaceous achenes with a cellular-reticulate pattern of depressions on the surface. This is in contrast to the golden to brown, warty or wrinkled achenes of *E. compressa*.



3. *Eleocharis erythropoda* Steud. — Spikerush

Rhizomatous perennial 1-7 dm tall; **culms** terete, rigid, 0.5-1.5 mm thick; **sheaths** reddish or purplish toward the base, usually firm, truncate to oblique at the orifice. **Spikelets** ovoid to lance-cylindric, acuminate to blunt, 5-15(20) mm long, 2-4 mm thick; **sterile basal scale** 1, encircling the culm; **floriferous scales** many, brown, reddish-brown or pale on the sides, green or pale on the midvein, lanceolate to ovate, 2.5-4.5 mm long; **perianth** variable, usually of 2-6 white to pale brown bristles, shorter than to exceeding the achene; **styles** bifid. **Achenes** yellow to brown, biconvex, 1.2-1.7 mm long excluding the tubercle, 0.9-1.3 mm wide; **tubercle** thick, deltoid to conic, 0.25-0.7 mm high, 0.2-0.6 mm wide, constricted at the base. Jun—Aug. Marshes, wet meadows, ditches, shores and stream banks; common, often abundant; (e Que. to n Sask. and sw Mack., s to VA, TN, n TX, CO and NM). *E. calva* Torr., *E. palustris* (L.) R. & S.



4. *Eleocharis macrostachya* Britt. — Spikerush

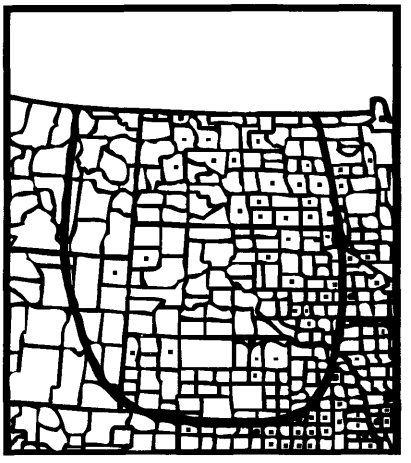
Quite similar to the preceding but more robust; **culms** 1.5-10 dm tall, 1-3 mm thick; **sheaths** reddish or purplish toward the base, usually firm, truncate to oblique at the orifice. **Spikelets** ovoid to lance-cylindric, acuminate to rather blunt, 5-25 mm long, 2.5-4 mm thick; **sterile basal scales** 2(3); **floriferous scales** as in the preceding; **perianth** variable; **styles** bifid. **Achenes** yellow to brown, biconvex, 1.4-1.7 mm long excluding the tubercle, 1-1.2 mm wide; **tubercle** thick, deltoid, 0.5-0.7 mm high, 0.4-0.75 mm wide, constricted at the base. Jun—Aug. Same habitats as the preceding, often dominant in shallow marsh zones; common, often abundant; (IL to AK, s to MO, TX, CA and into Mex.). *E. palustris* (L.) R. & S.



5. *Eleocharis obtusa* (Willd.) Schult. — Blunt spikesedge

Tufted, fibrous-rooted annual 0.5-3 dm tall; **culms** terete, 0.5-1.2 mm thick; sheaths green, firm, oblique at the orifice. **Spikelets** ovoid to lance-cylindric, 4-18 mm long, 2-4 mm thick; **sterile basal scales** 1 or 2; **floriferous scales** many, brown on the sides, with a green or pale midvein, scarious on the margins, rounded at the tip, 1.7-2.5 mm long; **perianth** variable, of up to 6(7) brown bristles, shorter than to exceeding the achene, or the perianth lacking; **styles** bifid or trifid or both in the same spikelet. **Achenes** light green to brown, shiny, biconvex, 0.8-1.3 mm long excluding the tubercle, 0.7-1 mm wide; **tubercle** flat, triangular, sharp-edged, 0.1-0.3 mm high, tightly fitting to the broad, flat summit of the achene. Jun—Sep. Exposed mud in marshes, ditches, streams and temporary ponds, often where disturbed by cultivation; occasional; (Widespread over most of N.Amer. and Eurasia). *E. ovata* (Roth) R. & S., *E. engelmannii* Steud.

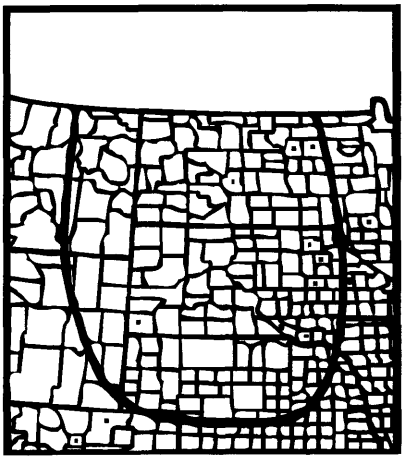
Plants of this region belong to var. *ovata* (Roth) Drapalik and Mohlenbrock.



6. *Eleocharis parvula* (R. & S.) Link ex Buff. & Fingerh. — Dwarf spikesedge

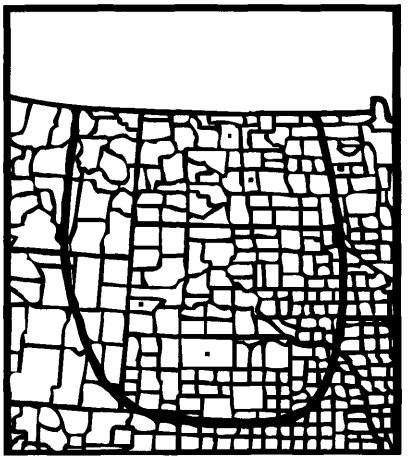
Very small, tufted, mat-forming perennial from filiform rhizomes; **culms** filiform, 2-6 cm tall, 0.2-0.3 mm thick; **sheaths** inconspicuous, membranous. **Spikelets** ovoid, 2-4 mm long, 1-2 mm thick; **sterile basal scale** 1; **floriferous scales** 2-9, pale throughout or brown on the sides, ovate, scarious on the margins, 1.5-2(2.5) mm long; **perianth** none or much reduced; **styles** trifid. **Achenes** pale brown and cellular-reticulate, trigonous, 0.9-1.3 mm long including the tubercle, 0.6-0.7 mm wide; **tubercle** inconspicuous, appearing confluent with the achene, not forming a distinct apical cap. Jul—early Sep. Wet saline or alkaline flats and shores; uncommon and scattered; (Newf. to Vancouver I., s to n S.Amer.; also w Europe and the Mediterranean region).

Plants of this region belong to var. *anachaeta* (Torr.) Svens.



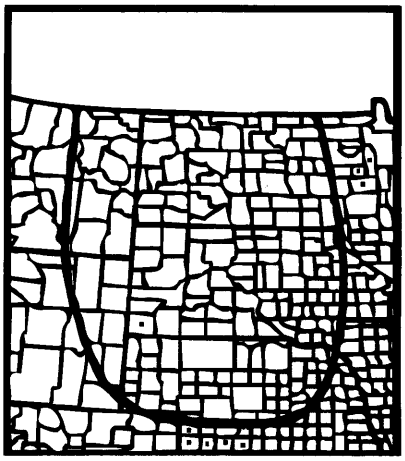
7. *Eleocharis pauciflora* (Lightf.) Link — Few-flowered spikesedge

Small rhizomatous perennial (0.5)1-3 dm tall; **culms** arising in small tufts or solitary, filiform, longitudinally grooved, less than 1 mm thick; **sheaths** firm, oblique at the summit. **Spikelets** ovoid, 4-8 mm long, 2-3 mm thick; **scales** all floriferous, usually 3-9, pale to deep brown, narrowly ovate, scarious on the margins, 2.5-5.5 mm long, the lowest scales longer than the upper ones; **perianth** shorter than to equaling or exceeding the achene; **styles** trifid. **Achenes** grayish-brown or brown, trigonous, 0.9-2.8 mm long including the tubercle, ca. 1/2 as wide; **tubercle** slender, confluent with the achene and appearing like a beak. Jun—Aug. Fens, old bogs and springy areas; uncommon and scattered from ND to NE; (Circumboreal, in N.Amer. s to NJ, IL, MN, NE, NM and CA).



8. *Eleocharis rostellata* (Torr.) Torr.

Tufted perennial from a stout, erect rootstock, without creeping rhizomes; **culms** wiry, compressed above, mostly 4-10 dm long, 1-1.4 mm wide, the longer ones occasionally arching and rooting at the tip; sheaths firm, brown, truncate to oblique at the summit. **Spikelets** ovoid to oblong-lanceolate, 6-17 mm long, 2.5-4.5 mm thick; **sterile basal scale** 1; **floriferous scales** 10-20 or more, pale to dull brown with hyaline margins, 3-5 mm long; **perianth bristles** about equaling the achene (including tubercle); **styles** trifid. **Achenes** olivaceous to brown, trigonous-obovoid, 1.9-3 mm long including the tubercle, ca. 1/2 as wide; **tubercle** confluent with the achene body and beaklike, light green to brownish, ca. 1/3 the length of the achene. Jul—Sep. Calcareous wet meadows, seeps and stream margins, often associated with mineral springs; uncommon and localized, sw SD and sw NE; (N.S. to B.C., s to FL, TX and n Mex.; also S.Amer.).



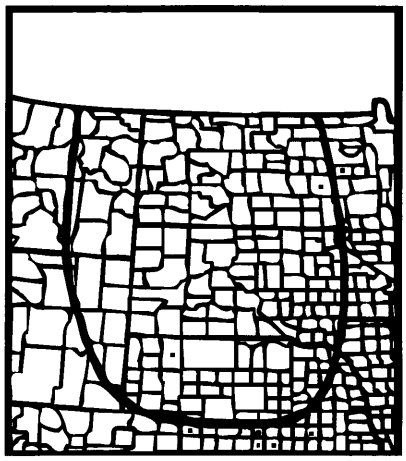
9. *Eleocharis smallii* Britt. — Spikerush

Very similar to *E. macrostachya* and often difficult to distinguish from it, differing mainly as follows: **Culms** terete, 4-10 dm tall, often soft and inflated, 1-5 mm thick; **sheaths** membranous or firm, sharply oblique at the orifice, with a prominent V-shaped sinus. **Spikelets** lance-cylindric, acuminate, 7-27 mm long; **floriferous scales** linear-lanceolate, 3-4.5 mm long. Jun—Aug. Marshes, ditches, stream and lake margins, often in shallow water; common, often abundant; (Labr. and Newf. to Man., s to DE, VA, TN, AL, MO and OK). *E. palustris* (L.) R. & S.



10. *Eleocharis wolfii* A. Gray — Wolf's spikesedge

Sparsely tufted perennial from slender rhizomes; **culms** flattened, frequently spiraled, 1-3 dm tall, mostly 0.7-1.5 mm wide; **sheaths** often purplish toward the base, membranous, sharply oblique at the orifice. **Spikelets** narrowly ovoid, 4-9 mm long, 2-3 mm thick; **scales** few, all floriferous, marked with purple, ovate-lanceolate, ca. 3 mm long, broadly scarious on the margins; **perianth** none; **styles** trifid. **Achenes** gray, with several longitudinal ridges and many fine crosslines, nearly terete, 0.7-1 mm long, 1/2 as wide; **tubercle** conic, 1/4 as long as the achene, constricted at the attachment to the achene. Jun—Jul. Wet meadows and low prairie; rare and scattered from w MN and e ND to s NE; (IN to Alta., s to TN, LA and CO; adventive in NY).



11. *Eleocharis xyridiformis* Fern. & Brackett — Spikerush

Quite similar to *E. macrostachya*, differing chiefly as follows: **Culms** flattened and ribbonlike especially in the lower portion, some often twisted, 1-3.5 mm wide, tending to be yellow-green (rather than dark green); **sheaths** truncate at the apex. **Spikelets** oblong-ovoid to linear-cylindric, 7-27 mm long, 2-4 mm thick. **Achenes** 1.2-1.5 mm long excluding the tubercle, 0.9-1.2 mm wide; **tubercle** 0.3-0.5 mm long, 0.4-0.5 mm wide. Jun—Aug. Shores and shallow water of lakes, ponds and marshes; frequent mainly in the c and w parts of the region; (ND and MT s to TX and into Mex.).





***Eleocharis xyridiformis*, a member of the *E. palustris* complex which also includes *E. erythropoda*, *E. macrostachya*, and *E. smallii*.**

6. ***Eriophorum*** L. — Cottonsedge

Solitary or sparsely tufted, grasslike, rhizomatous perennials; **culms** rather stout, terete to weakly trigonous, mostly solid. **Leaves** mostly basal, sheathing the stems; **blades** elongate, grasslike, flat or folded or subterete and sometimes channeled on the upper surface. **Involucral bracts** few, foliaceous in spp. having few to several spikelets in the inflorescence, or resembling enlarged, sterile basal scales in those with a single terminal spikelet. **Inflorescence** terminal, containing few to several spikelets in an umbelliform cyme, or comprised of a solitary spikelet; **spikelets** having a cotton tuft appearance at maturity due to the elongate, silky perianth bristles; **scales** many, spirally arranged, scarious. **Flowers** perfect; **perianth** of numerous, long, persistent, white to rufous bristles, greatly surpassing the scales at maturity; **stamens** 3; **styles** trifid. **Achenes** brown, unequally trigonous, sometimes with a short style beak.

Reference:
Fernald, M. L. 1905. The North American species of *Eriophorum*. Rhodora 7:81-92, 129-136.

1 Inflorescence a single terminal spikelet; foliaceous involucral bracts absent . . . . . 1. *E. chamissonis*

1 Inflorescence of few to several spikelets; foliaceous involucral bracts present.

2 Involucral bract 1, shorter than the inflorescence . . . . . 2. *E. gracile*

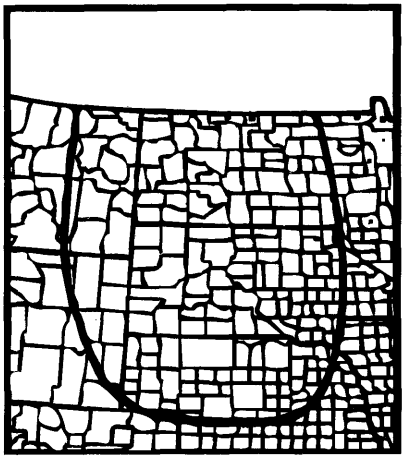
2 Involucral bracts 2 or 3, the longest usually surpassing the inflorescence.

3 Midvein of the scale fading before reaching the very thin tip of the scale . . . . . 3. *E. polystachion*

3 Midvein of the scale broadening toward the tip of the scale and reaching the tip . . . . . 4. *E. viridicarinatum*

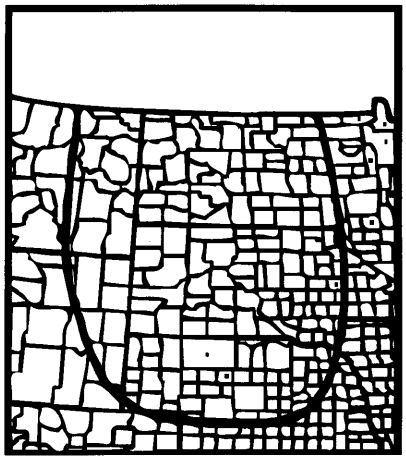
1. *Eriophorum chamissonis* C. A. Mey. — Chamisso cottonsedge

Culms solitary or in groups of few, terete, finely ridged, 2-6 dm tall, 1-2 mm thick. **Leaves** few, the uppermost arising from near the middle of the culm and often bladeless; **blades** of the lower leaves subterete to slightly trigonous, sometimes channeled, 1-2 mm wide. **Spikelet** solitary and terminal, appearing like a hemispheric or subglobose cotton tuft a few cm in diameter; **involucral bracts** not foliaceous, resembling enlarged, sterile basal scales, these blackish with pale margins, obovate to triangular-ovate, the largest 1-2 cm long; **floriferous scales** blackish-green, the tip and margins pale, obscured in the spikelet by the bristles; **perianth bristles** white to rufous. **Achenes** dark brown, distinctly beaked, 2-2.7 mm long, ca. 1/3 as wide. Jun—Jul. Bogs; rare, with records from Bottineau and Rolette Counties, ND; (Circumboreal, in N.Amer. s to N.B., MN, nw WY and OR).



2. *Eriophorum gracile* Koch — Slender cottonsedge

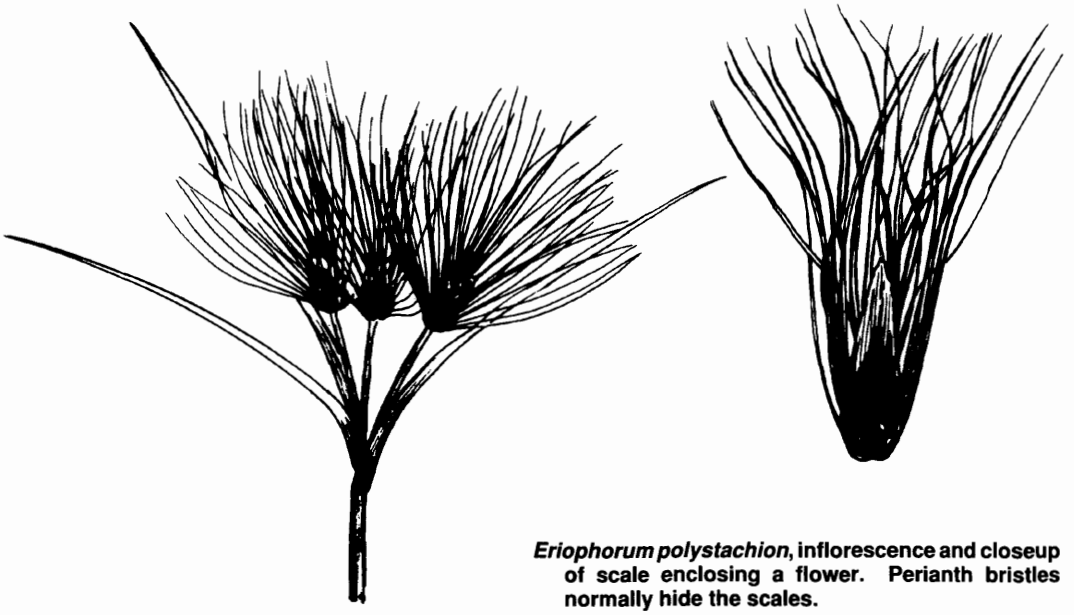
Culms solitary from rhizomes, slender, weak, subterete, 2-6 dm tall, 1-2 mm thick. **Leaves** few to several, the basal often withered by flowering time, the uppermost arising above or below the middle, with a reduced blade shorter than the sheath; **blades** channeled on the upper surface, 1-2 mm wide. **Spikelets** 2-5, obovoid to obconic, 1.5-2 cm long with the expanded bristles; **pedicels** spreading to nodding, to 3 cm long; **involucral bracts** several but only 1 foliaceous and erect, shorter than the inflorescence; scales pale to blackish-brown, ovate, bluntly acute-tipped; **perianth bristles** white. **Achenes** pale tan to light brown, narrowly obovate, 2.5-3.5 mm long, 1/3 to 1/4 as wide. Jun—Jul. Fens and boggy meadows; rare and possibly extirpated in our region, e SD and nc NE; (Circumboreal, s in N.Amer. to PA, IN, IA, NE, CO, ID and CA).



3. *Eriophorum polystachion* L. — Narrowleaf cottonsedge

Culms mostly solitary, weakly trigonous, becoming conspicuously so below the inflorescence, finely ridged, 3-6(9) dm tall, 1.5-3 mm thick. **Leaves** few to several, the uppermost arising in the upper 1/2 of the stem; **blades** flat or conduplicate, 3-6 mm wide when flat, commonly dying back from the tips; **sheaths** sometimes reddish, dark-girdled at the summit. **Spikelets** 2-8, roughly obconic, 1-3 cm in diameter with the bristles fully expanded; **pedicels** rather lax, the spikelets drooping; **involucral bracts** foliaceous, the principal one rather erect and usually surpassing the inflorescence; **scales** pale throughout or darkened with a pale tip and margins, ovate to lance-subulate, 4-6 mm long, deciduous, the midvein fading before reaching the very thin tip of the scale; **perianth bristles** white to faintly tawny, sometimes rather short when the achenes fail to develop. **Achenes** dark brown to nearly black, blunt at the tip, 2-3 mm long, ca. 1 mm wide. Jun—Jul. Bogs, fens, fresh wet meadows and springs; occasional from e MT and n ND to e SD; also the Black Hills and the Sand Hills; (Circumboreal, in N.Amer. s to ME, NY, MI, n NE, CO, n NM, ID and OR). *E. angustifolium* Honck.



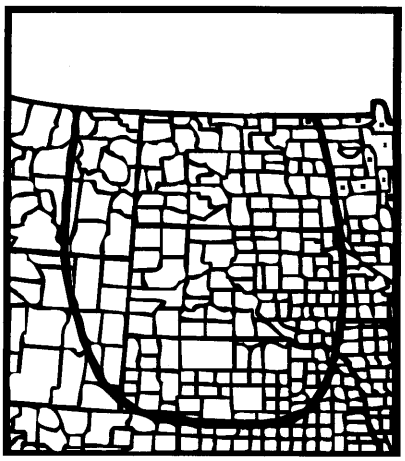


***Eriophorum polystachion*, inflorescence and closeup of scale enclosing a flower. Perianth bristles normally hide the scales.**

4. *Eriophorum viridicarinatum* (Engelm.) Fern.

Very similar to the preceding, differing mainly as follows: **Sheaths** not dark-girdled at the summit, green throughout. **Midvein of the scale** broadening toward the tip of the scale and reaching the tip. Bogs and swamps; rare, ne ND and w MN; (Newf. to AK, s to NY, OH, MI, MN, ne ND, CO, and n ID).

Many previous records of this species were based on misidentified specimens of *E. polystachion.*



7. *Fimbristylis* Vahl

Grasslike annuals and perennials; **culms** tufted or solitary, slender. **Leaves** mainly basal, narrowly linear, flat to involute, with or without a ligule of short hairs. **Inflorescence** a terminal umbel or cyme of spikelets, with 1 or 2 spikelets sessile, subtended by an involucre of 2 or 3 short, leaflike bracts; **spikelets** several to many, ovoid to oblong-lanceolate, many-flowered; **scales** spirally arranged and imbricate in the spikelets, all floriferous. **Flowers** perfect; **perianth** lacking; **stamens** (1)2-3; **styles** bifid or trifid, swollen at the base above the attachment to the achene, readily deciduous. **Achenes** lenticular or trigonous, obovoid, smooth to reticulate.

Reference:

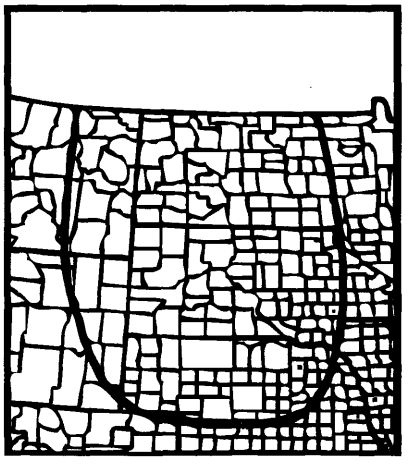
Kral, R. 1971. A treatment of *Abildgaardia*, *Bulbostylis* and *Fimbristylis* (Cyperaceae) for North America. Sida 4:57-227.

1 Achenes trigonous; styles trifid; plants annual ..... 1. *F. autumnalis*

1 Achenes lenticular; styles bifid; plants perennial ..... 2. *F. puberula*

1. *Fimbristylis autumnalis* (L.) R. & S.

Tufted annual with shallow fibrous roots; **culms** 1-many, flattened, 0.5-4 dm tall. **Leaves** shorter than the culms; **blades** flat, 1-2 mm wide; ligule a line of short hairs. **Inflorescence** cymose, subtended by 2 or 3 foliaceous bracts, these usually shorter than the inflorescence; **pedicels** filiform, stiffly spreading to ascending; **spikelets** usually many, solitary or partly in twos or threes on the pedicels, lanceolate to oblong-lanceolate, 3-10 mm long; **scales** golden-brown or coppery with a prominent green midrib, elliptic-ovate, 1-1.5 mm long, awn-tipped below to mucronate above in the spikelet; **stamens** 2; **styles** trifid. **Achenes** ivory to light brown, trigonous, 0.4-0.5 mm long, strongly ribbed on the 3 angles, nearly smooth to cross-reticulate on the faces, sometimes warty toward the base. Jun—Sep. Shores, stream banks and wet meadows, often where sandy; rare and probably occurring as a waif in our range, e SD and e NE; (ME and Que. to MN and SD, s to FL and TX; also Mex., C. and S.Amer.).



2. *Fimbristylis puberula* (Michx.) Vahl

Perennial with slender, stiff **culms** 2-7 dm tall, solitary or in small tufts, sometimes bulbous at the base, with short, slender to thick rhizomes. **Leaves** shorter than the culm; **blades** flat to involute, 0.5-3 mm wide; ligule a line of short hairs or incomplete to absent. **Inflorescence** umbellate or some branches forked, subtended by 2 or 3 foliaceous bracts, the longest of these shorter than to exceeding the inflorescence; **pedicels** slender, ascending to spreading; **spikelets** few to many, ovoid to ovoid-cylindric, 5-10 mm long; **scales** pale to dark brown, broadly ovate, mostly 3-3.5 mm long, broadly rounded at the apex, often with a short awn or mucro, scarious and sometimes short-ciliate on the margins, firm, shiny and often finely striate on the back, the lower scales sometimes puberulent; **stamens** (2)3; **styles** bifid, fringed with fine hairs below the branches. **Achenes** pale brown, lenticular, 1.2-1.8 mm long, reticulate between fine longitudinal lines on the convex faces, the straplike filaments often adherent to the achene base. Jun—Aug. Wet meadows, shores and moist to dry prairies, often where sandy; occasional in NE; (NJ to MI and NE, s to FL, TX and NM). *F. castanea* (Michx.) Vahl, *F. caroliniana* (Lam.) Fern., *F. drummondii* Boeckl.

Most plants of the northern plains are var. *interior* (Britt.) Kral, characterized as follows: **Culms** rarely bulbous at the base, with numerous slender, twisted, orangish rhizomes produced from the rather soft, tufted base. **Longest involucral bract** usually surpassing the inflorescence; **spikelet scales** glabrous.

From e NE we have a few collections of var. *puberula*: **Culms** bulbous at the base, arising from a thick rhizome and clothed by the firm, fibrous sheaths of old leaves. **Longest involucral bract** usually much shorter than the inflorescence; **spikelet scales** short-ciliate.



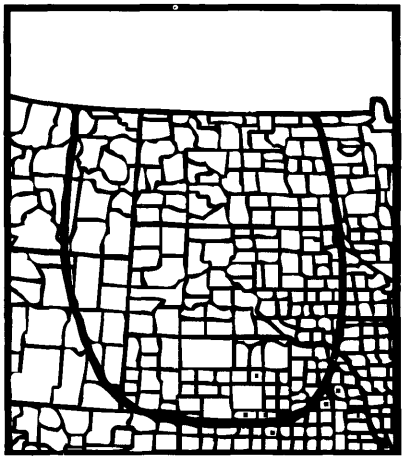
1. *Fuirena simplex* Vahl

Tufted grasslike annual (in this region) with shallow fibrous roots; **culms** slender, weak, mostly 2-6 dm long, sharply trigonous above. **Leaves** grasslike, mostly cauline and extending upward to below the inflorescence; **blades** soft, flat, 2-5 mm wide, sparingly to moderately pubescent; **sheaths** glabrous to variously hirsute or hispid, hairy at the collar; ligule membranous with a fringe of short hairs. **Inflorescence** of 1-3 clusters of 2-several spikelets in a terminal head, rarely of a single spikelet (on diminutive culms), each cluster subtended by 2-3 narrow, spreading or reflexed, foliaceous bracts; **spikelets** ovoid to oblong-ovoid, 4-11 mm long, appearing bristly due to recurved awns of scales; **scales** numerous and imbricate, reddish-brown toward the base, blackish or blackish-brown on the margins, the body obovate, 1.5-2 mm long, short-pubescent, strongly 3-nerved in the middle, the 3 nerves excurrent into a subterminal, recurved awn 1.5-5 mm long. **Flowers** perfect; **perianth** of 3 stipitate scales alternating with 3 retrorsely barbellate bristles, perianth scales oblong-ovate, 3-nerved, mucronate, persistent to, surpassing and enclosing the achene; **stamens** 3; **styles** trifid. **Achenes** light green, sharply trigonous with flat to concave faces, 0.7-1 mm long including the short stipitate base and slender style beak. Aug—Sep. Stream and pond margins and low areas on floodplains, often where sandy; occasional, c and e NE; (IL to MO and NE, s to TX and NM; also Mex., C.Amer. and the Caribbean).

Plants of the northern plains belong to var. *aristulata* (Torr.) Kral, distinguished from the more southern var. *simplex* by its annual habit and 3-nerved (rather than 5- to 7-nerved) spikelet scales.

Reference:

Kral, R. 1978. A synopsis of *Fuirena* (Cyperaceae) for the Americas north of South America. Sida 7:309-354.



9. ***Hemicarpha*** Nees

Dwarf, tufted, fibrous-rooted annuals 3-15 cm tall; **culms** and **leaves** filiform; **leaves** 2 per culm, basal, shorter than the culms; **involucral bracts** 2 or 3, foliaceous, the principal one rather erect, causing the inflorescence to appear lateral. **Inflorescence** of 1-3 sessile, ovoid spikelets, these compact, containing numerous minute, spirally arranged scales; **perianth** consisting of a single minute inner scale opposite the subtending outer scale, this inner scale often absent; **bristles** none; **stamen** solitary; **styles** bifid. **Achenes** minute, obovate and compressed or cylindrical, black or brown, minutely apiculate.

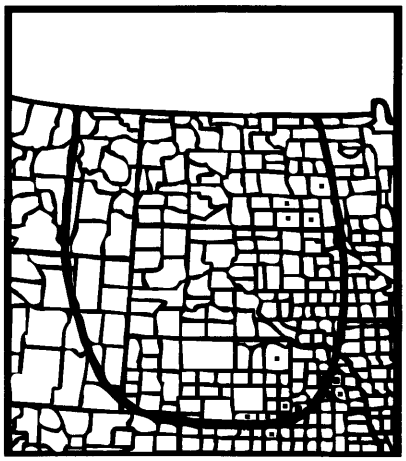
Reference:
Friedland, S. 1941. The American species of *Hemicarpha*. Amer. J. Bot. 28:855-861.

1 Inner scale equaling or exceeding the achene and often cupped around it; mature achenes obovate, compressed, black ..... 1. *H. drummondii*

1 Inner scale much shorter than the achene or absent; mature achenes cylindrical, brown ..... 2. *H. micrantha*

1. *Hemicarpha drummondii* Nees

Very similar to and often considered a variety of the following, differing in having scales with a curved **awn** ca. 2/3 the length of the scale body; **inner perianth scale** equaling or exceeding the achene and often cupped around it. **Mature achenes** black, obovate, compressed. Aug—Sep. Sandy shores and stream banks; uncommon in se ND, occasional in e and c NE; (OH to se ND, s to MO and TX, w to NM, AZ and the Pacific states).



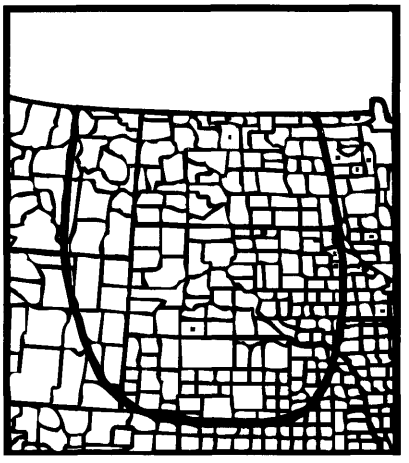
2. *Hemicarpha micrantha* (Vahl) Britt.

Spikelets 1-4 mm long; **scales** with a green midvein, pale or reddish-brown on the sides, obovate to oblanceolate, acute to mucronate, incurved, 0.7-1 mm long; **inner scale** much shorter than the achene, often bifid, or the inner scale absent. **Mature achenes** brown, cylindrical, 0.5-0.8 mm long. Aug—Sep. Same habitats as the previous species; frequent in e and c NE, otherwise rare n probably as a waif; (ME to Ont. and MN, s to FL, TX, NM, AZ and the Pacific states; also Mex., C. and S.Amer. and the W. Indies).



1. *Rhynchospora capillacea* Torr.

Small, tufted, grasslike perennial; **culms** capillary, 0.5-4 dm tall; **leaves** filiform, involute, 0.2-0.4 mm wide. **Inflorescence** of 1 or 2 small, ovoid to oblong clusters of spikelets, sometimes only 1 terminal spikelet present, otherwise the terminal cluster containing 2-10 spikelets; lateral cluster, when present, containing 1-4 spikelets, remote from the terminal cluster, subsessile or short-peduncled, each cluster subtended by 1-few short, setaceous bracts. **Spikelets** ovoid to ellipsoid, 3-7 mm long; **scales** spirally imbricate, brown, elliptic or elliptic-ovate, the pale midvein prolonged into a cuspidate tip, the lower scales empty, the terminal ones mostly staminate, only 1-2(5) achenes produced from perfect-flowered scales in the middle portion of each spikelet; **perianth bristles** 6, retrorsely barbellate, exceeding the achene, sometimes some additional shorter bristles present; **stamens** 3; **styles** 2. **Achenes** obovate-oblong, biconvex, the body tawny, semiglossy, 1.7-2.1 mm long, truncate above at the juncture with the beak, narrowed below to a stipitate base; beak dull brown, narrowly triangular, 0.7-1.1 mm long. Jul—Aug. Calcareous fens and bogs; rare and scattered in ND and SD; (Newf. to Alta., s to VA, TN, OH, IN, MO and SD).



11. ***Scirpus*** L. — Bulrush

Stout, mostly rhizomatous, reedlike or rushlike perennials (short, tufted annual in *S. saximontanus*), medium to tall in stature; **culms** simple, trigonous or terete, solid or pithy. **Leaves** sheathing the stems, the blades grasslike, broad and flat to narrow and often folded or channeled above, or blades poorly developed, the leaves reduced mainly to sheathing at the base of the culms. **Involucral bracts** 1-several subtending the inflorescence, when 1, the bract appearing like a continuation of the culm, otherwise foliaceous. **Inflorescence** terminal or appearing lateral, paniculate or umbellate, the spikelets single or in glomerules on pedicels, or the inflorescence compact, with all or most of the spikelets sessile; **spikelets** 1-numerous; **scales** spirally arranged, imbricate. **Flowers** perfect; **perianth** of 1-6 retrorsely barbed bristles, rarely absent; **stamens** 2 or 3; **styles** bifid or trifid; **achenes** correspondingly lenticular or trigonous, usually beaked.

References:

Beetle, A. A. 1947. *Scirpus.* North Amer. Flora 18:481-504.

Schuyler, A. E. 1967. A taxonomic revision of North American leafy species of *Scirpus.* Proc. Acad. Nat. Sci. Philadelphia 119: 295-323.

Schuyler, A. E. 1974. Typification and application of the names *Scirpus americanus* Pers., *S. olneyi* Gray and *S. pungens* Vahl. Rhodora 76:51-52.

Ward, R. L. 1973. A cytotaxonomic study of the *Scirpus lacustris* L. complex in the northern Great Plains. Unpubl. Ph.D. thesis, N. Dak. State Univ., Fargo.

1 Principal involucral bract 1, erect or nearly so, resembling a continuation of the culm; inflorescence appearing lateral.

2 Plants annual, tufted; achenes cross-ridged . . . . . 11. *S. saximontanus*

2 Plants perennial, rhizomatous; achenes smooth or reticulate.

3 Spikelets 1-6, sessile in a cluster.

4 Stems trigonous; scales aristate, bifid . . . . . 10. *S. pungens*

4 Stems terete or nearly so; scales acute to obtuse . . . . . 7. *S. nevadensis*

3 Spikelets numerous, pedicelled singly or in clusters, borne in a dense to open panicle.

5 Styles trifid; achenes trigonous; perianth of 2-4 bristles; spikelets solitary (rarely paired) on the pedicels . . . . . 4. *S. heterochaetus*

5 Styles bifid (rarely trifid); achenes lenticular; perianth of 6 bristles; spikelets mostly in glomerules of (1)2-8(15) on the pedicels.

6 Spikelets mostly in glomerules of 3-8(15), grayish-brown; culms dark green and resistant to crushing when fresh, fading with drying . . . . . 1. *S. acutus*

6 Spikelets mostly single or in pairs, reddish-brown; culms light green and easily crushed when fresh . . . . . 12. *S tabernaemontani*

1 Principal involucral bracts 2-several, foliaceous and spreading; infloresence terminal.

7 Spikelets few to many, 10-50 mm long, 6-12 mm thick; achenes 2.5-4.5 mm long; culms sharply trigonous.

8 Styles trifid; achenes trigonous; leaf sheaths convex at the mouth, the ventral nerves abruptly divergent at the summit . . . . . 3. *S. fluviatilis*

8 Styles bifid; achenes lenticular; leaf sheaths truncate or concave at the mouth, the ventral nerves gradually divergent at the summit . . . . . 5. *S. maritimus*

7 Spikelets very numerous, 3-10 mm long, 1-1.5 mm thick; achenes ca. 1 mm or less long; culms obtusely trigonous.

9 Perianth bristles much contorted, smooth, not barbellate, equaling or exceeding the scales.

10 Perianth bristles conspicuously surpassing the scales, giving the spikelets a woolly appearance . . . . . 2. *S. cyperinus*

10 Perianth bristles about equaling the scales, the spikelets not woolly in appearance . . . . . 9. *S. pendulus*

9 Perianth bristles straight to curved, barbellate, shorter than to equaling the scales.

11 Leaf sheaths partly red-tinged; styles bifid . . . . . 6. *S. microcarpus*

11 Leaf sheaths entirely green; styles trifid . . . . . 8. *S. pallidus*

1. *Scirpus acutus* Muhl. ex Bigel. — Hardstem bulrush

Tall, slender, scapose perennial, densely colonial from extensive, stout rhizomes; **culms** rather stout, terete, 1-2.5(3.5) m long, dark green and resistant to crushing when fresh, fading with drying. **Leaves** consisting of 3-5 basal sheaths, the upper ones with tapering blades to 25 cm long; **principal involucral bract** erect, appearing as a continuation of the culm, 1.5-10 cm long, eventually turning brown. **Inflorescence** a panicle of up to 60 spikelets, appearing lateral, compact to open, the branches rather stiff; **spikelets** in glomerules of 2-15 (mostly 3-7) on the pedicels, grayish-brown, 5-15 mm long, 3-5 mm thick; **scales** suffused and often spotted with brown or dark red, 2-3.5 mm long, scarious, especially the lower ones often puberulent on the back, acute to slightly cleft at the apex, usually mucronate, the mucro to 0.5 mm long, the margins often finely ciliate; **perianth** of 6 unequal bristles, usually shorter than the achene body; **stamens** 3, the flattened filaments often persistent; **styles** bifid, seldom trifid. **Achenes** light green to dull or dark brown, lenticular, unequally biconvex, the body 1.8-2.2 mm long, 1.2-1.9 mm wide, the style beak minute to 0.5 mm long. Jun—mid Aug. Usually emergent in shallow to deep water of marshes, ditches, ponds and lakes, especially where the water is brackish; common, often abundant; (N.S. to B.C., s to NC, TX and CA).





***Scirpus acutus*, inflorescence.**

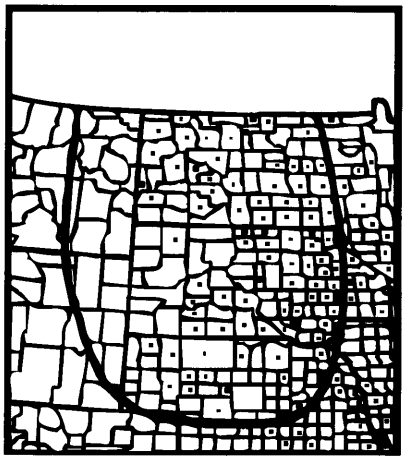
2. *Scirpus cyperinus* (L.) Kunth. — Wool grass

Coarse, tufted perennial from short rhizomes; **culms** obtusely trigonous, to 2 m tall. Leaves numerous on the culms; **blades** 3-10 mm wide, scabrous on the margins, involute toward the tips; **sheaths** brownish, dark brown at the mouth; **involucral bracts** usually 2-4, foliaceous, spreading, the longest shorter than to surpassing the inflorescence, usually brown or reddish-brown at the base. **Inflorescence** large and spreading, with several to many slender primary branches or rays to 15 cm long, these bearing a secondary set of reduced involucral bracts and branches at their summit, the secondary branches themselves often terminating in a tertiary set of involucral bracts and branches, the ultimate branches spreading to drooping, terminating in glomerules of 2-several spikelets, or some spikelets borne singly, sometimes mostly single; **spikelets** very numerous, ovoid, 3-6 mm long, 2-3 mm wide, appearing woolly due to the long perianth bristles; **scales** streaked with reddish-brown, sometimes blackish, elliptic-ovate, 1-1.3 mm long, bluntly-acute; **perianth bristles** 6, smooth, contorted, brownish, much exceeding the scale; **styles** trifid. **Achenes** whitish to tan, flattened-trigonous, the dorsal angle low, 0.6-0.9 mm long, ca. 1/2 as wide, with a short, slender beak. Jul—Sep. Wet meadows, marshes and swamps; rare, with records from Custer and Pennington Counties, SD; also w MN and IA; (Newf. to s B.C., s to FL, e TX and SD). *S. atrocinctus* Fern.



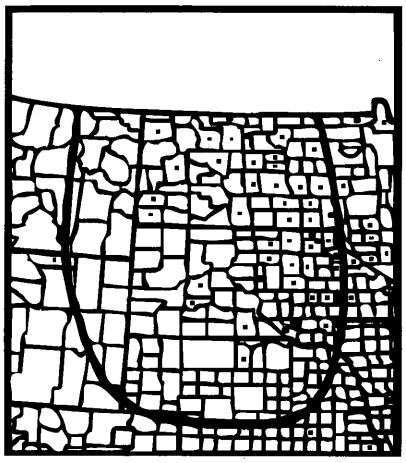
3. *Scirpus fluviatilis* (Torr.) A. Gray — River bulrush

Stout perennial 7-15 dm tall, often forming large colonies by the extensive rhizomes; **culms** erect, sharply trigonous, arising from black tuberous thickenings on the rhizomes. **Leaves** sheathing most of the length of the culm; blades ascending, the upper ones commonly surpassing the inflorescence, 6-15 mm wide; **sheaths** convex at the mouth, the ventral nerves abruptly divergent at the summit; **involucral bracts** 3-5, foliaceous and spreading, the longest to 30(45) cm long. **Inflorescence** terminal, containing 10-20 spikelets, several of the spikelets nearly sessile in 1 or 2 clusters, others solitary or in glomerules of 2-5 at the ends of pedicels to 8 cm long; **spikelets** 10-25(35) mm long, 6-12 mm thick; **scales** golden brown, puberulent on the back, 6-9 mm long, acute to bifid, aristate, the awn 1-3 mm long, curved; **perianth** of 6 unequal, white to coppery bristles, mostly equaling or exceeding the achene body; **stamens** 3, strongly exsert at anthesis, with conspicuous elongate yellow anthers 4-6 mm long, the filaments flattened, often persistent to the achene; **styles** trifid, strongly exsert. **Achenes** tan to grayish-green or grayish-brown, often mottled, trigonous, 3-4.5 mm long, 2-2.8 mm wide, with a beak 0.2-0.5 mm long. Jun—Aug. Usually in shallow water of streams, ditches, marshes, lakes and ponds; common except in the w part; (Que. to WA, s to VA, MO, KS and CA).



4. *Scirpus heterochaetus* Chase — Slender bulrush

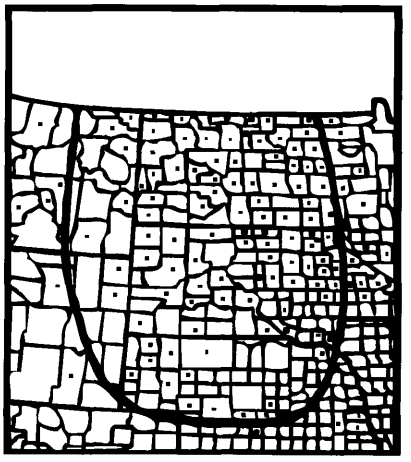
Much like *S. acutus* in habit and general appearance; **culms** more slender, 1-2(2.3) m long. **Leaves** reduced mainly to 3-4 sheaths at the base of the culm, the upper sheaths with a blade to 6.5 cm long; **principal involucral bract** erect, 1-15 cm long. **Inflorescence** a rather open, lax panicle of up to 60 spikelets, usually much fewer; **spikelets** solitary (rarely paired) on the pedicels, 5-17 mm long, 3-6 mm thick; **scales** suffused with light brown to reddish-brown, 2.5-3.5 mm long, scarious, mucronate to aristate, with an awn to 2 mm long; **perianth** of 2-4 bristles, the 2 bristles on the angles of the achene usually the longest, sometimes exceeding the achene body; **stamens** 3; **styles** trifid. **Achenes** light green to dark grayish-brown, unequally trigonous, the ventral face broad and flat, achene body 2-2.5 mm long, 1.5-2 mm wide, with a beak 0.2-0.8 mm long. Jun—mid Aug. In the same habitats as *S. acutus*, but only dominant where the water is fresh; occasional in the e and c parts, rare w and s; (Que. and MA to ND, s to VA, MO, n TX and intermittently w to WA and CA).



5. *Scirpus maritimus* L. — Prairie bulrush

Like *S. fluviatilis* in most aspects, differing mainly as follows: Smaller in stature, 3-9 dm tall. **Leaves** 3-9 mm wide; **sheaths** truncate or concave at the mouth, the ventral nerves gradually divergent at the summit; **involucral bracts** 3-5, the longest one sometimes erect, to 30 cm long. **Inflorescence** containing (2)3-20 spikelets, these all sessile in a single cluster, or some solitary or in glomerules of 2-4 spikelets on pedicels to 4 cm long; **spikelets** 10-25 mm long, 6-9 mm thick; **scales** 5-7 mm long, usually bifid, aristate, the awn to 2 mm long, mostly straight; **perianth** of 2-6 coppery bristles, reaching 1/2 the length of the achene body. **Achenes** tan or greenish-brown to brown, lenticular, 2.5-3.7 mm long, 2-2.4(3) mm wide, the beak inconspicuous, to 0.3 mm long. Jun—Aug. In shallow water or mud in the same habitats as *S. fluviatilis*, but especially abundant in brackish or saline situations; common; (Interruptedly circumboreal). *S. paludosus* A. Nels.

North American plants are distinguished from Eurasian *S. maritimus* as var. *paludosus* (A. Nels.) Kukenth.





Scirpus maritimus.

6. *Scirpus microcarpus* Presl — Redstem bulrush

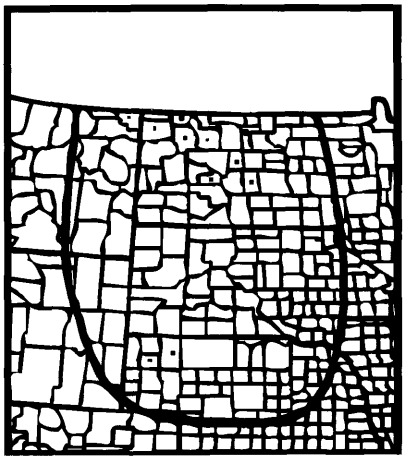
Perennial from stout creeping rhizomes, the stems arising singly or few together, 5-13 dm tall, weakly trigonous. **Leaves** sheathing most of the culm; **blades** ascending, the upper ones usually surpassing the inflorescence, 6-11 mm wide; **sheaths** partly red-tinged; **involucral bracts** 3-4, foliaceous, the longest to 25 cm long. **Inflorescence** a terminal umbelliform cyme, rather loose and spreading, containing numerous glomerules of 4-many spikelets, the glomerules clustered at the ends of pedicels to 10(15) cm long; **spikelets** very numerous, 3-5 mm long, 1-1.5 mm thick; **scales** hyaline except for the green midvein, blackish on the sides, 1.2-1.6 mm long, acute to obtuse, mucronulate; **perianth** of 4-6, white to tan bristles, exceeding the achene body; **stamens** 2, the exserted anthers ca. 1 mm long, the filaments often adherent to the achene; **styles** bifid. **Achenes** light green to pale tan, lenticular, 0.8-1.3 mm long, 0.5-0.7 mm wide, the beak minute. Jun—Jul. Stream banks, wet meadows, marshes and springs, where water is fresh; frequent in the n part, uncommon s and w; (Newf. to B.C., s to WV, n IL, IA, NE, NM and CA). *S. rubrotinctus* Fern.

The phase of *S. microcarpus* occurring in this region is var. *rubrotinctus* (Fern.) M. E. Jones.



7. *Scirpus nevadensis* S. Wats. — Nevada bulrush

Perennial 1-5 dm tall from deep-seated rhizomes; **culms** erect, terete or nearly so, sheathed by the leaves toward the base. **Leaves** few to several per culm, the blades channeled above with inrolled margins, 0.5-2 mm wide, strongly ascending, seldom overtopping the culm; **principal involucral bract** erect, resembling a continuation of the culm, sometimes turning brown, 0.7-5(10) cm long; **additional involucres** 1-few, appearing like enlarged scales subtending the inflorescence, sometimes green. **Inflorescence** appearing lateral, the spikelets directed toward one side of the culm; **spikelets** 1-5(6), sessile, 5-20(25) mm long, 3-6 mm thick; **scales** brown with a pale midvein, glossy, 4-5 mm long, acute to obtuse; **perianth** of 1-4 bristles of variable length, shorter than the achene; **stamens** 3, the filaments straplike, often adherent to the achene; **styles** bifid. **Achenes** tan to brown, cellular-reticulate, lenticular, plano-convex, 2-2.5 mm long, often nearly as wide, the beak absent or minute. Jun—Sep. Alkaline or saline wet meadows, seepage areas and shores; occasional in c and nw ND; nw NE; (Sask. and ND to c WA, s to nw NE, WY, c UT and e CA).



8. *Scirpus pallidus* (Britt.) Fern. — Pale bulrush

Loosely tufted perennial with short rhizomes, 5-17 dm tall, the culms trigonous. **Leaves** sheathing most of the culm; **blades** ascending, usually not surpassing the inflorescence, 5-17 mm wide; **sheaths** entirely green; **involucral bracts** 3-4, foliaceous, slightly to much exceeding the inflorescence, the longest to 15 cm long. **Inflorescence** a terminal, rather compact, umbelliform cyme containing many dense glomerules of numerous spikelets, the glomerules densely clustered at the ends of pedicels to 12 cm long; **spikelets** very numerous and crowded, 2-5 mm long, 1-2.5 mm thick; **scales** hyaline except for the broad, green midvein, blackish on the sides, mostly 2-2.5 mm long including an awn 0.4 mm or more long; **perianth** mostly of 6 white to tan bristles shorter than or equaling the achene; **stamens** 3; **styles** trifid. **Achenes** light green to pale tan, unequally trigonous, the ventral side broadest, the achene body 0.7-1 mm long, 0.5-0.7 mm wide, with a beak to 0.2 mm long. Jul—Aug. Wet meadows, shores, ditches, stream banks, springs and other wet places; common e and c, less so w; (Ont. to Alta. and WA, s to MO, TX, NM and AZ). *S. atrovirens* Willd. var. *pallidus* Britt.

Rarely entering the region in the extreme ne part (e.g., Pembina Co., ND) is the very similar *S. atrovirens*, of which *S. pallidus* is often treated as a variety. *S. atrovirens* differs from *S. pallidus* chiefly as follows: **Scales** dark green on the sides, eventually turning brownish or blackish, 1-2 mm long including a mucro 0.1-0.2 mm long.

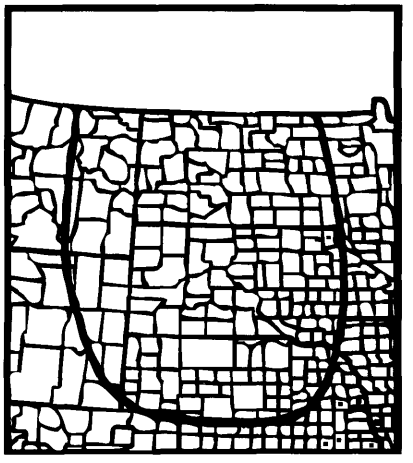




***Scirpus pallidus*, habit. Photo by James R. Johnson.**

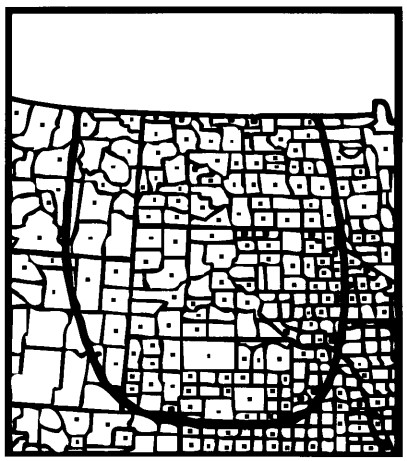
9. *Scirpus pendulinus* Muhl.

Loosely tufted from short, thick rhizomes; **culms** obtusely trigonous, to 1.5 m tall, clothed at the base by old leaf bases. **Leaves** several, scattered on the stem; **blades** flat, 4-10 mm wide; **involucral bracts** 3-several, reduced but foliaceous, shorter than the inflorescence, pale brown at the base. **Inflorescence** umbellate, rather open, with several to many primary branches, 1 or 2 lateral inflorescences sometimes produced below the terminal one, ultimate branches with 1 sessile and few-several pedicellate spikelets, mostly nodding at the tips; **spikelets** numerous, ovoid to mostly oblong-cylindric, 4-10 mm long, 2-3.5 mm thick, blunt-tipped; **scales** reddish-brown on the sides with a prominent green midrib, elliptic-ovate, 1.5-2.7 mm long, including the short-awned to cuspidate tip; **perianth bristles** 6, smooth, much contorted, brownish, longer than the achene but barely, if at all, extended beyond the scale; **stamens** 3; **styles** trifid. **Achenes** tan to light brown, trigonous, ellipsoid to obovoid, 1-1.3 mm long, apiculate. Jun—Aug. Marshes, wet meadows, stream banks and ditches; rare, ne SD, e and se NE; (ME to MN and SD, s to FL, TX, NM and into n Mex.; also reportedly OR and CA). *S. lineatus* Michx., *S. pendulus* Muhl.



10. *Scirpus pungens* Vahl — Three-square

Slender rhizomatous perennial 2-10(14) dm tall; **culms** erect to gently curved, trigonous, the sides concave to slightly convex. **Leaves** few, mostly 1-3 per culm, sheathing the base of the culm, the blades typically folded or channeled above, 1-2 mm wide (2-4 mm wide when flat), usually diverging from the culm well within the lower 1/3 of its length and not overtopping it; **principal involucral bract** erect, resembling a continuation of the culm, 2-8(18) cm long; **additional involucral bracts** 1-2, appearing as enlarged sterile scales subtending the spikelets. **Inflorescence** appearing lateral, comprised of 1-4(6) sessile spikelets, these 5-20 mm long, 3-5 mm thick; **scales** light to dark brown or reddish-brown, 3-5 mm long, mostly aristate and bifid, the awn 0.5-2 mm long; **perianth** of 1-6 bristles, variable in length, shorter than the achene; **stamens** 3 or sometimes 2, the straplike filaments often remaining attached at the base of the achene; **styles** trifid or bifid. **Achenes** light green or tan to dark brown, trigonous or lenticular, ventrally flat, the body 2-3 mm long, the beak prominent, 0.3-0.5 mm long. Jun—Sep. Shores, stream banks, wet meadows, ditches, seepage areas and other wet places; common, often abundant; (S Can., s to S.Amer.; also Europe, Australia and New Zealand). *S. americanus* Pers., misapplied.





Scirpus pungens.

11. *Scirpus saximontanus* Fern.

Small, tufted annual 1.5-4 dm tall; **culms** several to many, terete or essentially so, grooved when dried. **Leaves** 1 per culm, mainly basal, sheathing only or with a short blade mostly less than 1(-4) cm long; **principal involucral bract** prominent, erect, resembling a continuation of the culm, 3-15 cm long; **other involucral bracts** none or weakly developed, shorter than to surpassing the inflorescence, projecting laterally below the spikelets. **Inflorescence** appearing lateral, comprised of 3-8 spikelets, all essentially sessile or some in clusters of 2-3 at the tips of short pedicels to 1 cm long; **spikelets** ovoid to oblong-cylindric, 4-13 mm long, 2.5-3 mm thick; **scales** whitish to eventually dull yellowish-brown, with a prominent green midrib, scarious-margined, rotund-ovate, strongly convex dorsally, 2.5-3 mm long, mucronate or the lower scales with an awn to 1 mm long; **perianth bristles** absent or otherwise variable; **stamens** 3, the straplike filaments often adherent to the achene; **styles** trifid. **Achenes** light green to eventually dark brown, strongly trigonous, obovoid, 1.4-1.8 mm long, conspicuously cross-ridged on the surface, short-beaked. Aug—Sep. Muddy shores and flats where previously flooded; occasional in SD and NE; (IA and SD, s to MO, TX and into n Mex.). *S. supinus* L. var. *saximontanus* (Fern.) Koyama.

Reports of *S. hallii* A. Gray and *S. smithii* A. Gray in the region are very likely based on the above. Both are similar to *S. saximontanus* but have bifid styles and lenticular (plano-convex rather than strongly trigonous) achenes. *S. hallii* has the achenes cross-ridged like those of *S. saximontanus*, whereas the achenes of *S. smithii* are smooth.



12. *Scirpus tabernaemontani* Gmel. — Softstem bulrush

Similar to *S. acutus*; **culms** rather stout near the base, terete, 1-3.5 m long, light green, easily crushed when fresh. **Leaves** consisting of 4-5 basal sheaths, the upper ones with a blade to 7 cm long; **principal involucral** bract erect, 1.5-11 cm long. **Inflorescence** a panicle of up to 235 spikelets, appearing lateral, spreading, rarely congested, lax and drooping; **spikelets** solitary or paired on the pedicels, rarely in glomerules of 3 or more, reddish-brown, 4-13 mm long, 3-4 mm thick; **scales** suffused with reddish-brown to dark brown, 1.8-3.2 mm long, scarious, often very finely ciliate on the margins, obtuse or rounded, usually mucronate, the mucro to 0.5 mm long; **perianth** of 6 bristles, mostly equaling or exceeding the achene body; **stamens** 3; **styles** bifid. **Achenes** light green to dark brown or black, lenticular, unequally biconvex, the body 1.5-2.1 mm long, 1.3-1.6 mm wide, the beak minute, to 0.2 mm long. Jun—mid Aug. Same habitats as *S. acutus* but mostly in fresh water and more often in riparian and stream habitats; common, often abundant; (Newf. to s AK, s to S.Amer.). *S. validus* Vahl



63. **Poaceae**, the Grass Family

Perennial or annual, rhizomatous or tufted plants with long, linear, parallel-veined **leaves** arranged alternately in 2 vertical ranks on a terete (rarely compressed), usually hollow **stem** with swollen, solid nodes; **leaf sheaths** commonly open longitudinally, the margins overlapping (sheaths tubular with the margins united in *Bromus* and *Glyceria*); a membranous or hairy **ligule** projecting between the blade and the culm from the summit of the sheath, this sometimes absent. **Flowers** much reduced, perfect or rarely unisexual (the plants then monoecious or dioecious), each subtended by 2 bracts, the larger one (**lemma**) containing the flower, the smaller one (**palea**) covering the flower, palea rarely absent, the **lemma** and **palea** often adhering to and enclosing the ripe grain, the flower and its surrounding lemma and palea collectively termed the **floret**; **perianth** rudimentary, represented by no more than 2 (in taxa of this region) inner, obscure scales (lodicules), these usually undetectable; **stamens** usually 3(1-6); **ovary** superior, 1-celled, never enclosed in a sac; **styles** bifid, the stigmas plumose; **ovule** 1, usually parietal. **Florets** arranged in **spikelets**, these consisting of 1-many florets which are sessile on a shortened axis (**rachilla**), the lowest 2 bracts of the spikelet empty (the **glumes**), these rarely absent, often unequal, the lowermost of the glumes usually smaller and called the **first glume**, the upper one called the **second glume**, the glumes seldom equal and opposite. **Spikelets** arranged in a variety of inflorescence types, the most common being a **panicle** in which the spikelets are individually pedicelled in a branching inflorescence, or less often, the spikelets sessile on a rachis in one or more **spikes**; if solitary, the spike terminal, or if more than one, the spikes 1-sided (the spikelets all attached to one side of the rachis) and arranged in a raceme or panicle; **spikelets** disarticulating either above or below the glumes at maturity, the glumes remaining attached in the inflorescence if disarticulation occurs above the glumes, or the glumes falling with the florets (and sometimes with other parts of the inflorescence attached) if disarticulation is below the glumes.

Poaceae is the second largest family in our region, with most species characteristic of prairie, but many also occurring in wetland and woodland habitats. The family is rife with species that occur in a broad array of moisture regimes and many of those are included here.

References:

Hitchcock, A. S. 1971. Manual of the grasses of the United States. Vol. 1 and 2. Revised by Agnes Chase. Dover Publications, Inc., New York.

Pohl, R. W. 1978. How to know the grasses, third edition. Wm. C. Brown Publishers, Dubuque, Iowa.

1 Spikelets containing 2 or more functional florets (many may contain only 1 floret in *Catabrosa*).

2 Tall, stout reeds over 2 m tall, with a large plumelike panicle; rachillas hairy . . . . . 22. *Phragmites*

2 Plants without the above combination of characters.

3 Inflorescence a simple, terminal spike, the spikelets sessile on an unbranched rachis . . . . . 1. *Agropyron*

3 Inflorescence of variously branched types, usually a panicle, if appearing spikelike, then the spikelets individually pedicelled.

4 Glumes both as long as or exceeding the lowest floret, often as long as the entire spikelet; lemmas awned from the back or awnless.

5 Lemmas awned from below the middle of the back . . . . . 9. *Deschampsia*

5 Lemmas awnless.

6 Florets bearded on the callus; spikelets disarticulating above the glumes . . . . . 26. *Scolochloa*

6 Florets glabrous on the callus; spikelets disarticulating below the glumes.

7 Glumes alike, both inflated and broadly boat-shaped; spikelets nearly round in outline . . . . . 4. *Beckmannia*

7 Glumes dissimilar, the second much broader than the first; spikelets not round . . . . . 28. *Sphenopholis*

4 Glumes, or at least the first one, shorter than the first floret; lemmas awned from the tip or awnless.

8 Spikelets all sessile or very short-pedicelled in an inflorescence of several to many straight branches, much of the inflorescence often enclosed by leaf sheaths . . . . . 17. *Leptochloa*

8 Spikelets, or at least some of them, obviously pedicelled, borne in an open to contracted panicle.

9 Spikelets unisexual (plants dioecious), in a simple, contracted panicle; low rhizomatous perennial of saline or alkaline soils . . . . . 10. *Distichlis*

9 Spikelets bisexual, in an open to contracted panicle; plants of various habits and habitats.

10 Lemmas prominently 3-nerved.

11 Spikelets 2-flowered (many may be 1-flowered); lemmas truncate and erose at the tip . . . . . 7. *Catabrosa*

11 Spikelets several- to many-flowered; lemmas acute-tipped . . . . . 12. *Eragrostis*

10 Lemmas faintly to prominently 5- to 7-nerved.

12 Callus of the florets bearded with short, stiff hairs . . . . . 26. *Scolochloa*

12 Callus not bearded, although cobwebby hairs may be present at the base of the lemma.

13 Lemmas awned ..... 5. *Bromus*

13 Lemmas awnless.

14 Lemmas prominently 7-nerved ..... 13. *Glyceria*

14 Lemmas faintly 5-nerved.

15 Lemmas tapered to an acute to blunt tip, often with cobwebby hairs at the base and/or short-pubescent on the back; leaf blades with the margins and midrib converging to a blunt, keeled tip resembling the prow of a boat ..... 23. *Poa*

15 Lemmas little tapered to a blunt, often erose tip, glabrous; leaf blades flat or involute and pointed at the tip ..... 25. *Puccinellia*

1 Spikelets containing 1 functional floret.

16 Glumes absent.

17 Spikelets unisexual, terete, the pistillate above the staminate in a large panicle; leaves smooth ..... 29. *Zizania*

17 Spikelets bisexual, strongly compressed; leaves strongly scabrous, abrasive to the touch ..... 16. *Leersia*

16 Glumes present.

18 Spikelets containing 1 fertile floret and 1 or 2 sterile or staminate florets below the fertile one (the 2 lower florets represented by a pair of tiny, villous scales appressed to the base of the fertile lemma in *Phalaris*, otherwise the lower floret or florets more lemmalike or glumelike).

19 Spikelets disarticulating above the glumes, the 2 lower florets falling with the fertile one as a unit.

20 Lower florets sterile, reduced to a pair of villous scales at the base of the hard, shiny fertile one ..... 20. *Phalaris*

20 Lower florets staminate, longer than the fertile one and enclosing it, similar to the fertile floret in texture ..... 14. *Hierochloe*

19 Spikelets disarticulating below the glumes, the entire spikelet falling with the fertile floret and the single, glumelike sterile floret intact.

21 Spikelets crowded in few to many densely flowered branches; glumes and lemmas with stout, stiff hairs ..... 11. *Echinochloa*

21 Spikelets widely spreading in an open panicle; glumes and lemmas glabrous or merely scabrous on the nerves ..... 19. *Panicum*

18 Spikelets containing a single fertile floret only (some reduced sterile spikelets may be present).

22 Spikelets sessile or essentially so on one or more rachises, the infloresence a terminal spike or of several to many 1-sided spikes arranged in a raceme or panicle.

23 Inflorescence a terminal spike; lemmas with awns several times longer than the body; glumes awnlike ..... 15. *Hordeum*

23 Inflorescence of several to many 1-sided spikes arranged in a raceme or panicle; glumes awnless or with awns shorter than the body.

24 Glumes unequal, narrow; spikes in a terminal raceme ..... 27. *Spartina*

24 Glumes equal, broadly boat-shaped; spikes in a narrow panicle ..... 4. *Beckmannia*

22 Spikelets borne on pedicels in an open or contracted panicle, the panicle sometimes dense and spikelike.

25 Spikelets disarticulating below the glumes, falling as an entire unit.

26 Glumes awned.

27 Awns of the glumes several times longer than the body ..... 24. *Polypogon*

27 Awns of the glumes shorter than the body ..... 21. *Phleum*

26 Glumes awnless.

28 Panicle dense, cylindric and spikelike ..... 3. *Alopecurus*

28 Panicle more open, not cylindric or spikelike ..... 8. *Cinna*

25 Spikelets disarticulating above the glumes, the glumes remaining after the florets have fallen.

29 Lemmas awned from the back, bearded on the callus, 5-nerved ..... 6. *Calamagrostis*

29 Lemmas awnless or awned from the tip, glabrous or pilose toward the base, 3-nerved.

30 Floret equal to or exceeding one or both glumes (excluding awns, if present); lemmas strongly nerved ..... 18. *Muhlenbergia*

30 Floret exceeded by both glumes; lemmas very faintly nerved ..... 2. *Agrostis*

1. *Agropyron repens* (L.) Beauv. — Quackgrass

Strongly rhizomatous and weedy perennial, the foliage deep green to somewhat glaucous; **culms** erect to decumbent, 5-10 dm tall, smooth and hollow. **Leaf blades** flat to seldom involute, 2-9(14) mm wide, glabrous or pilose on the upper surface; **sheaths** glabrous or sparsely pilose near the summit, usually with prominent, clawlike **auricles** at the mouth; **ligule** very short and membranous, to 0.5 mm long, finely erose. **Inflorescence** a balanced, bilateral spike 5-19(26) cm long, continuous or somewhat interrupted in the lower portion; **rachis joints** flattened, scabrous on the angles. **Spikelets** 1 per node, 3- to 8-flowered, 10-20 mm long; **glumes** subequal, the first usually slightly shorter than the second, lanceolate, 5-13 mm long, strongly 5- to 7-nerved, firm, glabrous or scaberulous on the midnerve, acute or often awned from a minutely bifid apex, the awn sometimes to 7 mm long; **lemmas** 7-10(12) mm long, reduced upward, faintly 5-nerved, glabrous, acute or awned like the glumes; **palea** about equaling the body of the lemma, scaberulous on the margin; **anthers** prominent, 3-5.5 mm long. **Grain** brown, oblong-cylindric, 4-5 mm long, remaining enclosed by the firm-textured lemma and palea. Jun—Sep. Wet meadows, ditches, stream banks and other wet or moist places; common; (Intro. from Eurasia and established from Newf. to AK, s to NC, KY, KS and CA).

See discussion on the following page.



Agropyron repens **(from Hitchcock 1950).**

A few other members of the wheat tribe (Triticeae) are occasionally encountered in wetland habitats, although not to the extent of *Agropyron repens* and *Hordeum jubatum*. Among the wheatgrasses, these include *A. smithii* Rydb. and *A. trachycaulum* (Link) Malte, the latter including *A. subsecundum* (Link) A. S. Hitchc. and sometimes itself included in Old World *A. caninum* (L.) Beauv. *A. smithii*, western wheatgrass, is well known as a dominant species in native mixed grass prairie and is seldom thought of as inhabiting wetlands; however, some ecotypes do favor alkaline wet meadows in the central and western parts of the Dakotas. The species has even been observed as a codominant emergent in shallow marshes with *Eleocharis macrostachya*. *A. smithii* resembles *A. repens* in general habit but differs markedly in its strongly glaucous color, narrower, often involute leaves and the glumes and lemmas tapered (not bifid) to an awned tip.

A. trachycaulum, slender wheatgrass, occasionally occurs on or near shores and stream banks. Unlike the 2 species already discussed, *A. trachycaulum* is a bunchgrass lacking rhizomes. Occurring in the northern Great Plains are var. *trachycaulum*, with lemmas awnless or with awns to 6 mm long, and var. *unilaterale* (Cassidy) Malte, with lemmas having awns 17-40 mm long.

A. trachycaulum and *Hordeum jubatum* are often implicated as parents in the formation of the sterile F1 hybrid X *Agrohordeum macounii* (Vasey) Lepage (formerly *Elymus macounii* Vasey). The plant resembles the genus *Elymus* in having 2 spikelets per node on the rachis, and it is similar to *Hordeum jubatum* in having the rachis disarticulate at maturity. Its hybrid nature is plainly evident by the empty florets. The plant is occasional in moist disturbed habitats such as shorelines and stream banks.

Finally, *Elymus canadensis* L., Canada wildrye, is a common, tall, tufted perennial of woodlands, moist prairie and road ditches. It is also a frequent inhabitant of stream banks, elevated shorelines and marsh borders. The large, thick, nodding spikes with long, ultimately recurved awns are distinctive for this species in our area.

2. *Agrostis* L. — Bentgrass

Rhizomatous (sometimes stoloniferous) or tufted perennials with soft, flat leaves and usually open panicles. **Spikelets** 1-flowered, disarticulating above the glumes; **glumes** subequal, acute to acuminate, scabrous on the keel, 1-nerved; **floret** exceeded by both glumes; **lemma** lanceolate, obtuse, more delicate than the glumes, very faintly 3-nerved; **palea** absent or rudimentary, or to 2/3 as long as the lemma, scarious.

1 Palea absent or rudimentary; plants usually lacking rhizomes or stolons.

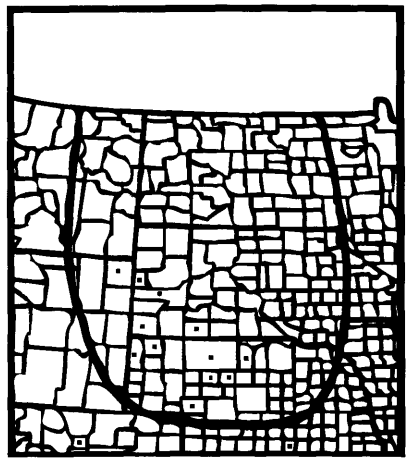
2 Panicle open and diffuse, the widely spreading main branches branched and bearing spikelets only above the middle . . . . . 2. *A. hyemalis*

2 Panicle narrow and condensed, the strongly ascending main branches branched and bearing spikelets to near their bases . . . . . 1. *A. exarata*

1 Palea present, 1/2 to 2/3 as long as the lemma; plants with rhizomes and/or stolons . . . . . 3. *A. stolonifera*

1. *Agrostis exarata* Trin. — Spikebent

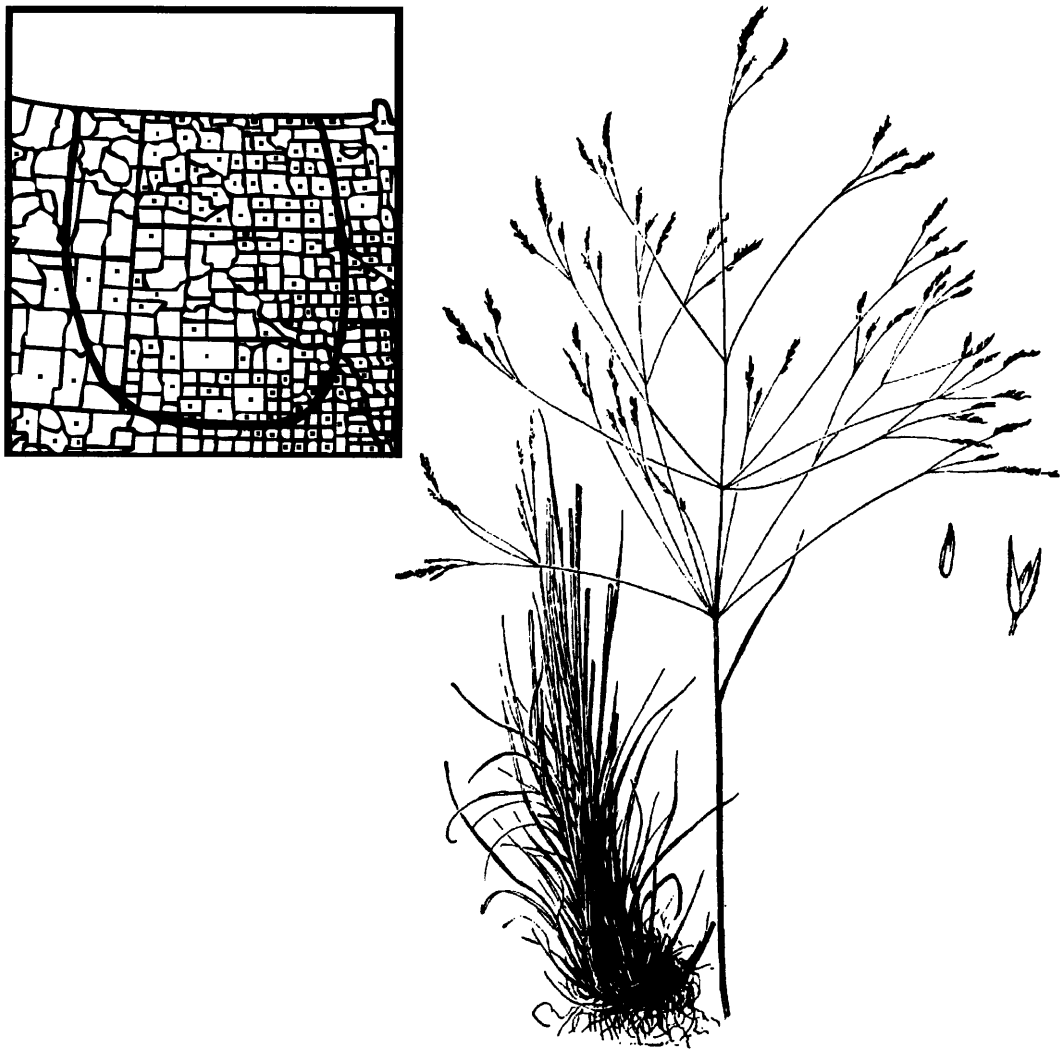
Tufted perennial, sometimes with short rhizomes; **culms** erect to sometimes decumbent at the base and rooting at the nodes, 2-10 dm tall. **Leaves** distributed well up the culm, the blades ascending to spreading, flat, 2-10 mm wide, scabrous; **sheaths** glabrous to scaberulous; **ligule** hyaline, lacerate, 1.5-6 mm long. **Panicle** narrow and condensed, (4)6-25 cm long, continuous or somewhat interrupted mainly in the lower portion, the main branches strongly ascending, bearing short branches and spikelets to near the base. **Spikelets** green or sometimes purplish, 2-3 mm long; **glumes** lanceolate, acuminate, 1.9-3 mm long, scabrous on the keel; **lemma** 1.5-2.5 mm long, rarely awn-tipped; **palea** absent or rudimentary; **anthers** 0.3-0.5 mm long. **Grain** brownish, oblong, ca. 1 mm long. Jul—Aug. Moist meadows and stream banks; uncommon and scattered in w SD, e WY, c and w NE; (Alta. to AK, s to NE, w OK, NM and CA).



2. *Agrostis hyemalis* (Walt.) B.S.P. — Ticklegrass

Tufted perennial with slender culms, erect to decumbent, 2-6 dm tall. **Leaves** mostly basal, the blades ascending to spreading, flat to involute, 0.5-2 mm wide, glabrous or scaberulous; **sheaths** glabrous, the ligule hyaline, rounded and usually erose, 1-2 mm long. **Panicle** open and diffuse, 8-25(35) cm long, the main branches rather lax, filiform and spreading, themselves branching and bearing spikelets only above the middle. **Spikelets** often purplish, (1.5)2-2.8(3) mm long; **glumes** lanceolate, acute to acuminate, 1.3-2.8 mm long; **lemma** 1.2-1.5 mm long; **palea** absent; **anthers** 0.2-0.5 mm long. **Grain** brown, narrowly ellipsoid, 1-1.2 mm long. Jun—Aug. Wet meadows, seepage areas, ditches, stream banks, shores and also in upland situations, often where alkaline; frequent; (Labr. to AK, s to FL and Mex.). *A. scabra* Willd.

Two intergrading varieties may be recognized in the region. The prevalent one, var. *tenuis* (Tuckerm.) Gl. (= *A. scabra* Willd.), has larger spikelets than the typical variety and can be distinguished by the **first glume** 2-2.8 mm long. Entering our range from the s is var. *hyemalis* which has the **first glume** 1.3-1.7 mm long. Var. *hyemalis* is frequent in NE to s and e SD. Intermediates not assignable to either variety are encountered in the range of var. *hyemalis* in our region.

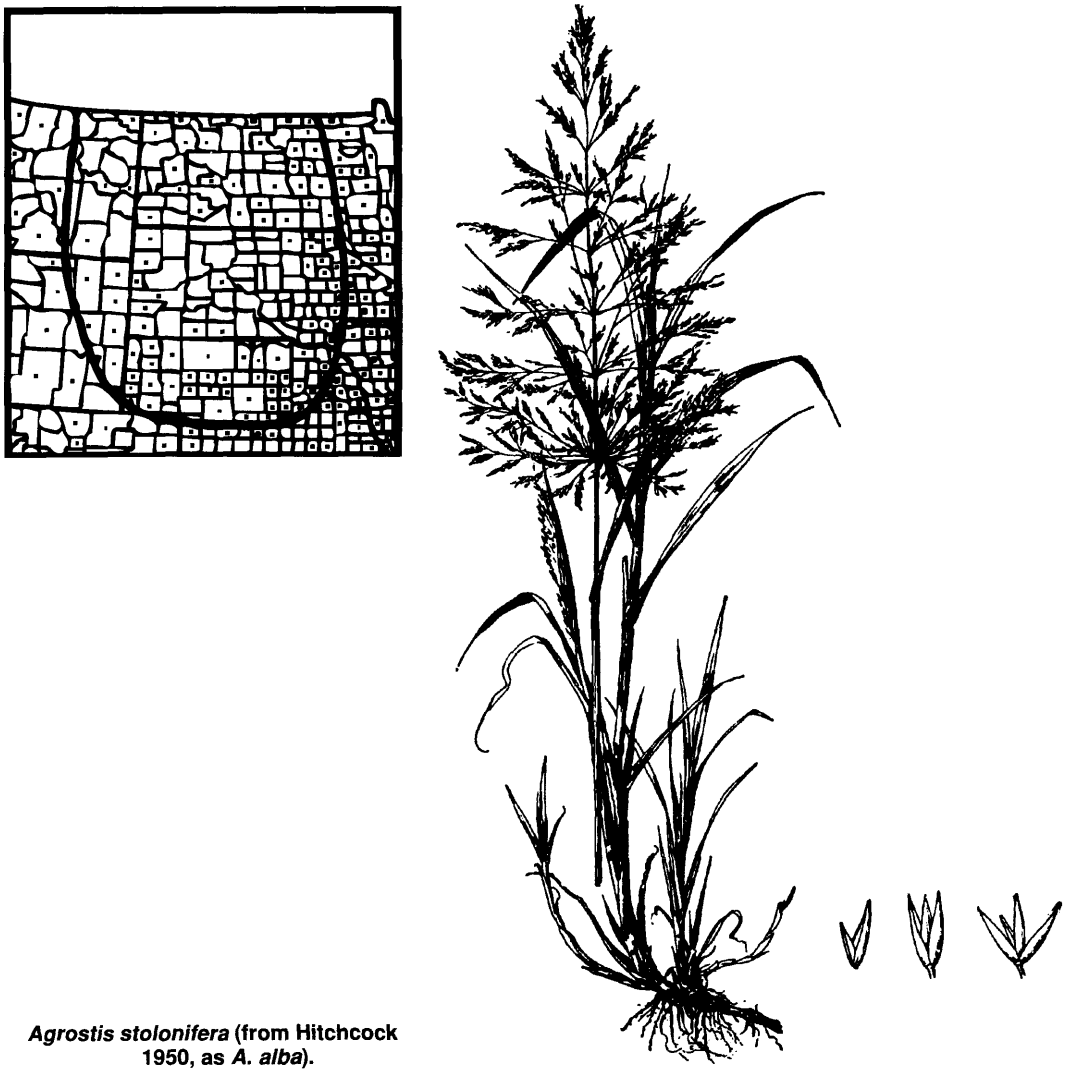


Agrostis hyemalis **(from Hitchcock 1950, as *A. hiemalis*).**

3. *Agrostis stolonifera* L. — Redtop

Rhizomatous or sometimes stoloniferous perennial 3-10(14) dm tall; **culms** erect or decumbent at the base. **Leaf blades** ascending, 1-6 mm wide, scabrous; **sheaths** glabrous, the ligule hyaline, usually splitting, 1-5 mm long. **Panicle** open (rarely contracted) but not diffuse, (2)6-20 cm long, the main branches branching and bearing spikelets near the base and toward the tips. **Spikelets** usually purplish, turning pale or whitish after anthesis; **glumes** ovate-lanceolate to lanceolate, acute to mucronate, 1.5-2.5 mm long; **lemma** 1.6-2 mm long; **palea** present, 1/2 to 2/3 as long as the lemma; **anthers** 0.5-1.3 mm long. **Grain** brown, ellipsoid, 0.8-1.2 mm long. Jul—Sep. Wet meadows, seepage areas, ditches, stream banks and shores; frequent to common; (Intro. from Europe and cultivated here as a pasture grass, escaped throughout most of Can. and the U.S.). *A. alba* L., *A. gigantea* Roth., *A. palustris* Huds.

Most northern Great Plains material fits var. *major* (Gaud.) Farw., a robust, predominantly rhizomatous form, sometimes producing stolons as well. More slender, weakly rhizomatous plants that reproduce freely by stolons are referred to var. *stolonifera*. Distinction between these two varieties is often difficult. Also occurring sporadically in our range is a form in which the panicle is narrow and contracted through maturity. Such plants are var. *palustris* (Huds.) Farw.



Agrostis stolonifera **(from Hitchcock 1950, as *A. alba*).**

3. *Alopecurus* L. — Foxtail

Tufted annuals and tufted or rhizomatous perennials with soft, flat leaves and dense, cylindric, spikelike panicles; **culms** erect or decumbent at the base. **Spikelets** 1-flowered, strongly compressed, densely crowded in the spikelike panicle, disarticulating below the glumes; **glumes** equal, laterally compressed, usually united toward the base, 3-nerved, often silky hairy on the back, awnless; **lemma** about as long as the glumes or shorter, laterally compressed with the margins united toward the base, faintly 3- to 5-nerved, awned from the back, the awn not exserted to exserted well beyond the glume tips; **palea** absent. **Grain** olivaceous to grayish-brown, somewhat obovoid, apiculate at both ends, 1-2 mm long.

1 Anthers more than 1.5 mm long; glumes more than 2.5 mm long; lemmas often more than 2.5 mm long.

2 Awns elongate, geniculate, 5-10 mm long, the exserted portion (1)2-6 mm long; plants nonrhizomatous, although some stems tending to root at the lower nodes . . . . . 5. *A. pratensis*

2 Awns shorter, 0.3-2(6) mm long, seldom exserted as much as 2 mm; plants strongly rhizomatous . . . . . 2. *A. arundinaceus*

1 Anthers less than 1.5 mm long; glumes usually less than 2.5 mm long; lemmas often less than 2.5 mm long.

3 Awn exserted just barely to 1.5 mm beyond the glume tips . . . . 1. *A. aequalis*

3 Awn exserted 2-4 mm beyond the glume tips.

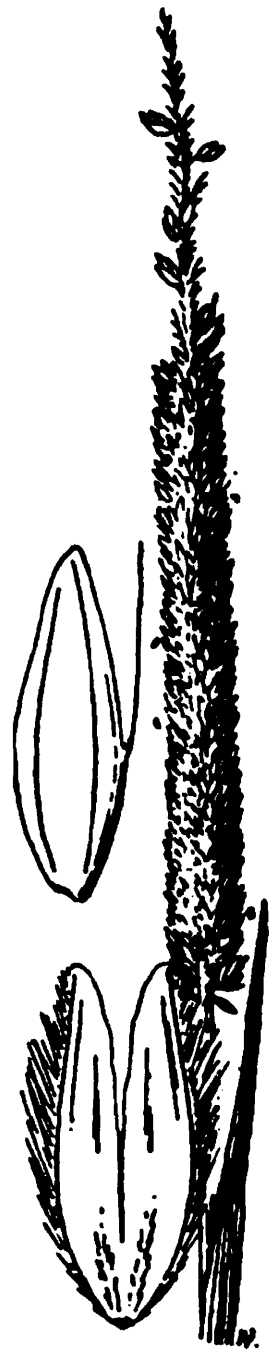
4 Plants annual; anthers ca. 0.5 mm long . . . . . 3. *A. carolinianus*

4 Plants perennial; anthers 0.8-1.5 mm long . . . . . 4. *A. geniculatus*

1. *Alopecurus aequalis* Sobol. — Short-awn foxtail

Tufted perennial 2-7 dm tall; **culms** erect to decumbent, often rooting at the nodes. **Leaf blades** 1-5 mm wide, finely scabrous above; **ligule** membranous, rounded to elongate, 2-7 mm long. **Spikelike panicle** erect, 3-6(8) cm long, 3-6 mm thick. **Glumes** 2-2.5 mm long, obtuse-tipped, villous on the keel and lateral nerves; **lemma** about equaling the glumes; **awn** from back of lemma exserted just barely to 1.5 mm beyond the glume tips; **anthers** 0.5-1 mm long. Jun—Sep. Shallow water or mud of wet meadows, marshes, water-filled ditches, springs, shores and stream banks; common in the n part, less so s; (Circumboreal, in N.Amer. s to NJ, PA, OH, IL, MO, KS, NM and CA).

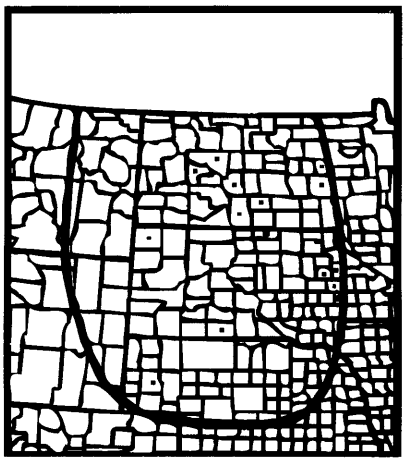




Alopecurus aequalis **(from Hitchcock 1950).**

2. *Alopecurus arundinaceus* Poir. — Creeping foxtail

Strongly rhizomatous perennial (4)7-11 dm tall, often purplish at the base and in the inflorescence; **culms** stout, erect. **Leaves** mostly toward the base, reduced upward on the culm; **blades** 3-11 mm wide, smooth or scabrous on the upper surface; **ligule** membranous, 1-3 mm long. **Spikelike panicle** appearing silky due to hairs of the glumes, often grayish-purple, turning gray-brown with age, 3-11 cm long, 6-12 mm thick. **Glumes** 3.5-5.5 mm long, acute to acuminate, spreading-villous on the keel, glabrous or with shorter appressed hairs on the sides; **lemmas** 2-4 mm long; **awn** of the lemma 0.3-2(6) mm long, straight to slightly geniculate, unexserted or exserted as much as 2 mm; **anthers** 1.5-2.5 mm long. May—Jul(Aug). Wet meadows, shores, stream banks, ditches and other wet or moist places; frequently planted in low ground of tame pastures and hay meadows, especially in the n part; rapidly becoming naturalized; (Intro. from Eurasia and established in parts of s Can. and the northern Great Plains).



3. *Alopecurus carolinianus* Walt. — Carolina foxtail

Tufted annual (0.5)1-2.5 dm tall; **culms** erect to decumbent. **Leaf blades** 1-3 mm wide, finely scabrous above; **ligule** membranous, rounded to elongate, 1-5 mm long. **Spikelike panicle** erect, 1-5 cm long, 3-5 mm thick. **Glumes** 1.5-2.8 mm long, obtuse-tipped, villous on the keel and lateral nerves; **lemma** about equaling the glumes; **awn** from back of lemma exserted 2-4 mm beyond the glume tips, geniculate; **anthers** ca. 0.5 mm long. Late May—Aug. Mud flats or wet ground of temporary ponds, wet meadows and low prairie; uncommon and scattered; (MA to B.C., s to FL, LA, TX, AZ and CA).





Alopecurus carolinianus **(from Hitchcock 1950).**

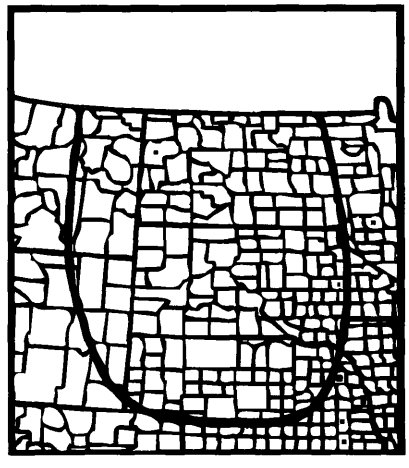
4. *Alopecurus geniculatus* L. — Water foxtail

Much like *A. aequalis*, differing mainly as follows: **Spikelike panicle** 3-7 cm long, 4-6 mm thick. **Glumes** 2-3 mm long; **awn** from back of lemma exserted 2-3 mm beyond the glume tips; **anthers** 0.8-1.5 mm long. Jun—Sep. Same habitats as *A. aequalis*; uncommon and scattered; (Newf. to Sask. and B.C., s to VA, PA, MI, WI, OK, CO, AZ and CA).



5. *Alopecurus pratensis* L. — Meadow foxtail

Loosely tufted perennial 4-9(12) dm tall; **culms** stout, erect, sometimes rooting at the lower nodes. **Leaves** mostly toward the base; **blades** 2-7 mm wide, smooth or finely scabrous above; **ligule** membranous, 1-4 mm long. **Spikelike** panicle grayish, turning stramineous with age, 3-12 cm long, 5-11 mm thick; **glumes** 3.5-6 mm long, acute-tipped, villous mainly on the keel and lateral nerves. Lemmas 3.5-5.5 mm long, sometimes slightly surpassing the glumes, awn of the lemma usually geniculate, 5-10 mm long, the exserted portion 2-6 mm long; anthers 1.6-3.5 mm long. May—Jul. Wet meadows and marshy places; sparingly planted at one time as a forage and hay crop and possibly persisting in low areas; uncommon; (Intro. from Eurasia and naturalized from Newf. to AK and sporadically over the n U.S.).



1. *Beckmannia syzigachne* (Steud.) Fern. — Western sloughgrass

Stout annual or shortlived perennial 3-10 dm tall; **culms** solitary or few to several clumped. **Leaf blades** soft, flat, 3-10(13) mm wide, scaberulous; **sheaths** overlapping, glabrous, the upper one often loosely sheathing the lower portion of the panicle; **ligule** membranous, rounded to acute, 3-6 mm long. **Inflorescence** of many 1-sided spikes arranged in a narrow, continuous or interrupted panicle 8-25(30) cm long, the panicle branches strongly ascending to appressed; **spikes** bearing several to many spikelets in 2 rows on the rachis, mostly 5-15 mm long. **Spikelets** usually 1-flowered or many often 2-flowered, compressed and overlapping, suborbicular, 2-3 mm long, becoming stramineous at maturity, disarticulating below the glumes; **glumes** equal, broad, boat-shaped, inflated, apiculate at the tip, 3-nerved, the lateral nerves faint; **lemma(s)** about as long as the glumes but much narrower, lanceolate, the acuminate tip(s) protruding from between the glume tips, membranous, very obscurely 5-nerved; **palea** nearly as long as the lemma; **anthers** 0.5-1.1 mm long. **Grain** golden brown, ellipsoid, 1.5-2 mm long. Jun—Sep. Wet meadows, marshes, ditches, shores and stream banks; common from ND and e MT to n and w NE and e WY; (w NY to Man. and AK, s to OH, IL, n KS, NM and CA; also e Asia).



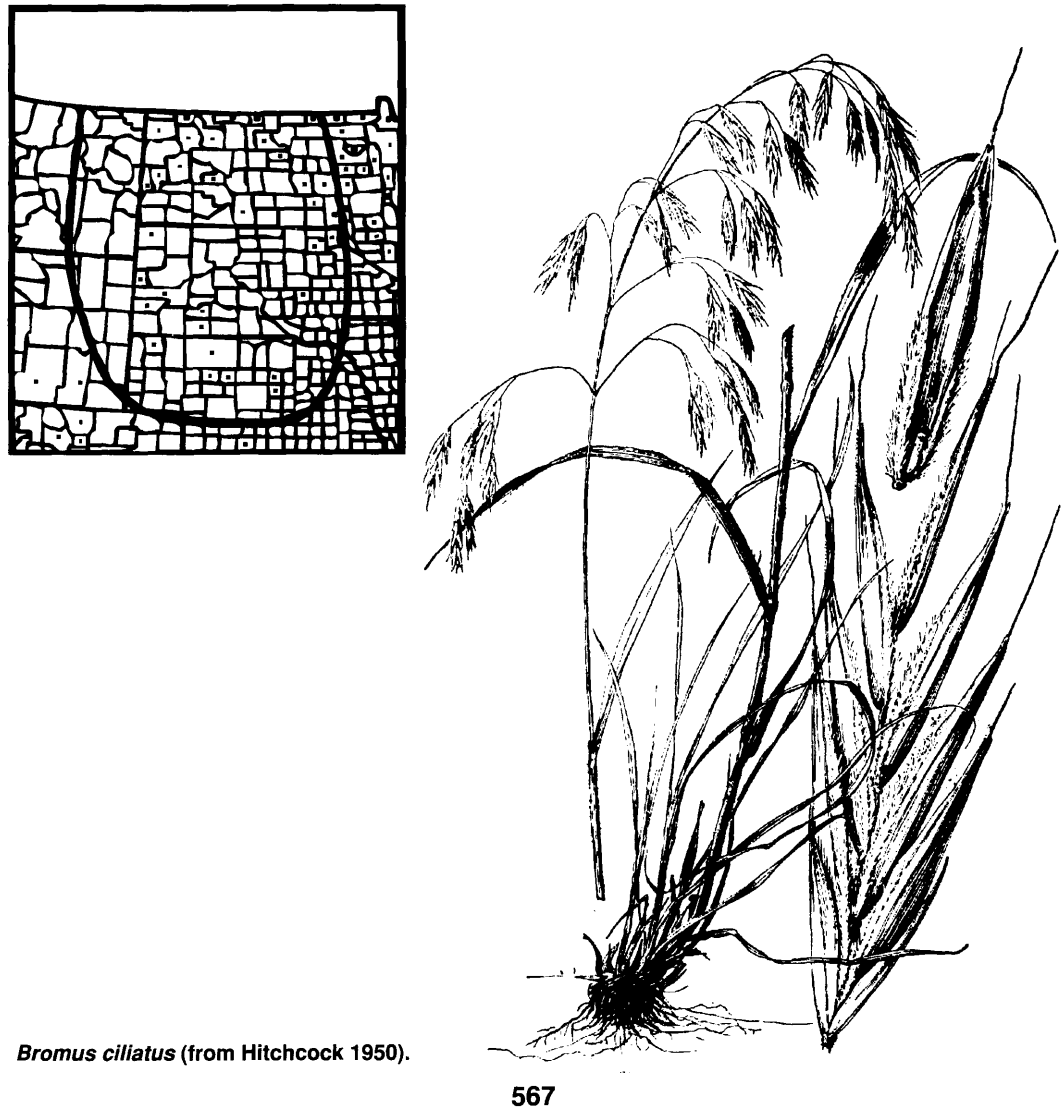


Beckmannia syzigachne **(from Hitchcock 1950).**

1. *Bromus ciliatus* L. — Fringed brome

Nonrhizomatous perennial 5-12 dm tall; **culms** few together or single, often pubescent at the nodes. **Leaf blades** flat, 3.5-10(12) mm wide, glabrous or pilose mainly on the upper surface; **sheaths** glabrous to pilose; **ligule** membranous, very short to 1.5 mm long, erose. **Inflorescence** a loose, open panicle 7-20(33) cm long, the branches usually drooping; **spikelets** rather large, 4- to 10-flowered, 14-25(35) mm long, 4-10 mm wide; **glumes** glabrous to scabrous on the nerves, the first glume 4-9.5 mm long, 1-nerved or some rarely 3-nerved, acute, the second glume 6-11(14) mm long, 3-nerved, acute or with a short-awned tip; **lemmas** mostly 8-15 mm long, reduced upward, 5- to 7-nerved, usually prominently villous along the margins mainly in the lower 1/2 to 3/4, glabrous on the back or short-pubescent toward the base, awned from between the teeth of a minutely bifid apex, the awn 1-6 mm long; **palea** about equaling the body of the lemma; **anthers** highly variable in size, 0.7-2(4.6) mm long. **Grain** elongate, about equaling the palea, retained between the lemma and palea. Jul—Aug(Sep). Wet to moist ground of fresh springs, fens, stream banks and thickets, also in moist woods; occasional; (Newf. to WA, s to NJ, TN, IA, TX and CA).

See the discussion on the following page.



Bromus ciliatus **(from Hitchcock 1950).**

Of the several native species of brome in the region, *B. ciliatus* is the only one found in wet ground with regularity. Although better known from moist woods in other parts of its range, in our area it demonstrates a clear preference for open, wet to moist places where surface water is fresh.

Smooth brome, *Bromus inermis* Leyss., is naturalized throughout our range. Because of its abundance and ubiquity, it is common to find smooth brome in moist meadows and other habitats associated with prairie wetlands. The rhizomatous habit and awnless or very short-awned, glabrous to scabrous lemmas make smooth brome distinctive among our bromes.

The weedy nature of the introduced annual bromes accounts for their frequent occurrence in previously flooded areas, e.g., dried shores, floodplains, etc. The most commonly encountered of these are Japanese brome, *Bromus japonicus* Thunb. ex Murr. and downy brome, *B. tectorum* L. Both are much better known as upland weeds.

6. *Calamagrostis* Adans. — Reedgrass

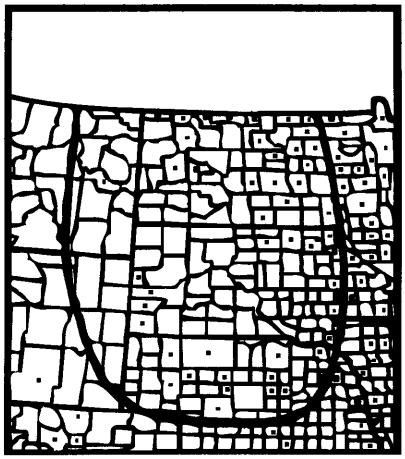
Perennials of moderate to tall stature, tufted from rhizomes; **leaves** green or glaucous, scabrous; **sheaths** mostly not overlapping, glabrous; **ligule** prominent, membranous, elongate, usually lacerate, 3-6 mm long. **Panicles** loose and open or dense and contracted, the branches spreading or ascending, scabrous. **Spikelets** 1-flowered, often purplish, disarticulating above the glumes; **glumes** subequal, the first shorter than the second or occasionally vice versa, lanceolate, acute to acuminate, the first glume 1-nerved, the second 3-nerved; **lemma** shorter and more delicate than the glumes, lanceolate, cleft or erose at the narrowed tip, 5-nerved, awned from the back, the awn diverging from near or below the middle of the back, nearly reaching to slightly exceeding the tip of the lemma, the base of the lemma (callus) bearded with a tuft of copious hairs, these shorter than to equaling the lemma; **palea** shorter than the lemma, membranous and appearing nerveless. **Grain** brown, ellipsoid, 1-1.5 mm long.

1 Panicle rather loose and open, the branches ascending to spreading; leaves rather lax, flat, 2-6 mm wide ..... 1. *C. canadensis*

1 Panicle contracted, dense or interrupted, the branches short, ascending to appressed; leaves stiff, often involute, 1-4 mm wide when flat ..... 2. *C. stricta*

1. *Calamagrostis canadensis* (Michx.) Beauv. — Bluejoint reedgrass

Culms rather slender, erect, 6-15 dm tall, often rooting from lower nodes when partly submersed; **leaves** green to glaucous, the blades rather lax, flat, 2-6 mm wide. **Panicle** rather loose and open, 8-20 cm long, the branches ascending to spreading. **Glumes** (1.5)2-4 mm long, glabrous or scaberulous on the back; **lemma** 1.5-3 mm long, thin, translucent, glabrous to scaberulous; **anthers** 1-1.7 mm long. Late Jun—Aug. Wet meadows, shallow marshes, boggy areas, springs and stream banks; frequent in the n and e parts, also the Black Hills and the Sand Hills, otherwise uncommon; (Greenl. to AK, s to NJ, WV, NC, MO, KS, NM and CA).

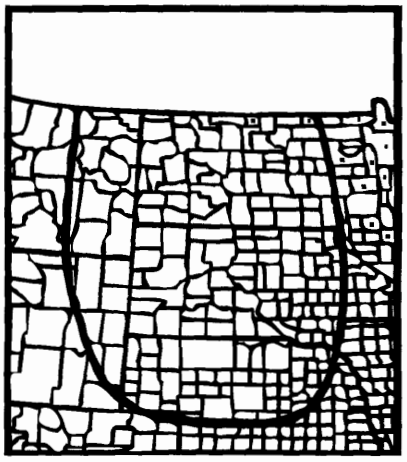




Calamagrostis canadensis **(from Hitchcock 1950).**

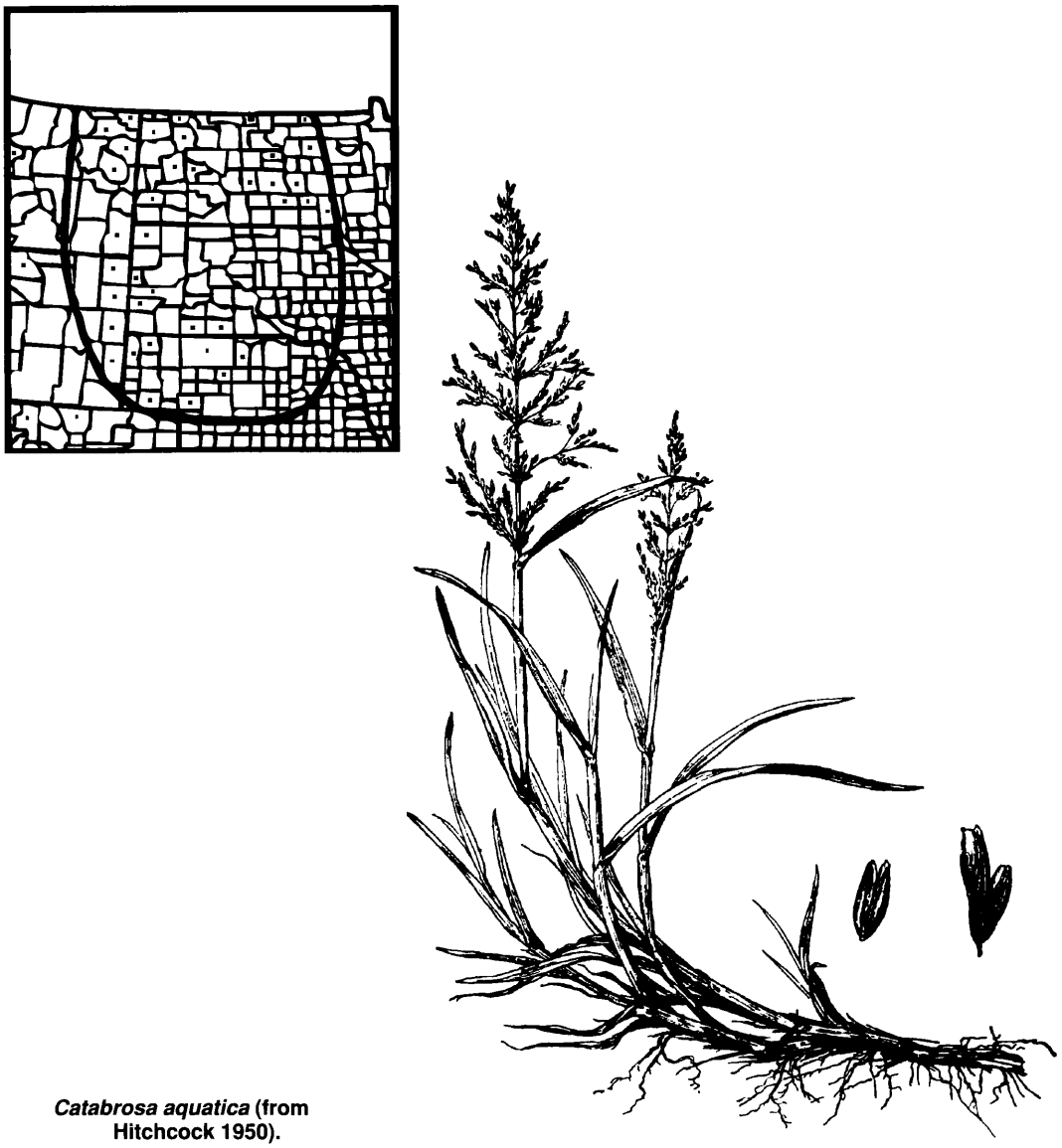
2. *Calamagrostis stricta* (Timm) Koel. — Northern reedgrass

Sometimes resembling *C. canadensis*, foliage glaucous, the **culms** more stout, erect, 3-12 dm tall; **leaf blades** stiff, often involute, 1-4 mm wide when flat. **Panicle** contracted, dense or interrupted, 6-15(25) cm long, the branches short, ascending to appressed. **Glumes** (2.5)3-4(5) mm long, scabrous on the back; **lemma** 2-3(4) mm long, rather firm, opaque, scabrous; **anthers** 1.2-2.6 mm long. Late Jun—Sep. Wet meadows, shallow marshes, springs, boggy areas, shores and stream banks; common in the n part, less so s and w; (Greenl. to AK, s to NY, PA, VA, OH, MO, KS, NM, AZ and CA). *C. inexpansa* (Torr.) A. Gray; *C. neglecta* (Ehrh.) Gaertn.



1. *Catabrosa aquatica* (L.) Beauv. — Brookgrass

Loosely tufted or sprawling perennial 2-4 dm tall; **culms** thick but weak, often prostrate, branching and rooting at the nodes in mud or water. **Leaf blades** soft, flat, mostly less than 15 cm long, 3-8(15) mm wide, glabrous, the tip acuminate, mucronate or obtuse; **sheaths** glabrous; **ligule** scarious, elongate, 1-4 mm long. **Panicle** pyramidal or oblong, open, 10-20 cm long. **Spikelets** mostly 2-flowered or frequently mostly 1-flowered, golden or brown, 2-4 mm long, disarticulating above the glumes; **rachilla joint** elongate, the second floret (when present) well above the first; **glumes** unequal to nearly equal, scarious and nerveless at the tip, 1-2 mm long, the first smaller, ovate, the second broadest toward the tip, truncate and erose; **lemmas** truncate and erose at the apex, 1.5-2.5 mm long, 3-nerved; **palea** much like the lemma, 2-nerved; **anthers** 1-2 mm long. **Grain** brown, ellipsoid, ca. 1.5 mm long. Jun—early Sep. Springs, streams and seepage areas, where water is fresh; occasional, mostly in the n and w parts; (Newf. and Labr. to Alta., s to WI, NE, CO, AZ, NV and WA; also Eurasia).



Catabrosa aquatica **(from Hitchcock 1950).**

8. *Cinna* L. — Woodreed

Tall, slender, nonrhizomatous to weakly rhizomatous perennials of wet to moist, often shady habitats. **Leaf blades** rather broad, flat and lax; **ligule** prominent, brownish, membranous, lacerate. **Inflorescence** a rather large, closed to open panicle, the branches ascending to spreading or drooping. **Spikelets** small, 1-flowered, laterally compressed, disarticulating below the glumes, the rachilla slightly elongated so that the floret is stipitate at the base, prolonged as a tiny bristle behind the palea; **glumes** 1- or 3-nerved, strongly keeled, sharply acute, the first a little shorter than the second; **lemma** similar to the glumes, 3-nerved, more blunt than the glumes, usually with a short awn arising just below the tip; **palea** 1-nerved, shorter than the lemma. **Grain** golden-brown, ellipsoid, 1.5-2.5 mm long.

1 Second glume 3-nerved, 3.8-6 mm long; anthers 1.1-1.7 mm long; panicle rather condensed, with the branches strongly ascending ..... 1. *C. arundinacea*

1 Second glume 1-nerved, 2-3.5 mm long; anthers 0.5-0.8 mm long; panicle usually open, with the branches spreading to drooping ..... 2. *C. latifolia*

1. *Cinna arundinacea* L. — Woodreed

Nonrhizomatous to weakly rhizomatous perennial 6-15 dm tall; **culms** solitary or few together, erect, often bulbous at the base. **Leaf blades** 3.5-12(14) mm wide, glabrous to scabrous; **sheaths** glabrous; **ligule** 2.5-11 mm long. **Panicle** rather condensed, 10-30 dm long, the branches strongly ascending. **Glumes** narrowly lanceolate, scabrous on the keel, the first glume 1-nerved, 3-4.5 mm long, the second glume 3-nerved, 3.8-6 mm long; **lemma** 3.5-5 mm long, scaberulous on the back, usually with a short awn 0.2-1.5 mm long, arising just below the tip and often not surpassing it; **anthers** 1.1-1.7 mm long. Late Jul—Sep. Wet to moist woods and stream banks; uncommon, mainly in the n and e parts; (MN to MT, s to GA and e TX).

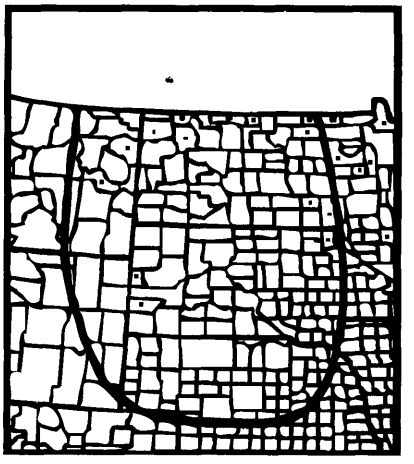




Cinna arundinacea **(from Hitchcock 1950).**

2. *Cinna latifolia* (Trev. ex Goepp.) Griseb. — Drooping woodreed

Similar to the preceding, weakly rhizomatous, 6-13 dm tall; **culms** single or few together, erect, not bulbous at the base. **Leaf blades** 3-13(17) mm wide, usually scabrous; **sheaths** smooth to scaberulous; **ligule** 2-7 mm long. **Panicle** usually loose and open, rarely condensed, 7-35 cm long, the branches lax and usually spreading to drooping. **Glumes** narrowly lanceolate to lanceolate, scabrous on the keel, both 1-nerved, the first glume 1.6-3(3.5) mm long, the second glume 2-3.5 mm long; **lemma** 2-3.5 mm long, scaberulous on the back, usually with an awn 0.3-1.5 mm long from just below the tip, usually surpassing the tip; **anthers** 0.5-0.8 mm long. Jul—Aug. Wet woods, swamps and springs, where water is fresh; occasional in the n and the Black Hills; (Newf. to AK, s to NC, TN, IL, SD, NM and CA).



1. *Deschampsia cespitosa* (L.) Beauv. — Tufted hairgrass

Tufted perennial 3-10 dm tall; **culms** stiff, erect, 1-3 mm thick. **Leaves** mostly basal, the blades usually not reaching the panicle, flat or involute, 2-3 mm wide, scabrous on the upper side; **sheaths** glabrous, the ligule white-hyaline, elongate, 2-6 mm long. **Panicle** contracted to open, 1-4 dm long, the filiform branches strongly ascending to loosely spreading, flowered toward the tips. **Spikelets** 2-flowered, purplish and fading to pale with age, 3-4(5) mm long, disarticulating above the glumes, the rachilla short-hairy, prolonged beyond the second floret; **glumes** acute, 2-4 mm long, subequal, the second somewhat longer than the first, 1-nerved or the second obscurely 3-nerved; **lemmas** 2- to 4-toothed at the apex, 2-3 mm long, the upper smaller than the lower, scarious, appearing nerveless, awned from near the base on the back, the awn surpassing the apex of the lemma or shorter, the callus short-hairy; **palea** acute, scarious; **anthers** 1-1.6 mm long. **Grain** brown, ellipsoid to pyriform, 1-1.5 mm long; Late Jun—Aug. Fresh wet meadows, boggy areas, springs and stream banks; occasional in the n and the Black Hills; (Greenl. to AK, s to NJ, NC, OH, IL, MN, ND, Black Hills of SD, NM, AZ and CA; also Eurasia).



Deschampsia cespitosa **(from Hitchcock 1950).**

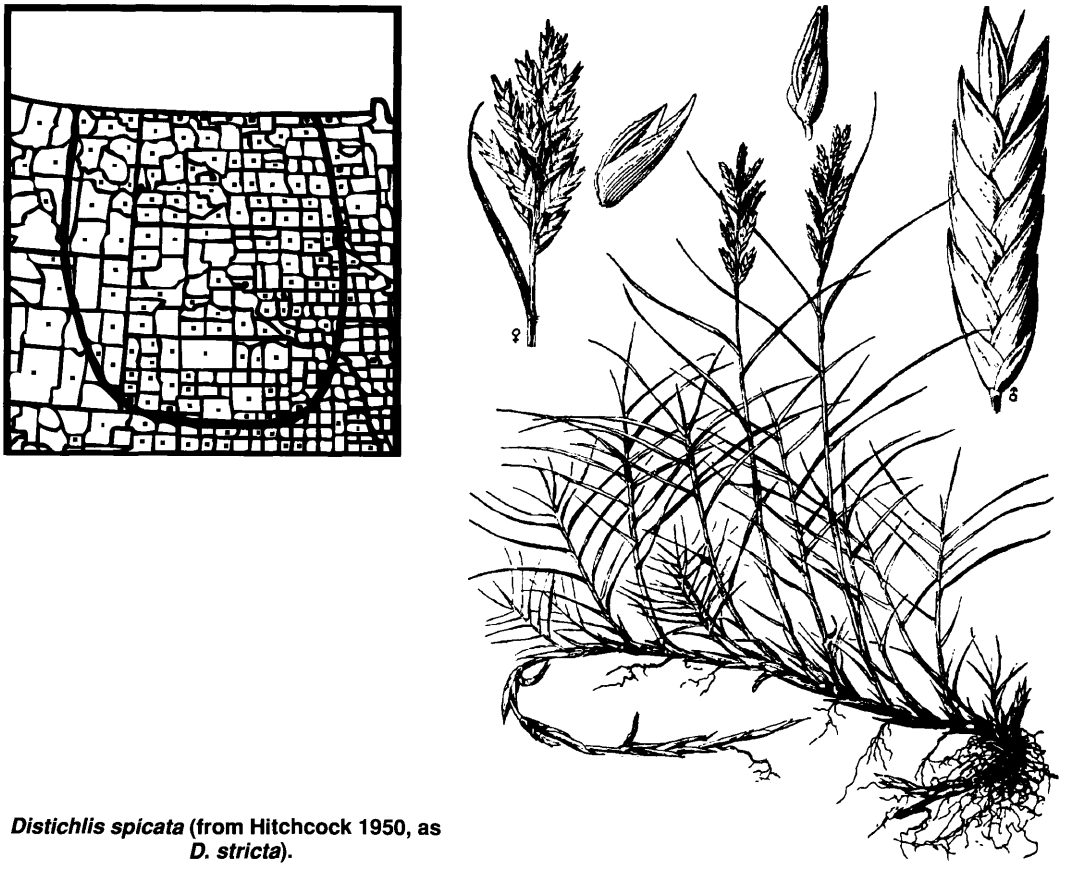
1. *Distichlis spicata* (L.) Greene — Saltgrass

Low, extensively rhizomatous, dioecious perennial 1-3 dm tall, the **culms** wiry, erect. **Leaf blades** strongly ascending, the uppermost reaching or surpassing the panicle, flat to involute, 0.5-3 mm wide, glabrous or with sparse hairs; **sheaths** glabrous or sparsely hairy, usually long-hairy at the collar; **ligule** inconspicuous. **Panicle** simple, narrow and contracted, rather few-flowered, 3-6 cm long. **Spikelets** several to many, short-pedicelled, strongly ascending, 8-20 mm long; **staminate spikelets** stramineous, mostly 8- to 15-flowered; **pistillate spikelets** greenish-gray, mostly 7- to 9-flowered, disarticulating above the glumes; **glumes** unequal, 3- to 7-nerved, the lateral nerves sometimes obscure, the first glume ovate to lanceolate, 1-4 mm long, the second glume lanceolate, 2-5 mm long; **lemmas** ovate, 3-6 mm long, acute to subacute, keeled, broadly scarious-margined, otherwise firm, many-nerved; **palea** nearly as long as the lemma, broader than the lemma at the base, coriaceous, enclosing the grain in the pistillate floret; **anthers** 2-3(4) mm long on male plants. **Grain** dull to coppery brown, the surface rather wrinkled, lance-subulate, 3-4.5 mm long, including the long tapering beak. Jun—early Sep. Alkaline or saline flats and shores, also drier sites; common; (w MN to Sask. and WA, s to TX and CA and into Mex.). *D. stricta* (Torr.) Rydb.

Northern Great Plains populations belong to var. *stricta* (Torr.) Beetle, which is the inland phase.

Reference:

Beetle, A. A. 1943. The North American variations of *Distichlis spicata*. Bull. Torrey Bot. Club 70:638-650.



Distichlis spicata **(from Hitchcock 1950, as *D. stricta*).**

11. *Echinochloa* Beauv. — Barnyardgrass

Stout, weedy annuals (1)3-10 dm tall, with flat glabrous **leaf blades** 3-16 mm wide and terminal **panicles** of few to many densely flowered, racemose branches; **culms** solitary or few to several, erect to decumbent, rather succulent; **sheaths** glabrous or puberulent at the base; **ligules** absent. **Spikelets** nearly sessile, ovoid, containing one terminal fertile floret and one sterile floret, disarticulating below the glumes; **glumes** very unequal, the first glume broad with a pointed tip, 1/3 to 1/2 the length of the spikelet (excluding awns, if present), 3-nerved, the second glume broadly ovate, acuminate to apiculate, hispid or papillose-hispid on the back, especially on the nerves, 5-nerved, the outer 2 nerves marginal; **sterile lemma** resembling the second glume in size and vestiture, awned or awnless; **palea** of the sterile floret membranous, 1/2 to 3/4 the length of the sterile lemma body; **fertile lemma** ovate to elliptic, plano-convex, firm, shiny, 2-3 mm long including the short beak; **palea** of the fertile floret about as long as the lemma body, its margins included by the inrolled margins of the lemma, the tip free. **Grain** retained inside the fertile floret.

For information on related taxa sometimes encountered in wetland habitats, see the discussion under *Panicum capillare*.

Reference:

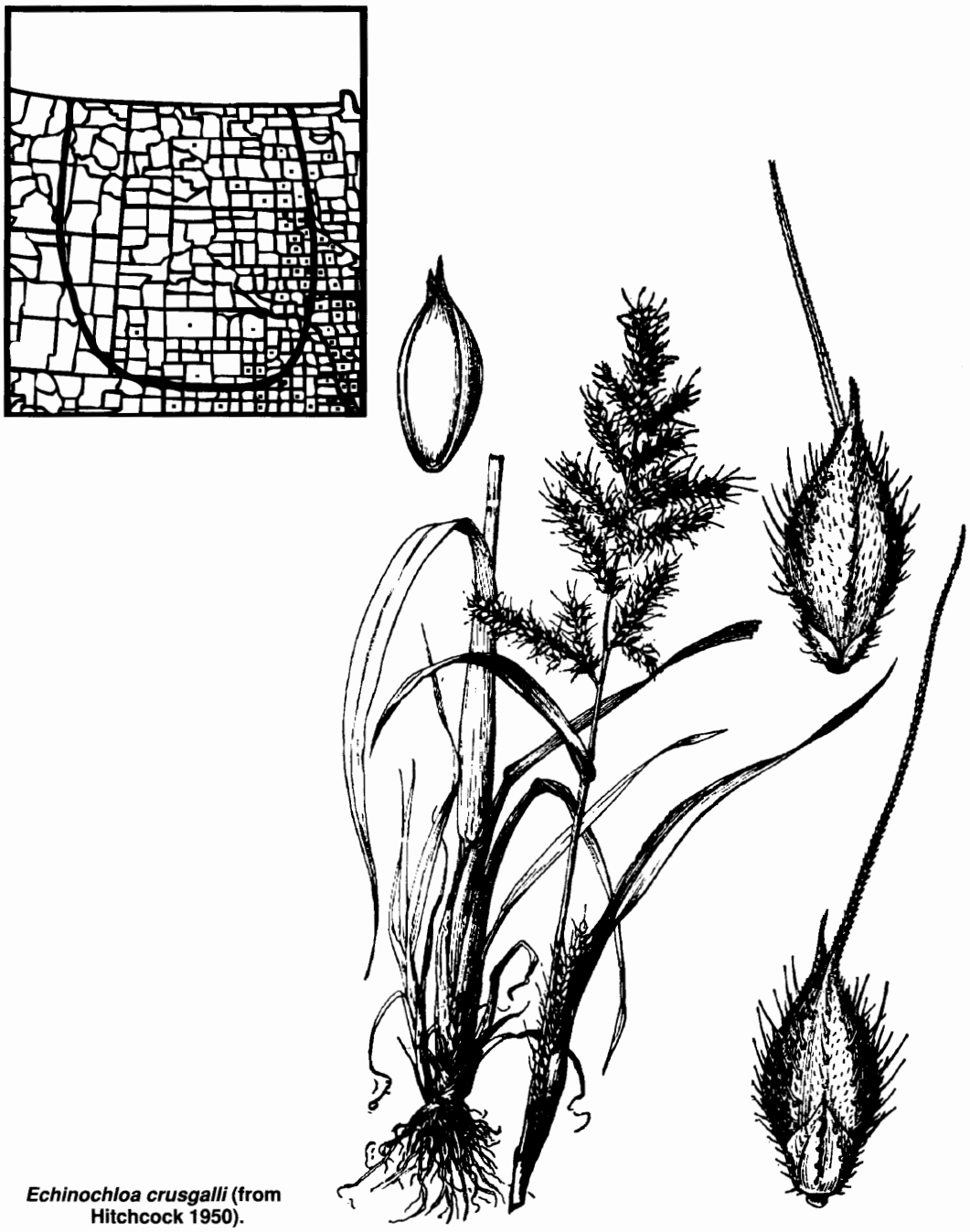
Gould, F. W., M. A. Ali and D. E. Fairbrothers. 1972. A revision of *Echinochloa* in the United States. Amer. Midl. Naturalist 87:36-59.

1 Firm, shiny apex of the fertile lemma obtuse or broadly acute, sharply differentiated from the often shriveled beak, the lemma body and the beak separated by a line of minute hairs . . . . . 1. *E. crusgalli*

1 Firm, shiny apex of the fertile lemma narrowly acute or acuminate, gradually tapering to the usually stiff beak, the lemma body and beak not separated by a line of minute hairs (the beak itself commonly puberulent) . . . . . 2. *E. muricata*

1. *Echinochloa crusgalli* (L.) Beauv.

Panicles green to purplish, seldom strongly purplish; **hairs** of the panicle branches, or at least some, as long as or longer than the spikelets (excluding awns, if present). **Spikelets** 3-5 mm long (excluding awns); **sterile lemma** awnless or with an awn to 4 cm or more long, awned and awnless sterile lemmas often occurring in the same panicle; **fertile lemmas** mostly elliptic, the firm shiny apex obtuse or broadly acute, sharply differentiated from the often shriveled beak, the lemma body and the beak separated by a line of minute hairs. Jul—Sep. Shores, wet meadows, ditches, stream banks, mud flats and other wet places; mainly in the e part but spreading w in the region; (Intro. from Europe, now occurring throughout much of s Can. and most of the U.S., s to Mex.).



Echinochloa crusgalli **(from Hitchcock 1950).**

2. *Echinochloa muricata* (Beauv.) Fern.

Panicles green to purplish, sometimes strongly purple, usually oblong or pyramidal; **hairs** of the panicle branches absent or shorter than the spikelets (excluding awns, if present). **Spikelets** 2-3.5 mm long (excluding awns); **sterile lemma** awnless or with an awn to 6(10) mm long; **fertile lemmas** mostly ovate, the firm shiny apex narrowly acute or acuminate, gradually tapering to the usually stiff beak, the lemma body and beak not separated by a line of minute hairs (the beak itself commonly puberulent). Jul—Sep. Same habitats as the preceding; very common; (Que. and N.B. to Alta. and WA, s to FL, TX, CA and into Mex.). *E. microstachya* (Wieg.) Rydb.

Northern Great Plains representatives of *E. muricata* are referable to var. *microstachya* Wieg., which differs from the typical variety in having smaller spikelets with shorter awns. Several attempts to segregate species and varieties within this polymorphic species have been made on the basis of such characters as awn length and the presence or absence of papillose hairs on the spikelets. Variability in these and other characters may be observed within the same populations, thus rendering taxonomic recognition of these variants meaningless. The lumping of *E. muricata* with *E. crusgalli* by some authors has further added to the confusion.



12. *Eragrostis* Beauv. — Lovegrass

Low, creeping, mat-forming annuals (those included here), perfect-flowered or dioecious; **culms** mostly spreading and rooting at the nodes. **Leaves** mostly in tufts at the nodes, short-sheathing and with rather short, flat to folded blades. **Inflorescences** usually many, condensed and capitate to somewhat open panicles; **spikelets** mostly many-flowered, linear to oblong, laterally compressed, the rachilla continuous and remaining intact as the glumes and lemmas fall, the paleas persisting for a short time; **glumes** unequal, acute to acuminate, (0)1-nerved or the second occasionally 3-nerved; **lemmas** acute, keeled, prominently 3-nerved; **paleas** shorter than the lemma, scarious, conspicuously 2-nerved.

Two weedy species of lovegrass are worth mentioning for their tendency to appear on dry shores and other previously inundated habitats, especially in dry, sandy or gravelly substrates. Both are typical of disturbed upland habitats like roadsides, fields and waste places. *E. pectinacea* (Michx.) Nees, Carolina lovegrass, is a tufted, nonstoloniferous grass with open, spreading panicles of narrow, linear, nonglandular spikelets that tend to lie parallel to the panicle branches. *E. cilianensis* (All.) E. Mosher, stinkgrass, is another tufted annual with more crowded panicles of broader spikelets and with wartlike glands on the keels of the glumes and lemmas, and also on the pedicels.

1 Plants perfect-flowered; anthers 0.2-0.3 mm long . . . . . 1. *E. hypnoides*

1 Plants dioecious; anthers 1.4-2.3 mm long . . . . . 2. *E. reptans*

1. *Eragrostis hypnoides* (Lam.) B.S.P. — Teal lovegrass

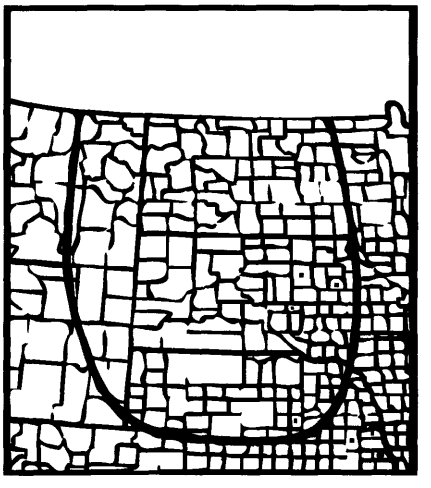
Perfect-flowered, mat-forming annual; **culms** mostly spreading and rooting at the nodes, the erect branches (2)5-15 cm tall, glabrous except for short pubescence at the nodes. **Leaf blades** flat to folded, mostly 1-5 cm long, 1-2(3) mm wide, glabrous or very short-pubescent; sheaths glabrous except for hairs at the summit and sometimes along the margins; **ligule** a tuft of hairs ca. 0.5 mm long. **Panicles** numerous, rather dense to open, oblong, 1.5-6 cm long. **Spikelets** several- to many-flowered, linear, 3-8 mm long; **glumes** ovate, 1-nerved, the first 0.5-1 mm long, the second 0.5-1.5 mm long; **lemmas** ovate-lanceolate, acute to acuminate, 1.5-2 mm long, hyaline between the 3 nerves; **anthers** 0.2-0.3 mm long. **Grain** golden brown, ovoid, 0.4-0.6 mm long. Late Jul—Sep. Wet sandy or muddy stream banks and alluvial bars; occasional from e and c ND, s to e and s NE; (Que. to WA, s throughout the U.S., except the desert and mountain regions, s into Mex. and S.Amer.).



Eragrostis hypnoides **(from Hitchcock 1950).**

2. *Eragrostis reptans* (Michx.) Nees

Similar to the preceding in habit but the plants dioecious; **culms** freely rooting at the nodes, the erect branches 3-25 cm tall, usually finely puberulent with gland-tipped hairs, seldom glabrate. **Leaves** mostly in tufts at the nodes; **blades** flat, 1-4 cm long, 1-3 mm wide, the blades and sheaths similarly short glandular-pubescent to seldom glabrate; **ligule** a fringe of hairs ca. 0.5 mm long. **Panicles** numerous, capitate, globose to oblong, mostly 1-3 cm long. **Spikelets** often nearly sessile in the headlike panicles, mostly many-flowered, sometimes purplish, narrowly oblong, (3)5-15 mm long, sometimes 1 or both glumes early deciduous, especially in male plants, **lemmas** persistent on male plants, eventually deciduous in the female; **staminate spikelets** with the first glume 1-nerved, 1-3.5 mm long, the second glume 1(3)-nerved, 2-4 mm long, the lemmas 2-4 mm long, acute; **anthers** 1.4-2.3 mm long; **pistillate spikelets** with the first glume (0)1-nerved, 0.2-1.5 mm long, the lemmas 1.5-3.2 mm long, acute to acuminate, sometimes awn-tipped. **Grain** brownish, obovoid, 0.4-0.7 mm long. Late Jul—Sep. Same habitats as the preceding; uncommon and scattered from ec SD to s NE; (KY to SD, s to LA, TX, and into Mex.; also FL).



13. *Glyceria* R. Br. — Mannagrass

Rhizomatous perennials with flat leaf blades and open panicles; **sheaths** tubular, the margins united for most of their length. **Spikelets** few- to many-flowered, ovoid to linear, subterete or slightly compressed, disarticulating above the glumes and between the florets; **glumes** unequal, acute or obtuse, scarious, 1-nerved; **lemmas** rounded on the back, usually obtuse and scarious at the tip, 7-nerved; **palea** about equaling the lemmas, nerved marginally and winged backward toward the grain; **stamens** 3 or 2.

Reference:
Church, G. L. 1949. A cyto-taxonomic study of *Glyceria* and *Puccinellia*. Amer. J. Bot. 36:155-165.

1 Spikelets linear, mostly 6- to 13-flowered, 9-15 mm long; panicle branches stiff, erect to ascending . . . . . 1. *G. borealis*

1 Spikelets ovoid to narrowly ovoid, 3- to 7(9)-flowered, 2.5-7 mm long; panicle branches lax, spreading or drooping at maturity.

2 First glume 1-2 mm long; lemmas 2.5-3 mm long; panicle 20-35 cm long . . . . . 2. *G. grandis*

2 First glume 0.5-1 mm long; lemmas 1.5-2 mm long; panicle 6-15(20) cm long . . . . . 3. *G. striata*

1. *Glyceria borealis* (Nash) Batch. — Northern mannagrass

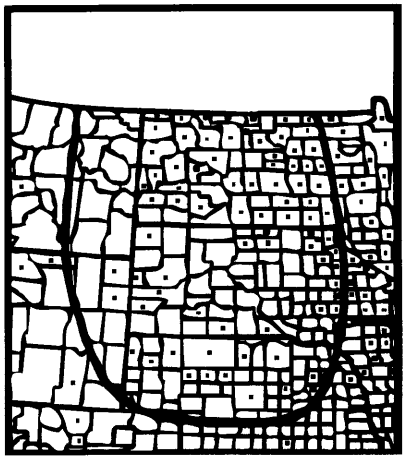
Culms 5-13 dm tall, rather weak, sometimes decumbent at the base, often producing adventitious roots from submersed lower nodes. **Leaf blades** 2-6 mm wide, glabrous; **sheaths** glabrous, the ligule scarious, rounded, 3-10 mm long. **Panicle** 15-40 cm long, with stiff, erect to ascending, racemelike branches. **Spikelets** linear, mostly 6- to 13-flowered, 9-15 mm long; **glumes** obtuse, the first 1.5-2 mm long, the second 2.5-3.5 mm long; **lemmas** oblanceolate, 3-4 mm long, obtuse to subacute, scarious-margined, scaberulous on the nerves; **anthers** 3, 0.5-0.9 mm long. **Grain** dark brown, oblong to ovoid, apiculate at the base, furrowed on the upper face, 1.5 mm long. Jun—Aug. In shallow water or mud of streams, ditches, ponds and marshes; frequent in ND and ne SD, otherwise rare in w SD and n NE; (Newf. to AK, s to NJ, PA, IL, MN, SD, NM, AZ and CA).

Glyceria fluitans (L.) R. Br. is a similar species found only in the Black Hills; otherwise it occurs well east of the region. It differs from *G. borealis* in the longer, more scabrous **lemmas** 4-7 mm long. This species is known from Custer and Pennington Counties, SD.



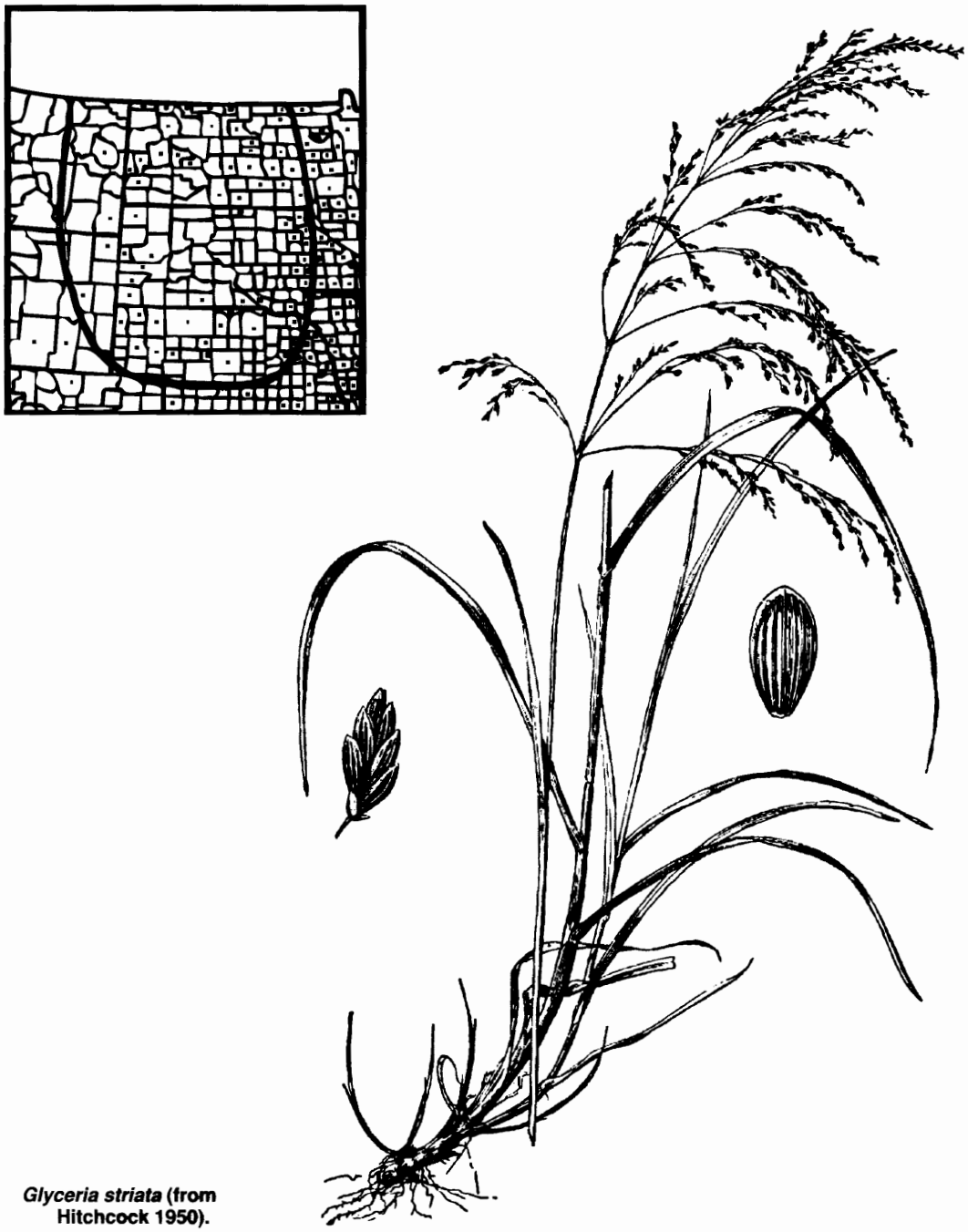
2. *Glyceria grandis* S. Wats. — American mannagrass

Culms 7-14 dm tall, 4-6 mm thick and rather spongy at the base. **Leaves** 4-12 mm wide, glabrous; **sheaths** glabrous, the ligule hyaline, entire or lacerate, 3-7 mm long. **Panicle** 20-35 cm long, oblong to pyramidal, very open with lax, drooping branches at maturity. **Spikelets** purplish, ovate to narrowly ovate, 3- to 6(9)-flowered, 4-7 mm long; **glumes** ovate to ovate-lanceolate, acute, the first 1-2 mm long, the second 2-2.5 mm long; **lemmas** purplish and often bronzed at the tip, oblong-lanceolate, 2.5-3 mm long, rounded to truncate; **anthers** 3, 0.7-1.1 mm long. **Grain** dark brown, ovoid, 1-1.3 mm long. Late Jun—early Sep. In shallow water or mud of marshes, ditches, streams, lakes and ponds; common and often abundant in the n part, less so in the s; (Que. and N.S. to AK, s to VA, TN, LA, NE, NM, AZ and WA).



3. *Glyceria striata* (Lam.) Hitchc. — Fowl mannagrass

Culms 2-8 dm tall, slender, clumped or single from rhizomes. **Leaves** 1-4 mm wide, glabrous; **sheaths** glabrous, the ligule scarious, rounded, 1-2 mm long. **Panicle** 6-15(20) cm long, loosely spreading and open, the branches lax, spreading or drooping. **Spikelets** often purplish, ovate, 3- to 7-flowered, 2.5-4.5 mm long; **glumes** ovate-elliptic, the first 0.5-1 mm long, the second 0.8-1.5 mm long; **lemmas** elliptic, obtuse to subacute, 1.5-2 mm long, strongly nerved; **anthers** usually 2, 0.2-0.5 mm long. **Grain** dark brown, shiny, suborbicular, 0.7-1 mm long. Jun—Jul, seldom late Aug—Sep. Fresh wet meadows, springs and stream margins; common in the n part, the Black Hills and the Sand Hills, otherwise scattered; (Newf. and Labr. to B.C., s to FL, TX and CA).



***Glyceria striata* (from Hitchcock 1950).**

1. *Hierochloe odorata* (L.) Beauv.

Perennial from creeping, often deep-seated rhizomes, sweetly scented (like sweetclover) especially when dried; **culms** erect, (1)2.5-5(7) dm tall, glabrous, sometimes clothed at the base by the previous year's leaves. **Leaf blades** flat (inrolled when young), much shorter (mostly 1-4 cm long) on the culms than on sterile shoots, 2.5-8 mm wide, glabrous or puberulent; **sheaths** glabrous or puberulent, especially at the collar; **ligules** membranous, 1-4 mm long. **Inflorescence** an ovoid to pyramidal panicle 4-10 cm long, the branches spreading to ascending. **Spikelets** golden-brown or often bicolored when young, with greenish or purplish at the base and golden toward the tips, 3-flowered, the lower 2 florets staminate, the terminal one perfect-flowered, disarticulating above the glumes with the 3 florets falling as a unit; **glumes** broadly ovate, subequal, 3.5-5.5 mm long, membranous and nearly transparent except at the base, faintly 1- to 3-nerved; **lemmas** of staminate florets golden-brown, 3-4 mm long, hirsute at the tip, along the margins and at the base, 5-nerved; **lemma of the perfect floret** 2.5-3.2 mm long, hirsute at the tip, otherwise smooth and shiny, obscurely 3- to 7-nerved; **anthers** of staminate florets 1.6-2.2 mm long, those of the perfect floret 1-1.6 mm long. **Grain** formed in few spikelets, retained inside the lemma, golden-brown, broadly ellipsoid, 1-1.5 mm long. Late Apr—Jul. Wet meadows and low prairie, often where sandy; frequent from n ND to e SD, otherwise rare in the Black Hills; (Circumboreal, in N.Amer. from Labr. to AK, s to NJ, OH, IL, IA, SD, AZ and WA).





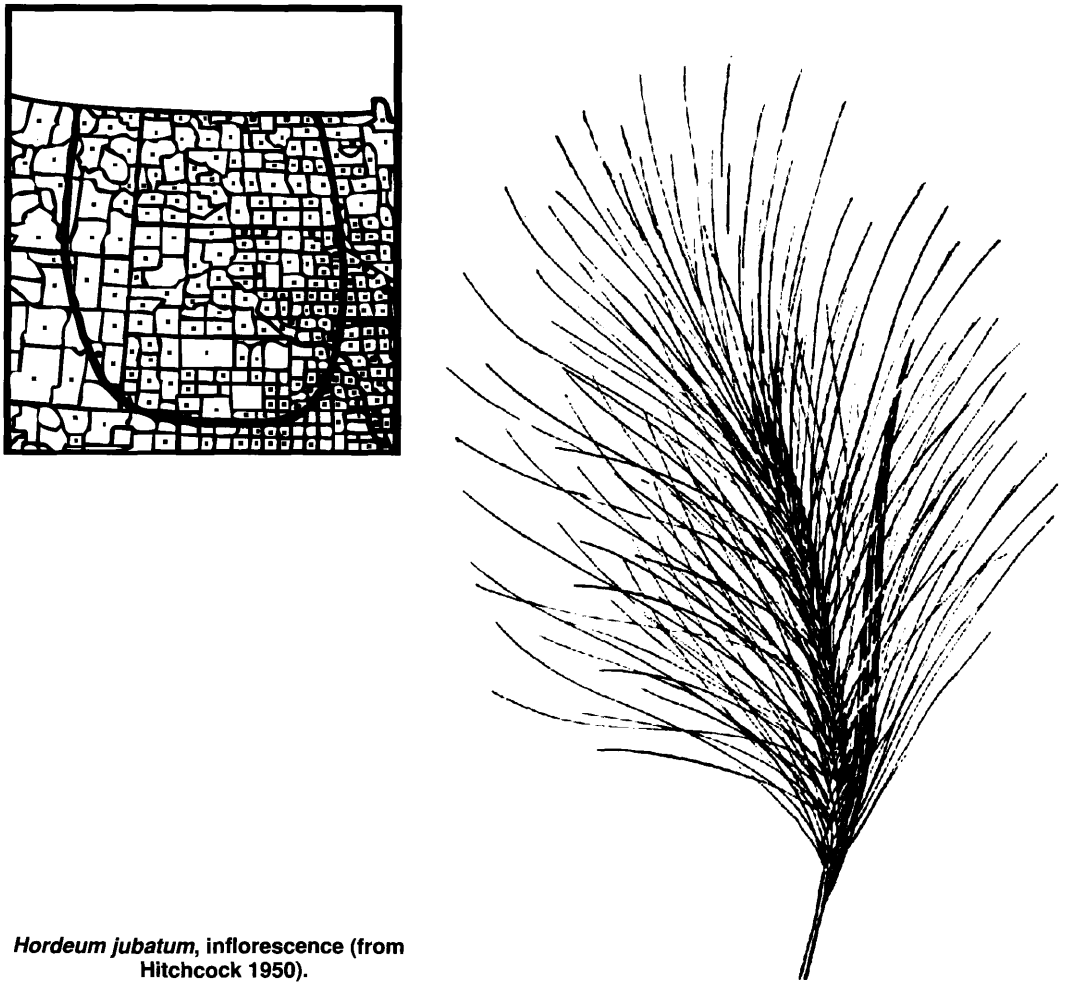
Hierochloe odorata **(from Hitchcock 1950).**

1. *Hordeum jubatum* L. — Foxtail barley

Tufted perennial 2-8 dm tall; **culms** erect or decumbent at the base. **Leaves** usually flat, 1-5 mm wide, glabrous; **sheaths** glabrous, the ligule scarious, truncate, less than 1 mm long. **Inflorescence** a terminal spike, erect to nodding, 3-10 cm long, bristly due to the long, slender, spreading awns of glumes and lemmas; **awns** (1.5)2.5-7 cm long. **Spikelets** 1-flowered, 3 at each node of the rachis, the central spikelet fertile, sessile, the lateral 2 reduced, sterile, with awnlike parts, short-pedicelled; **central spikelet** with the back of the lemma facing away from the rachis; **disarticulation** above the glumes on the rachilla and also between the nodes on the rachis; **lemma** lanceolate with a long-awned tip, the lemma body 4-6 mm long, rather firm, obscurely 5-nerved; **palea** as long as the lemma body; **anthers** 0.8-1.6 mm long. **Grain** tan to brown, oblong, 3 mm long, the lemma and palea adherent to the grain. Jun—Sep. Wet meadows, ditches, shores, shallow marshes, seepage areas and other wet or moist places, often where alkaline or saline, also common as a weed of drier disturbed sites; common, often abundant; (Newf. and Labr. to AK, s to MD, KY, MO, TX, CA and into Mex.).

In e MT a smaller plant with shorter awns 1 cm or less long is known as *H. brachyantherum* Nevski. There is good evidence that *H. jubatum* hybridizes with this entity.

See also the comments under *Agropyron repens.*



***Hordeum jubatum*, inflorescence (from Hitchcock 1950).**

1. *Leersia oryzoides* (L.) Sw. — Rice cutgrass

Loosely tufted perennial from creeping rhizomes, 3-10 dm tall; **culms** upright to decumbent. **Leaves** flat, 3-11 mm wide, strongly scabrous, abrasive to the touch; **sheaths** scabrous, usually puberulent at the collar; **ligule** truncate, rather firm, 1 mm long. **Panicle** 10-20 cm long, open with spreading to ascending branches or often partially to completely included by the uppermost leaf sheath, the spikelets then cleistogamous. **Spikelets** strongly compressed, pale green and becoming stramineous or brown with age, 3.5-5 mm long; **glumes** absent; **lemma** boat-shaped, hispid, coarsely so on the keel and margins; **palea** as long as or slightly exceeding the lemma, coarsely hispid on the keel, the margins tightly included by the lemma; **anthers** 0.2-2.4 mm long, the smaller sized anthers most typical of cleistogamous spikelets. **Grain** reddish-brown to brown, compressed, asymmetrically pyriform to obovoid, 2.5-3 mm long. Late Jul—early Sep. Muddy or sandy stream banks and shores; frequent except in the w part; (Que. and N.S. to B.C., s to FL, TX and CA, apparently absent in MT and WY; also in Europe).





Leersia oryzoides **(from Hitchcock 1950).**

1. *Leptochloa fascicularis* (Lam.) A. Gray — Bearded sprangletop

Tufted annual 1-4 dm tall, sometimes prostrate, somewhat succulent. **Leaves** strongly sheathing the culms, the upper ones usually surpassing and sheathing the inflorescences, the blades flat to involute, 1-3 mm wide, scaberulous; **sheaths** often purplish, glabrous; **ligule** elongate, often lacerate, 2-4 mm long. **Inflorescence** of several to many racemose branches, 5-20 cm long, the lower portion usually included by the uppermost sheath, the branches strongly ascending to weakly spreading, scabrous. **Spikelets** sessile or very short-pedicelled on the branches, 6- to 12-flowered, 7-20 mm long, disarticulating above the glumes; **rachilla** breaking between the florets at maturity into segments of 1 mm; **glumes** unequal, 1-nerved, the first lanceolate, 2-4 mm long, the second lanceolate to oblong, 4-5 mm long; **lemmas** acuminate, 4-5 mm long, decreasing upward, minutely notched at the apex and short-awned from between the minute teeth, 3-nerved, pubescent on the nerves toward the base; **palea** almost as long as the lemma body, nerved along the margins; **anthers** 0.1-0.4 mm long. **Grain** light brown, ellipsoid, flattened, 1.5-2.5 mm long. Jul—early Sep. Shores, stream banks, mud or sand flats and other places of temporarily standing water, especially where alkaline or saline; frequent from s ND and e WY to NE; (NH and NY to ND, s to FL, LA and TX, and in the w, WA and OR, s to AZ and CA; also in C. and S.Amer.).



18. ***Muhlenbergia*** Schreb. — Muhly

Solitary or tufted perennials, many producing creeping, scaly rhizomes; **culms** erect or decumbent at the base, often branching from the nodes; **leaf blades** rather short relative to width, scabrous; **sheaths** often not overlapping, the internodes exposed; **ligules** membranous. **Inflorescence** usually a narrow, contracted, spikelike panicle (open and diffuse in *M. asperifolia*), terminal, sometimes axillary panicles also produced. **Spikelets** 1-flowered, disarticulating above the glumes, the glumes remaining after the florets have fallen; **glumes** unequal to subequal, keeled or rounded on the back, acute to acuminate or awned from the tip, 1-nerved; **floret** equal to or exceeding one or both glumes (excluding awns, if present); **lemma** ovate-lanceolate or narrowly lanceolate, acute to acuminate, rarely awned, strongly 3-nerved, pilose at the base in some spp.; **palea** nearly as long as the lemma, 2-nerved.

Reference:

Pohl, R. W. 1969. *Muhlenbergia* subgenus *Muhlenbergia* (Gramineae) in North America. Amer. Midl. Naturalist 82:512-542.

1 Panicle open and diffuse, about as broad as long, the filiform branches widely spreading . . . . . 1. *M. asperifolia*

1 Panicle narrow and contracted, the branches short, ascending to appressed.

2 Leaf blades usually involute, 0.2-1 mm wide; panicles few-flowered, not glomerulate . . . . . 5. *M. richardsonis*

2 Leaf blades flat, 2-6(8) mm wide; panicle usually densely flowered and glomerulate.

3 Glumes awned, much surpassing the floret; anthers 0.5-1.5 mm long.

4 Internodes of the culm mostly smooth and shiny; main culms usually branched above; anthers 0.5-0.8 mm long; ligules 0.6-1.5 mm long . . . . . 4. *M. racemosa*

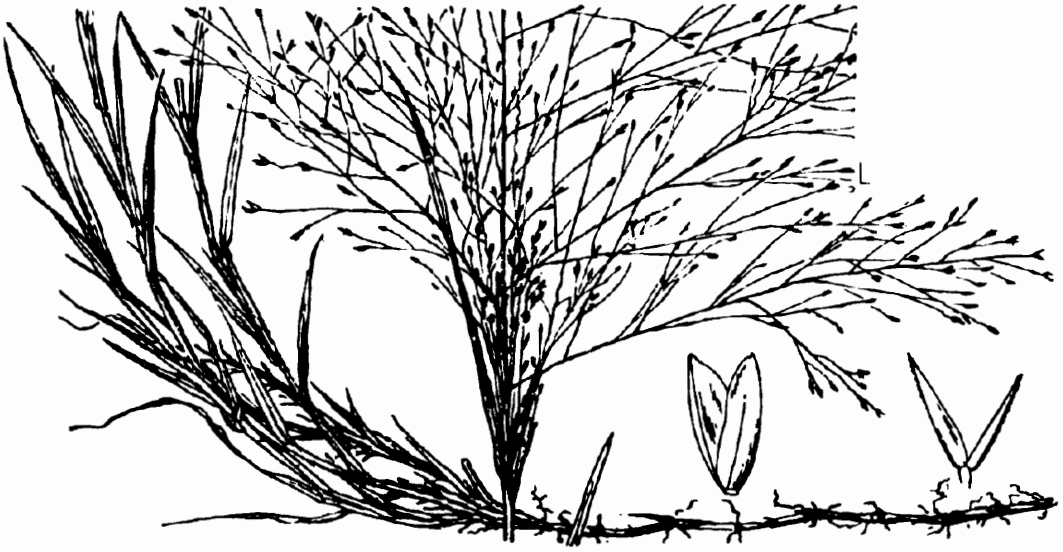
4 Internodes of the culm puberulent and dull; main culms unbranched or branched from the base; anthers 0.8-1.5 mm long; ligules 0.2-0.6 mm long . . . . . 2. *M. glomerata*

3 Glumes acuminate or short-awned, usually not to shortly surpassing the floret; anthers 0.3-0.5 mm long . . . . . 3. *M. mexicana*

1. *Muhlenbergia asperifolia* (Nees & Meyen) Parodi — Alkali muhly

Low perennial with slender scaly rhizomes; **culms** usually decumbent, branching from the lower nodes, 1-5 dm long. **Leaves** strongly ascending, flat, rather short, mostly 2-5 cm long, 1-3 mm wide, pale green; **sheaths** glabrous, the ligule truncate, erose, 0.5-1 mm long. **Panicle** open and diffuse, ovoid to pyramidal, 5-15 cm long, about as wide when fully expanded, the filiform branches widely spreading, scabrous, sparsely flowered. **Spikelets** solitary on filiform pedicels, purplish or dark gray; **glumes** unequal to subequal, lanceolate to ovate-lanceolate, acuminate, 1/2 to nearly as long as the floret; **lemma** ovate-lanceolate, narrowed to an acute to rounded tip, 1.2-1.8 mm long; **anthers** 0.6-1 mm long. **Grain** brown, ellipsoid, 1-1.2 mm long. Mid Jul—Sep. Wet meadows, seepage areas, shores and flats, often where alkaline or saline; common; (IN and IL to B.C., s to TX, CA and into Mex.).



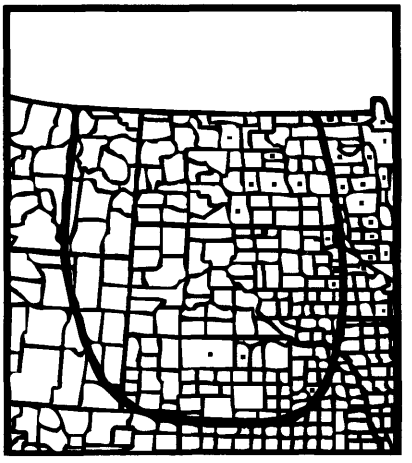


Muhlenbergia asperifolia **(from Hitchcock 1950).**

2. *Muhlenbergia glomerata* (Willd.) Trin. — Bristly muhly

Perennial 3-8 dm tall from stout scaly rhizomes; **culms** erect, unbranched or branching from the base, the internodes dull, puberulent. **Leaves** flat, mostly 6-12 cm long, 2-6 mm wide; **sheaths** glabrous, the ligule truncate, erose-ciliate at the tip, 0.2-0.6 mm long. **Panicle** contracted, usually densely flowered, glomerulate, often interrupted, (1)2-11 cm long, 4-10 mm thick. **Spikelets** crowded and appressed in the glomerules, green or purplish; **glumes** subequal, the first a little shorter than the second, subulate, awned, the bodies 1.5-3 mm long, the awn 1-5 mm long, both glumes (including the awns) much surpassing the floret, 1.3-2X as long as the lemma; **lemma** lanceolate, acuminate or rarely short-awned, 2-3 mm long, pilose on the callus, pubescent along the margins nearly to the tip; **anthers** 0.8-1.5 mm long. **Grain** brown to dark brown, oblong, 1-1.2 mm long. Aug—Sep. Wet meadows, springs, fens and boggy areas; uncommon from c and e ND to n NE; (Newf. and Que. to N.W.Terr. and B.C., s to WV, IN, IA, NE, CO, UT and OR).

The segregation of *M. glomerata* from the much more common *M. racemosa* is supported by cytological and ecological evidence, as well as morphological evidence. The diploid *M. glomerata* is restricted to permanently wet habitats whereas the tetraploid *M. racemosa* occurs in a variety of upland as well as lowland habitats.





***Muhlenbergia glomerata* (from Hitchcock 1950).**

3. *Muhlenbergia mexicana* (L.) Trin. — Wirestem muhly

Perennial 2-8 dm tall from stout, scaly rhizomes; **culms** erect or sometimes decumbent at the base, often branching from the nodes; internodes dull and puberulent, especially toward the summit. **Leaves** flat, mostly 5-15 cm long, 2-6 mm wide; **sheaths** glabrous, the ligule entire to erose-ciliolate, 0.5-1 mm long. **Panicle** contracted, densely flowered and glomerulate or sometimes more loosely flowered and very slender, often interrupted, 3-12 cm long, 2-10 mm thick. **Spikelets** crowded, usually appressed in glomerules, green or purplish; **glumes** subequal, narrowly lanceolate, acuminate or short-awned, shorter than to equaling the floret, sometimes barely surpassing it, 2.5-4 mm long, the awns, if present, to 1.5 mm long; **lemma** lanceolate, acuminate or rarely short-awned, 2-3 mm long; **anthers** 0.3-0.5 mm long. **Grain** brown, narrowly ellipsoid, 1.5-2 mm long. Aug—Sep. Wet meadows, seepage areas, springs, fens and stream banks; occasional; (WI to Alta., s to IL, OK, NM and AZ). *M. foliosa* (R. & S.) Trin.





Muhlenbergia mexicana **(from Hitchcock 1950).**

4. *Muhlenbergia racemosa* (Trin.) Rydb. — Marsh muhly, green muhly

Similar to *M. glomerata* but often more robust, 3-10 dm tall; **culms** erect to decumbent, unbranched or more commonly branched from the middle nodes; internodes smooth and shiny, sometimes puberulent-roughened near the summit. **Leaves** flat, 3-17 cm long, 2-5 mm wide; **sheaths** glabrous, the ligule truncate, erose-ciliate, 0.6-1.5 mm long. **Panicle** contracted and often lobed, sometimes interrupted in the lower portion, 3-13 cm long, 3-12 mm thick. **Spikelets** crowded and appressed in oblong to obovoid glomerules, green or purplish; **glumes** subequal, subulate to an awned tip, the bodies 1.5-3 mm long, the awns 1.5-3.5 mm long, both glumes (including the awns) much surpassing the floret; **lemma** lanceolate, 2.5-3.8 mm long, tapered to a sharp or minutely awned tip, pilose on the lower 1/2 and on the callus; **anthers** 0.5-0.8 mm long. **Grain** brown, oblong, 1.5-2 mm long. Late Jul—Sep(Oct). Wet meadows, shores, stream banks and also in disturbed upland habitats, often where shady; common; (Ont. to Alta. and WA, s to IN, IL, MO, OK, NM and NV).





Muhlenbergia racemosa **(from Hitchcock 1950).**

5. *Muhlenbergia richardsonis* (Trin.) Rydb. — Mat muhly

Low, loosely tufted perennial from slender scaly rhizomes, (1)2-5 dm tall; **culms** slender, erect or decumbent at the base. **Leaves** usually involute, 1-5 cm long, 0.2-1 mm wide; **sheaths** glabrous, the ligule elongate, erose, 1-2 mm long. **Panicle** narrow, few-flowered, interrupted or continuous, spikelike, not glomerulate, 2-5(9) cm long. **Spikelets** uncrowded, green or grayish; **glumes** subequal, ovate to ovate-lanceolate, acute, 1/3 to 1/2 as long as the floret; **lemma** lanceolate, mucronate, 2-3 mm long; **anthers** 1-1.5 mm long. **Grain** dark brown, ellipsoid, 1.2-1.5 mm long. Mid Jul—Sep. Low prairie, wet meadows and seepage areas, often where alkaline or saline; common in ND and ne SD, otherwise scattered s; (N.B. and ME to Alta., s to MI, MN, NE, NM, AZ and Baja CA).



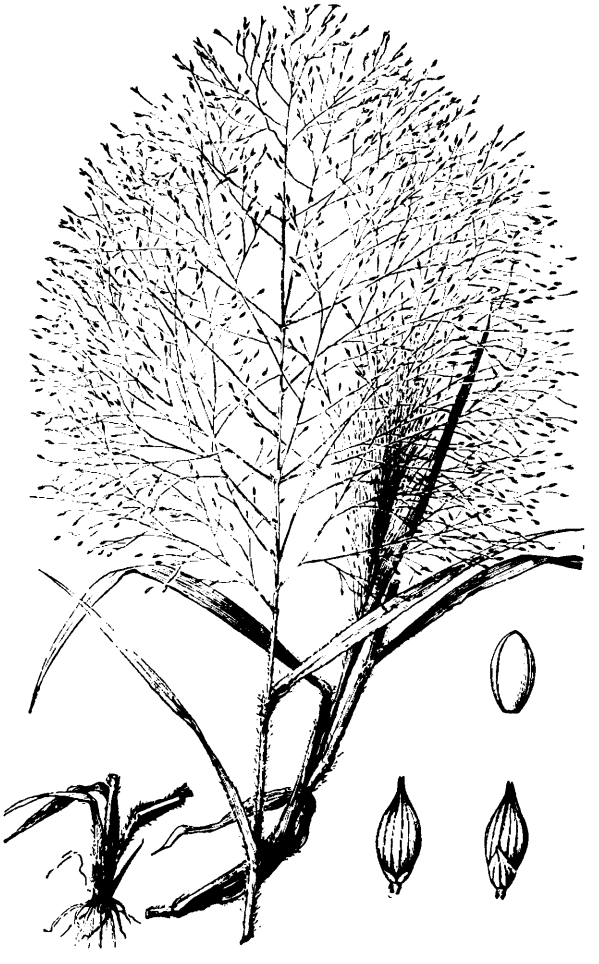


Muhlenbergia richardsonis **(from Hitchcock 1950).**

1. *Panicum capillare* L. — Common witchgrass

Weedy, tufted annual 1.5-5(7) dm tall, often purplish at the base and in the panicle; **culms** erect to decumbent and spreading, sometimes sparingly branched below. **Leaf blades** (2)5-16(27) mm wide, hispid on both surfaces or sometimes mainly on the margins toward the base; **sheaths** prominently papillose-hispid; **ligules** a fringe of hairs from a membranous base, 0.5-2.2 mm long. **Inflorescence** an open, diffuse panicle obovoid to oblong in outline, usually purplish, mostly 0.9-3 dm long (secondary panicles from axils often smaller when present), eventually breaking off the plant to tumble in the wind, the branches and pedicels widely spreading or the lower ones crowded and partly included in the upper leaf sheath, strongly scabrous. **Spikelets** containing one terminal fertile floret and one sterile floret, disarticulating below the glumes, lanceolate-acuminate in shape; **glumes** very unequal, the first glume broadly ovate, acute to acuminate, 1-2 mm long, 3- to 5-nerved, sometimes scabrous on the midvein, the second glume ovate-lanceolate, acuminate, 2.5-3.5(4) mm long, 5- to 7-nerved, glabrous or scabrous on the nerves; **sterile lemma** very similar to the second glume but often a little shorter, lacking a palea; **fertile lemma** hardened and shiny, elliptic-ovate, 1.5-1.9 mm long, 5- to 7-nerved; **palea** also hardened, its margins enclosed by the inrolled margins of the lemma; **anthers** 0.7-1.1 mm long. **Grain** retained inside the fertile floret. Jul—Sep(Oct). Shores, stream banks, and a variety of disturbed habitats, including roadsides and cropland; very common; (Que. to B.C., s throughout the U.S.; also Bermuda).





Panicum capillare **(from Hitchcock 1950).**

P. capillare is a prime example of an opportunistic weed that ventures into wetland habitats only during drawdown. Otherwise, it is better known as an upland weed.

Fall panicum, *P. dichotomiflorum* Michx., is another weedy annual of moist, disturbed habitats that can sometimes be found on stream banks, alluvial bars, shores and in wet ditches from e SD to e and c NE. It differs from *P. capillare* in its more robust habit and essentially glabrous foliage, among other characters.

Switchgrass, *P. virgatum* L., is a well known, dominant tallgrass prairie species that often occupies the mesic zone around basins and bordering streams. It differs from *P. capillare* in its taller stature and perennial, rhizomatous habit.

Among annual weeds of the *Panicum* tribe (Paniceae), the foxtails or pigeongrasses, *Setaria* spp., sometimes invade previously flooded substrates. Like panicums, these have 2-flowered spikelets that disarticulate below the glumes, with the lower floret empty or staminate and the upper one fertile and hardened. The spikelets are borne in distinctive bristly panicles that are condensed, cylindric and spikelike. Most often encountered in drawdown zones is *S. glauca* (L.) Beauv., yellow foxtail, with yellow-green spikelets 2.5-3.5 mm long, the second glume only 1/2 the spikelet length and sheaths with glabrous margins. *S. viridis* (L.) Beauv., green foxtail, is much less frequent in wetlands. It has green spikelets mostly less than 2.5 mm long, the second glume as long or nearly as long as the spikelet and sheaths with the upper margins ciliate.

1. *Phalaris arundinacea* L. — Reed canarygrass

Tall, stout, rhizomatous perennial 6-16 dm tall, often densely colonial. **Leaf blades** not surpassing the panicle, flat, 6-16(20) mm wide, glabrous; **sheaths** glabrous, sometimes purplish; **ligule** scarious, rounded or lacerate, 3-8 mm long. **Panicle** contracted and narrow, dense or interrupted, 6-18 cm long, the spikelets in dense lobelike clusters on short ascending branches. **Spikelets** 3.5-5 mm long, disarticulating above the glumes; **glumes** subequal, exceeding the fertile floret, ovate-lanceolate, acute to mucronate, whitish-green or purplish and turning stramineous with age, conspicuously 3-nerved; **fertile lemma** ovate, acute, slightly keeled, 2.5-3.5 mm long, firm and shiny, villous mainly on the margins, faintly 5-nerved; palea as long as the lemma; **anthers** 1.8-3.4 mm long; **sterile florets** 2, scalelike and villous, appressed against the base of the fertile one, 1-1.5 mm long. **Grain** brown to dark brown, ovoid, 1.5-2 mm long. Jun—Jul. Wet meadows, shallow marshes, wet ditches, shores and stream banks; common, especially in the e; (Circumboreal, in N.Amer. from Newf. to AK, s to NC, MO, OK, NM, AZ and CA).



Phalaris arundinacea **from Hitchcock 1950).**

1. *Phleum pratense* L. — Timothy

Tufted or single-stemmed perennial (4)5-10 dm tall; **culms** erect, smooth, purple or brown-banded at the nodes, bulbous at the base. **Leaf blades** flat, 2-8 mm wide, glabrous or scabrous; **sheaths** glabrous; **ligules** membranous, 1-4(5) mm long. **Inflorescence** a very condensed, cylindric, spikelike panicle 2-15 cm long, 5-8 mm thick, the branches and pedicels very short, crowded and hidden by the spikelets. **Spikelets** 1-flowered, compressed and U-shaped, crowded and uniformly appressed to spreading in the panicle, green or often purple-tipped, turning dull brown in age, disarticulating below the glumes; **glumes** essentially opposite and equal, strongly compressed and keeled, strongly 3-nerved in the green keeled portion, ciliate on the keel, otherwise membranous and glabrous to puberulent, the body 1.8-3 mm long, rounded to truncate above, the nerves extended into a stout, scabrous awn 0.5-2 mm long; **lemma** broadly ovate, 1.5-2(2.4) mm long, membranous, glabrous or appressed-puberulent, 5-nerved, the midvein often prolonged into a very short awn; **palea** membranous, somewhat shorter than the lemma, the 2 nerves sometimes prolonged as very short awns; **anthers** 1.5-2 mm long. **Grain** dull brown, plump, obovoid, 1.2-1.5 mm long. Jun—Aug. Wet meadows, low prairie, stream banks, ditches and more upland habitats; a common introduced hay and forage grass now widely established; (Intro. from Europe, naturalized from Newf. to AK, s throughout most of the U.S.).

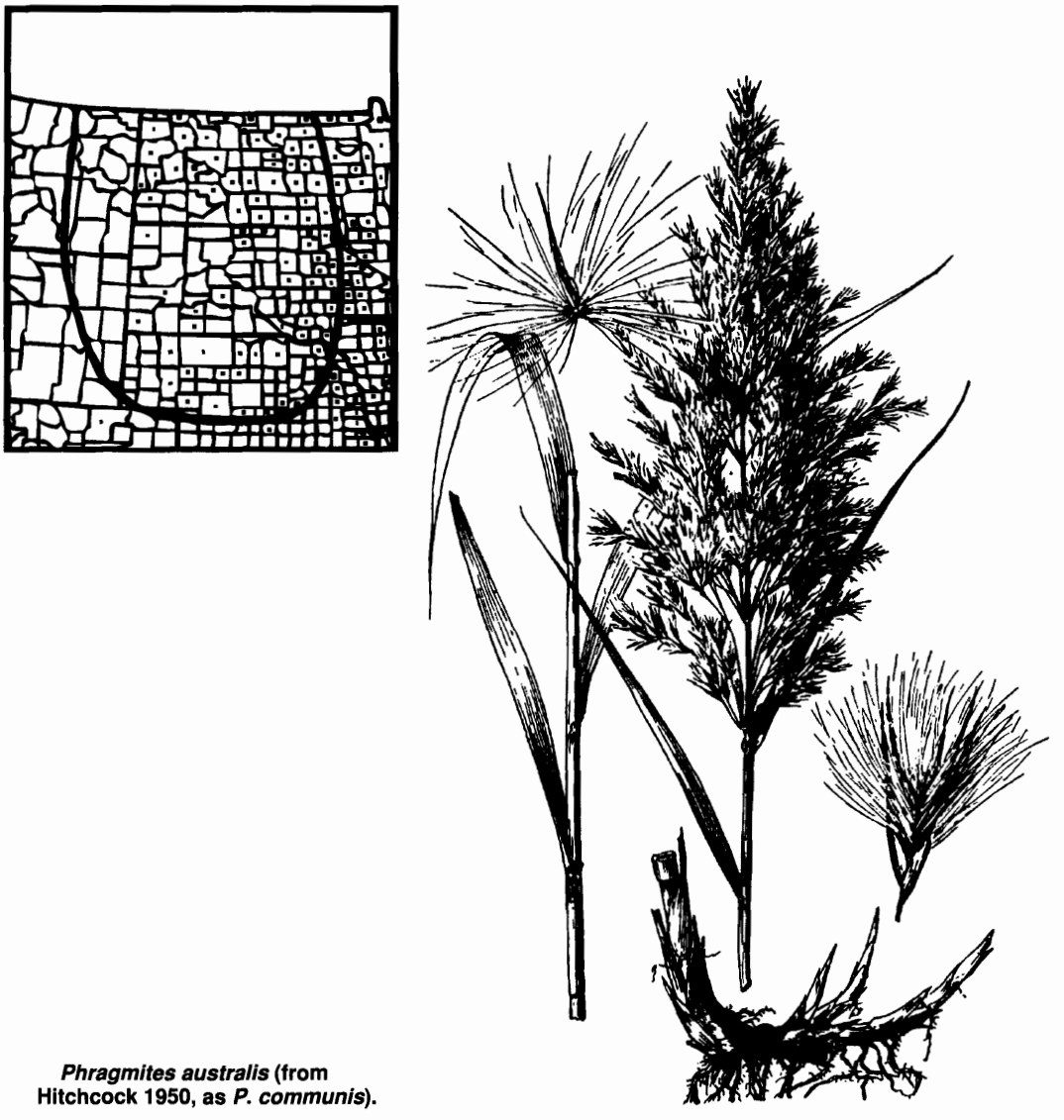




Phleum pratense **(from Hitchcock 1950).**

1. *Phragmites australis* (Cav.) Trin. ex. Steud. — Common reed

Tall, stout reeds 2-4 m tall, extensively colonial from usually deep-seated, scaly rhizomes, these sometimes acting as stolons and creeping over the substrate during drawdown; **culm** hollow, 5-15 mm thick toward the base, the internodes often purplish. **Leaves** broad, 1-3 cm wide; **sheaths** open, mostly overlapping, the ligule white-hyaline, fibrillose, 1 mm long. **Panicle** plumelike, rather densely flowered, purple and turning tawny with age, 15-40 cm long, the branches ascending to curved. **Spikelets** several-flowered, 10-15 mm long, disarticulating above the glumes, the florets decreasing in size upward, the rachilla covered with long silky hairs, these exceeding the florets, exposed after anthesis; **glumes** 3-nerved (the second rarely 5-nerved), unequal, the first glume ca. 1/2 the length of the second; **lemmas** long-acuminate, glabrous, 3-nerved; **palea** much shorter than the lemma, membranous, nerved along the margins. **Grain** seldom produced, dark brown, ellipsoid, 1.2-1.5 mm long. Jul—Sep. Fresh to saline marshes, shores, streams, ditches and seepage areas, in wet ground or shallow water; common, often abundant; (Nearly cosmopolitan). *P. communis* Trin.



Phragmites australis **(from Hitchcock 1950, as *P. communis*).**

23. *Poa* L. — Bluegrass

Tufted or rhizomatous perennials (those included here) of short to moderate stature, green or glaucous; **culms** erect to decumbent, hollow, sometimes compressed. **Leaves** mostly near the base, the blades flat to folded, the margins and midrib converging to a blunt, keeled leaf tip resembling the prow of a boat; **sheaths** partly closed, rounded or keeled; **ligules** membranous. **Inflorescence** an open to narrowly contracted panicle of small, mostly 2- to 8-flowered spikelets. **Spikelets** disarticulating above the glumes and between the florets; **glumes** subequal or the second a little longer than the first, acute; first glume 1- to 3-nerved; second glume 3-nerved; **lemmas** acute to blunt-tipped, reduced in size upward in the spikelet, faintly 5-nerved or appearing 3-nerved, with the intermediate nerves very obscure or obsolete, keeled or rounded on the back, often with a tuft of cobwebby hairs at the base, this sometimes scant, otherwise glabrous, scabrous or pubescent mainly on the nerves, sometimes pubescent or scabrous between the nerves as well; **palea** nearly as long as the lemma.

1 Culms strongly compressed, 2-edged; sheaths keeled ..... 2. *P. compressa*

1 Culms round to slightly compressed, not 2-edged; sheaths rounded.

2 Lemmas with a tuft of cobwebby hairs at the base, this sometimes scant; foliage green.

3 Plants tufted, sometimes stoloniferous, lacking rhizomes; panicle diffuse and open (contracted when young), mostly 8-30 cm long.

4 Lemmas pubescent on the keel and on the marginal nerves toward the base, the intermediate nerves very faint to obsolete .... 3. *P. palustris*

4 Lemmas pubescent on the keel only, not on the marginal nerves, the intermediate nerves prominent ..... 5. *P. trivialis*

3 Plants extensively rhizomatous; panicle more compact, mostly 3-13 cm long ..... 4. *P. pratensis*

2 Lemmas lacking a tuft of cobwebby hairs at the base, pubescent only on the keel and lateral nerves and sometimes between the nerves on the lower back; foliage glaucous ..... 1. *P. arida*

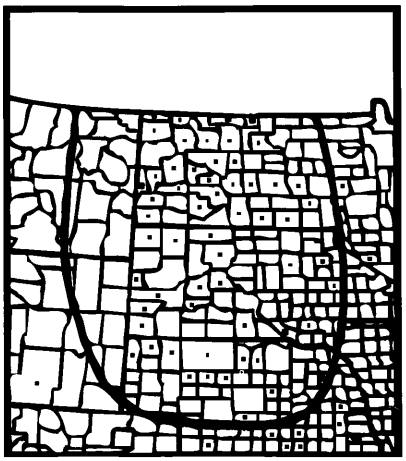
1. *Poa arida* Vasey — Plains bluegrass

Glaucous perennial 3-8 dm tall, with short to long rhizomes, the culms arising singly or tufted, erect, terete or somewhat flattened but not 2-edged, smooth. **Leaf blades** flat or involute-folded, 1-4 mm wide; **sheaths** glabrous, not keeled, closed only near the base; **ligules** 2-5 mm long, acute. **Panicles** usually contracted, sometimes rather open with the branches spreading-ascending, 2.5-15 cm long. **Spikelets** 3- to 9-flowered, often attractively tricolored owing to the glaucous glumes and the purple sides and whitish or bronzed tips of the lemmas, pale with age, 4-9 mm long, 1.5-3.5 mm wide; **glumes** ovate to ovate-lanceolate, obtuse to rounded at the tip, glabrous or scaberulous on the midnerve, somewhat unequal, the first glume 2.3-3.6 mm long, 1- to 3-nerved, the second glume 2.8-4.2 mm long, 3-nerved; **lemmas** 2.3-4 mm long, weakly keeled to rounded on the back, obtuse to rounded and somewhat erose at the tip, villous on the mid- and lateral nerves, pubescent between the nerves on the lower back, lacking cobwebby hairs at the base; **anthers** 1.2-2 mm long. **Grain** brown, obovoid, ca. 1 mm long. Jun—Aug. Alkaline wet meadows, shores and seepage areas, often abundant in such places, also drier upland sites; common in the c and w parts, less so in the e part; (Man. to B.C., s to IA, TX, NM and UT).

Three similar species of *Poa* are occasionally found in wet or moist, often alkaline habitats mainly in w part of our region. These share the glaucous coloration, narrow panicles and weakly keeled to rounded lemmas of *P. arida* and can thus be confused with it.

Most similar to *P. arida* is *P. glaucifolia* Scribn. & Williams, and like *P. arida*, *P. glaucifolia* is rhizomatous. The latter differs in its longer, more slender and more pointed lemmas mostly 3.5-5 mm long, usually less than 1/5 as wide in side view. The lemmas of *P. arida* are usually shorter and usually more than 1/5 as wide as long in side view.

P. juncifolia Scribn. and *P. canbyi* (Scribn.) Piper both differ from the above in their tufted, generally nonrhizomatous habits. (*P. juncifolia* sometimes has very short rhizomes.) *P. juncifolia* is distinguished by its glabrous to scabrous lemmas, not having the pubescence on the nerves and lower back like *P. arida* and *P. glaucifolia*. *P. canbyi* is strictly tufted with lemmas that are short-pubescent or strigose on the back, especially toward the base. A recent study by E. A. Kellogg (1985. Variation and names in the *Poa secunda* complex. J. Range Management 38:516-521.) suggests that *P. juncifolia* and *P. canbyi* are merely variants of *P. secunda* Presl (formerly *P. sandbergii* Vasey) and should be included under that name.



2. *Poa compressa* L. — Canada bluegrass

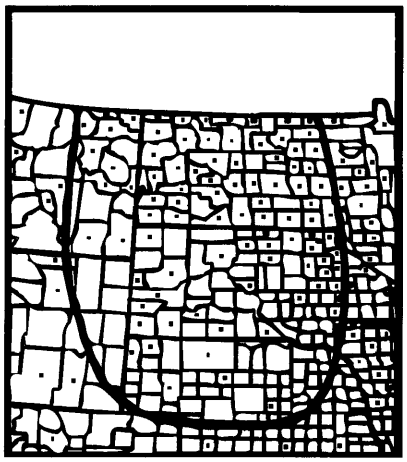
Strongly rhizomatous, glaucous perennial 1.5-6(8) dm tall; **culms** erect to decumbent, wiry, compressed and sharply 2-edged. **Leaf blades** flat to folded, 1-3.5(4.5) mm wide; **sheaths** compressed, strongly keeled, closed only near the base; **ligules** mostly 0.5-2 mm long, truncate. **Panicles** usually narrow and contracted with short branches, sometimes more open with the branches spreading, 1-10 cm long, the lowest branches usually 2 in number. **Spikelets** 2- to 6(7)-flowered, compressed, 2.8-5.5 mm long, 0.8-2 mm wide; **glumes** broadly lanceolate, subequal, keeled, the first glume 1.2-2.8 mm long, 1- to 3-nerved, the second glume 1.5-3.1 mm long, 3-nerved; **lemmas** (1.6)2-3 mm long, strongly keeled, usually purple-banded and bronzed at the tip, glabrous on the back or pubescent on the keel and marginal nerves, sometimes with a tuft of cobwebby hairs at the base; **anthers** 1-1.7 mm long. **Grain** brown, ellipsoid, 1-1.5 mm long. Jun—Aug. Shores, stream banks and meadows, also moist to dry prairie, woodland and disturbed areas, often in poor soils; common; (Intro. from Europe, naturalized from Newf. to AK, s throughout most of the U.S.).

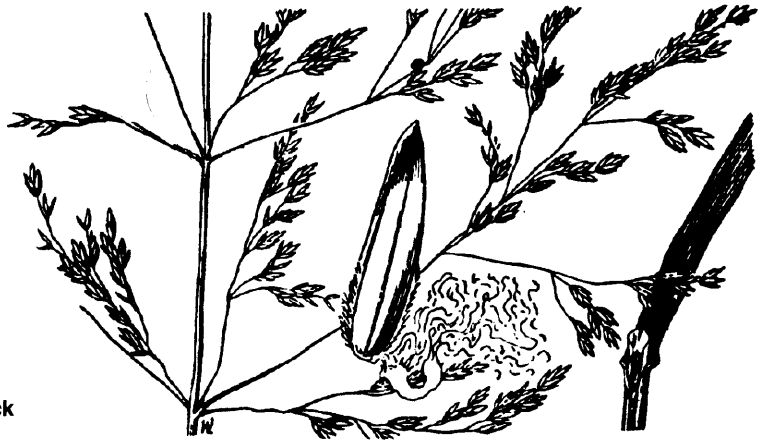


3. *Poa palustris* L. — Fowl bluegrass

Loosely tufted perennial 4-11 dm tall; **culms** terete, usually curved and decumbent at the base, producing roots from lower nodes and thus stolonous (simulating a short-rhizomatous base), usually purplish toward the base. **Leaf blades** ascending to spreading, rather lax, flat, 0.5-5 mm wide, scabrous; **sheaths** glabrous, rounded to slightly keeled, closed near the base; **ligules** mostly 1.6-5 mm long, rounded or lacerate. **Panicle** diffuse and loosely spreading (contracted when young and emerging from the sheath), 8-30 cm long. **Spikelets** 2- to 4-flowered, 2-5 mm long, 1.5-2 mm wide; **glumes** subequal, often purplish, lanceolate, acute, scabrous on the keel, the first glume 1.5-3 mm long, 1- to 3-nerved, the second glume 2-3.1 mm long, 3-nerved; **lemmas** 2-3 mm long, subacute, often purplish on the sides, bronzed at the tip, pubescent on the marginal nerves and keel toward the base, also bearing a tuft of cobwebby hairs at the base, this sometimes scant, the intermediate nerves very faint to obsolete so that the lemma appears 3-nerved; **anthers** 0.8-1.2 mm long. **Grain** brown, fusiform to narrowly ellipsoid, ca. 1 mm long. Jun—early Sep. Wet meadows, marshes, shores, stream banks, ditches and low prairie, also moist woods and hillsides; common in the n part, less so s; (Newf. and Que. to AK, s to VA, MO, NE, NM and CA; also Eurasia).

Inland bluegrass, *Poa interior* Rydb., is sometimes encountered on stream banks and in other moist to fairly dry habitats. It is similar to *P. palustris* except for its smaller stature and densely tufted nature. It can be distinguished from *P. palustris* by its smaller panicles, 5-15 cm long, and the shorter ligules, mostly less than 1.6 mm long.





Poa palustris **(from Hitchcock 1950).**

4. *Poa pratensis* L. — Kentucky bluegrass

Strongly rhizomatous, sod-forming perennial (2)3-8(12) dm tall, the foliage green or slightly glaucous; **culms** erect, terete to slightly flattened, not 2-edged. **Leaf blades** flat to involute-folded, 0.5-4 mm wide, glabrous or seldom lightly pubescent on the upper surface, often slightly scabrous on the margins; **sheaths** glabrous, rounded to slightly keeled, closed in the lower 1/2; **ligules** 0.5-1.5(2) mm long, truncate. **Panicles** usually open, often pyramidal, 3-13 cm long, the branches spreading to ascending, usually numbering 4-5 at the lowest node, the spikelets crowded on the branches so that the panicle is somewhat condensed. **Spikelets** 2- to 6-flowered, green or purplish, compressed, 3-5 mm long, 1.5-3 mm wide; **glumes** ovate-lanceolate to lanceolate, scabrous on the keel, mostly unequal, the first glume 1.8-3 mm long, 1- to 3-nerved, acute, the second glume 2.2-3.8 mm long, 3-nerved, acuminate; **lemmas** 2-3.8 mm long, strongly keeled, acute, sericeous on the keel and marginal nerves toward the base, also with a prominent tuft of cobwebby hairs at the base, glabrous or scabrous above on the keel, often marked with purple on the sides or margins, white or lightly bronzed at the tip, the intermediate nerves usually evident; **anthers** 1-1.8 mm long. **Grain** brown, ellipsoid, ca. 1.5 mm long, the lemma and palea adherent to it. May—Aug. Wet meadows, shores, stream banks and a great variety of moist to dry habitats, ubiquitous and often abundant, introduced for lawns and pastures but possibly native as well; (Eurasia, most of Canada and the U.S.).

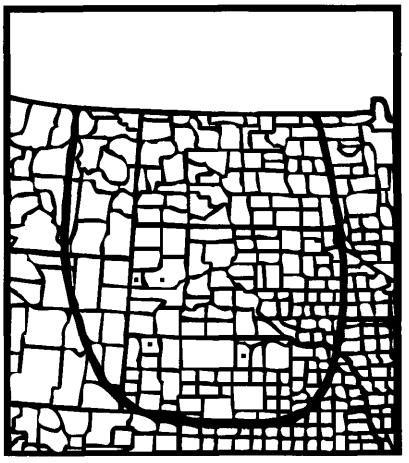




Poa pratensis **(from Hitchcock 1950).**

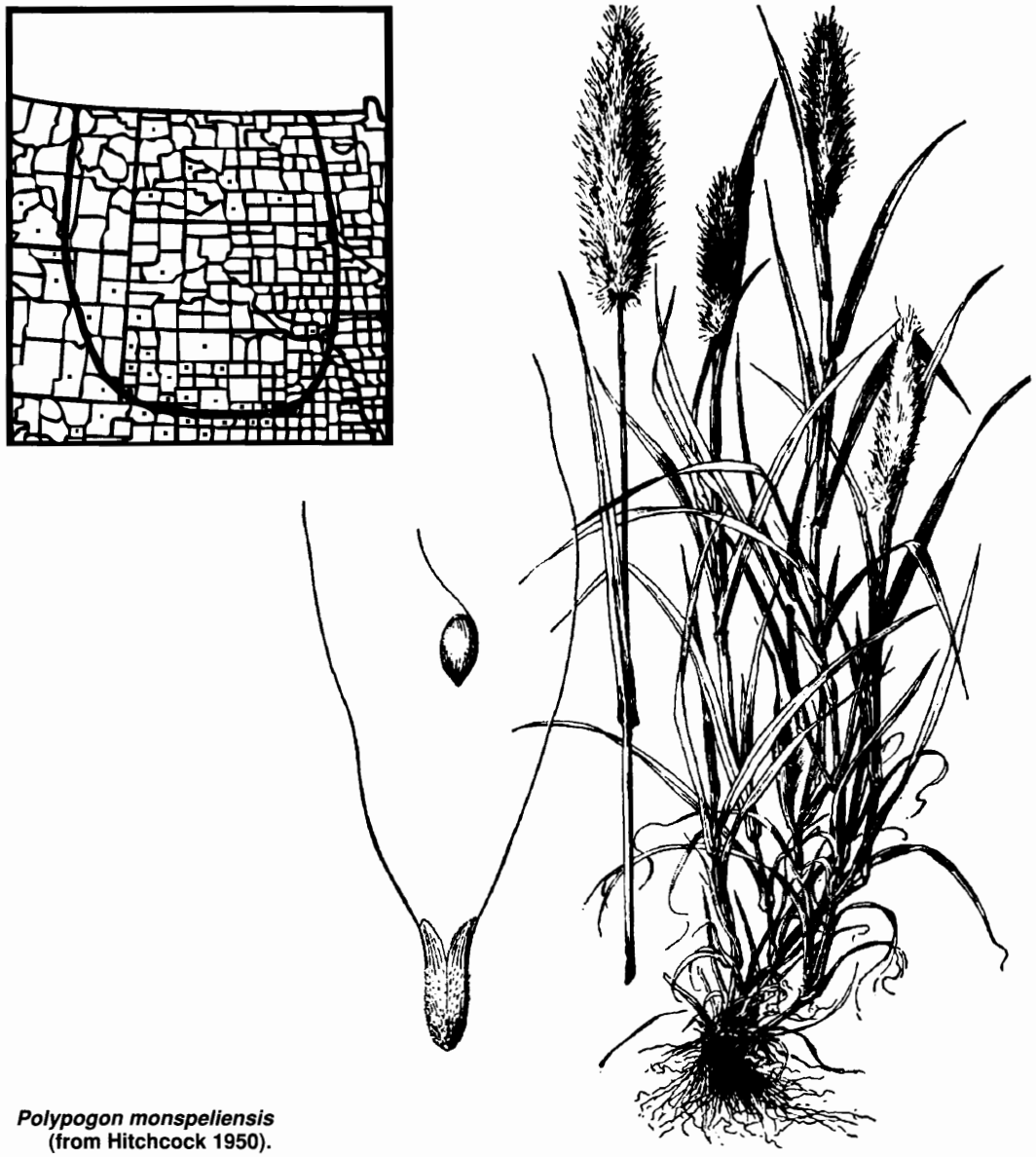
5. *Poa trivialis* L. — Rough bluegrass

Very similar to *P. palustris*, differing mainly as follows: **Leaves** and **sheaths** usually more scabrous. **Spikelets** 2- to 3-flowered, 3-4 mm long; **glumes** unequal, narrow and curved, acute to acuminate, the first glume 1.5-2.3 mm long, 1-nerved; second glume 2-3 mm long, 3-nerved; **lemmas** usually green with whitish tip and margins, sometimes marked with purple and slightly bronzed at the tip, pubescent on the keel only, not on the marginal nerves, the intermediate nerves prominent so that the lemma is plainly 5-nerved. Jun—Jul. In wet soil or shallow water around springs or along spring- fed streams, also to be expected in moist, shaded places; uncommon but locally abundant at scattered locations in the n Black Hills and n NE; (Intro. from Europe and now naturalized over much of e and w N. Amer., probably on the increase in our region).



1. *Polypogon monspeliensis* (L.) Desf. — Rabbitfoot beardgrass

Tufted annual 1-5(8) dm tall; **culms** erect or decumbent at the base. **Leaves** flat, 3-7 mm wide, scaberulous; **sheaths** glabrous, the ligule membranous, elongate, 2-7 mm long. **Panicle** ovoid-cylindric to cylindric, rather dense and spikelike, (1)3-8(15) cm long. **Spikelets** 1-flowered, 2 mm long (excluding awns of the glumes), tawny at maturity, disarticulating below the glumes; **glumes** equal, awned from the 2-lobed apex, hispidulous, 1-nerved, the awn 4-8 mm long; **lemma** much smaller than the glumes, 0.7-1 mm long, scarious, translucent and shiny, 1-nerved, erose at the apex, with a fragile awn about as long as or longer than the lemma body; **palea** about as long as the lemma and of the same texture. **Grain** golden-brown, ellipsoid, slightly smaller than the lemma, often retained inside the lemma and palea when shed. Jul—Sep. Wet sand or mud of stream banks, shores and around springs; occasional mainly in the w and s parts of our region; (Intro. from Europe, ranging from N.B. to AK, s to GA, OK, TX and CA; also C. and S.Amer.).



Polypogon monspeliensis **(from Hitchcock 1950).**

25. ***Puccinellia*** Parl. — Alkaligrass

Tufted perennials with flat to involute, mostly basal, pale green leaves and ultimately open panicles, the panicle branches ascending, spreading or reflexed with age, scabrous. **Spikelets** few- to several-flowered, elliptic to linear, subterete, disarticulating above the glumes and between the florets; **glumes** unequal, acute or obtuse, scarious at the tip, the first 1-nerved, the second 3-nerved; **lemmas** rounded on the back, acute to obtuse or truncate, scarious and often erose at the tip, often puberulent at the base, faintly 5-nerved; **palea** about as long as the lemma or shorter, its margins somewhat clasping the grain. **Grain** brown, ellipsoid or narrowly so, 1-1.5 mm long, tomentose at the tip.

References:
Church, G. L. 1949. A cyto-taxonomic study of *Glyceria* and *Puccinellia*. Amer. J. Bot. 36:155-165.
Fernald, M. L. and G. A. Weatherby. 1916. The genus *Puccinellia* in eastern North America. Rhodora 18:1-23.

1 Lemmas rounded to truncate, not narrowed at the apex, 1.6-2 mm long; panicle branches reflexed at maturity ..... 2. *P. distans*

1 Lemmas acute to obtuse or rounded, narrowed at the apex, 1.8-3.2 mm long; panicle branches usually ascending to spreading.

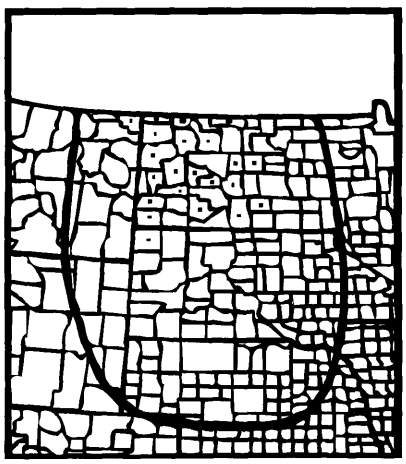
2 Anthers 1.2-1.8 mm long; second glume (1)1.5-2.5 mm long; lemmas 2-3.2 mm long ..... 1. *P. cusickii*

2 Anthers 0.4-1 mm long; second glume 1-2 mm long; lemmas 1.8-2.5(3) mm long ..... 3. *P. nuttalliana*

1. *Puccinellia cusickii* Weatherby — Cusick's alkaligrass

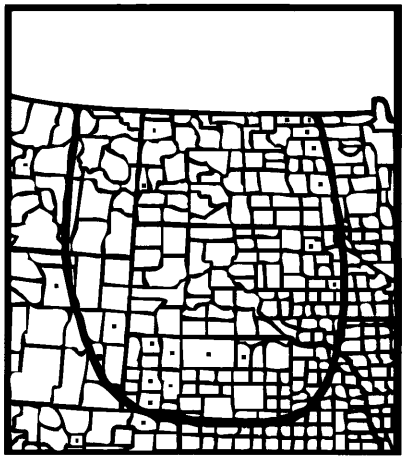
Culms 3-9 dm tall; **leaves** flat or more commonly involute, 1.5-4 mm wide, glabrous; **ligule** scarious, rounded to subacute, 1.5-3 mm long. **Panicle** oblong to pyramidal, 7-30 cm long, the branches ascending to spreading, the lower ones sometimes reflexed. **Spikelets** 3- to 7-flowered, purplish or green, turning purplish-brown with age, 3-7(9) mm long; **glumes** acute to obtuse, often erose, the first 0.5-1.8 mm long, the second (1)1.5-2.5 mm long; **lemmas** narrowed to an acute or obtuse tip, usually erose, 2-3.2 mm long; **anthers** 1.2-1.8 mm long. Jun—Jul. Wet saline or alkaline meadows, shores, stream banks, ditches, flats and seepage areas; frequent in c and w ND, e MT and nw SD; (Man. to Alta., s to SD, WY, ID and e OR).

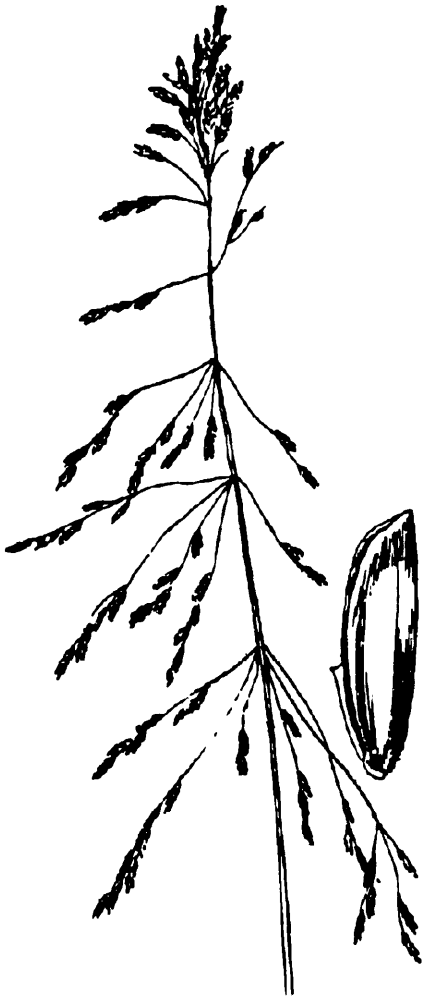
This species has been considered a large-anthered phase of *P. nuttalliana* by some authors.



2. *Puccinellia distans* (L.) Parl. — Weeping alkaligrass

Culms 1-5 dm tall; **leaves** flat to slightly involute, 1-3 mm wide, glabrous; **ligule** white-hyaline, rounded, 0.5-1 mm long. **Panicle** pyramidal, 5-15 cm long, the branches (at least the lower ones) reflexed at maturity. **Spikelets** 3- to 7-flowered, 3-6 mm long; **first glume** acute, 0.5-1.5 mm long, the **second glume** obtuse to rounded, erose; **lemmas** rounded to truncate, erose, not narrowed at the apex, 1.6-2 mm long; **anthers** 0.5-0.8 mm long. Late Jun—Aug. Springs, shores, ditches and wet disturbed places, not necessarily where alkaline or saline; uncommon, from scattered locations, probably increasing; (Intro. from Eurasia, in N.Amer. along the Atlantic coast from N.B. to DE and inland to the Great Lakes region and to the e base of the Rocky Mts.; also Yuk. and n B.C., s to CA).





Puccinellia distans **(from Hitchcock 1950).**

3. *Puccinellia nuttalliana* (Schult.) Hitchc. — Nuttall's alkaligrass

Very similar to *P. cusickii*, differing mainly as follows: **Spikelets** purplish or green and becoming stramineous or purplish-brown at maturity; **second glume** 1-2 mm long; **lemmas** 1.8-2.5(3) mm long; **anthers** 0.4-1 mm long. Jun—Jul. Same habitats as *P. cusickii*; common from ND and MT, s to n and w SD and WY; (WI to B.C., s to KS, NM, n Mex. and CA). *P. airoides* (Nutt.) Wats. & Coult.



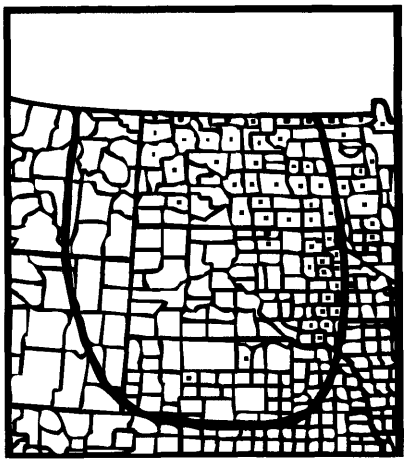


Puccinellia nuttalliana **from Hitchcock 1950, as *P. airoides*).**

1. *Scolochloa festucacea* (Willd.) Link — Whitetop, sprangletop

Tall rhizomatous perennial, often extensively colonial, 8-15 dm tall; **culms** stout, hollow, 3-5 mm thick near the base, usually with a few suckers and adventitious roots at the lower nodes. **Leaves** 3-10 mm wide, long-tapering to the sharp, slender tip, flat or involute along the margins, scabrous above, the sheaths glabrous; **ligule** white-hyaline, delicate, lacerate with age, 4-7 mm long. **Panicle** loose, open, 15-20 cm long, the branches ascending, bearing most of the spikelets above the middle of the panicle. **Spikelets** 3- to 4-flowered, purplish or green, turning stramineous with age, 7-10 mm long, disarticulating above the glumes and between the lemmas, the rachilla extended beyond the last floret; **glumes** unequal, lanceolate, acute or lacerate at the tip, the first glume 3-nerved, 4-7 mm long, the second glume 5-nerved, 6-9 mm long; **lemmas** lanceolate, acute or lacerate at the tip, the lower one or two 5-7 mm long, the upper ones smaller, firm, 7-nerved; palea as long as the lemma, firm, finely ciliate along the marginal nerves. **Grain** brown, white-pubescent at the tip, oblong to ellipsoid, furrowed on the upper side, 2-2.5 mm long. Jun—Jul. Usually in shallow water of fresh to brackish marshes, lakes and ponds; common and often abundant from ND and ne MT to e SD, also local in the Sand Hills; (Man. to B.C., s to n IA, NE and e OR; also n Eurasia). *Fluminea festucacea* (Willd.) Hitchc.

This grass is one of few emergent species which can provide a valuable forage for cattle. During dry periods, whitetop is sometimes mowed for hay. Under grazing pressure, *Scolochloa* disappears and is often replaced by undesirable bulrushes.





Scolochloa festucacea **(from Hitchcock 1950).**

27. *Spartina* Schreb. — Cordgrass

Coarse perennials spreading by long scaly rhizomes; **culms** stout and erect, tough. **Leaves** flat to involute, tough, scabrous; **sheaths** glabrous; **ligule** comprised of hairs. **Inflorescence** of several to many 1-sided spikes arranged in a terminal raceme, the spikes ascending to appressed; **spikelets** 1-flowered, strongly compressed and overlapping in 2 rows on one side of the rachis, disarticulating below the glumes; **glumes** unequal, flattened, hispid or scabrous on the keel, the first glume linear, shorter than the lemma, 1-nerved, the second glume narrowly lanceolate, exceeding the lemma, 1- or 2-nerved along the keel; **lemma** flattened, lanceolate, weakly hispid or scabrous on the keel, with one strong midvein and 2 obscure lateral ones; **palea** flattened, often slightly longer than the lemma, very obscurely 2-nerved. **Grain** golden brown, narrowly oblong and compressed, 4-6 mm long.

1 Second glume acute to mucronate; leaves usually involute, 2-5 mm wide when flattened; plants mostly 3-8 dm tall ..... 1. *S. gracilis*

1 Second glume awned, the awn 2-10 mm long; leaves flat to involute, 3-13 mm wide when flattened; plants mostly 7-18 dm tall ..... 2. *S. pectinata*

1. *Spartina gracilis* Trin. — Alkali cordgrass

Plants mostly 3-8 dm tall; **leaves** usually involute, 2-5 mm wide when flattened. **Inflorescence** of 3-8, 1-sided spikes, the spikes appressed in the raceme, 2-6 cm long. **Spikelets** 7-9 mm long; **glumes** hispid on the keel, the first glume ca. 1/2 as long as the second, acuminate, the second glume acute to mucronate; **lemma** nearly as long as the second glume, 6-8 mm long. Jul—Sep. Wet meadows, shores, flats and seepage areas, often where alkaline or saline; frequent; (c Man. to B.C., s to KS, NM, AZ and CA).



2. *Spartina pectinata* Link — Prairie cordgrass

More robust than the preceding, plants mostly 7-18 dm tall; **leaves** flat to involute, 3-13 mm wide when flattened. **Inflorescence** of 4-30, 1-sided spikes, the spikes ascending or appressed, 3-10 cm long. **Spikelets** 8-11 mm long (excluding the awn of the second glume); **glumes** strongly scabrous on the keel, the first glume shorter than to equaling the lemma, acuminate or with an awn 1-5 mm long, the second glume with an awn 2-10 mm long; **lemma** considerably shorter than the second glume, 7-9 mm long. Jul—Sep. Shallow marshes, wet meadows, ditches, low prairie and other wet or moist places, where water is fresh to brackish, very common, often abundant; (Newf. and Que. to Alta., e WA and OR, s to NC, AR, TX and NM).





Spartina pectinata **(from Hitchcock 1950).**

1. *Sphenopholis obtusata* (Michx.) Scribn. — Prairie wedgegrass

Tufted or sometimes solitary perennial 2-8 dm tall; **culms** slender, 0.5-1 mm thick. **Leaves** ascending to spreading, flat, scabrous, 1-7 mm wide; **sheaths** glabrous, or the basal ones puberulent; ligule white-hyaline, lacerate, 1-4 mm long. **Panicle** dense, contracted and spikelike, often interrupted, (1.5)5-12 cm long. **Spikelets** 2-flowered, 2.5-3.5 mm long, disarticulating below the glumes; **glumes** 1.5-2.5 mm long, scabrous on the keel, the first glume linear, 1-nerved, the second glume much broader than the first, obovate, 3- to 5-nerved; **lemmas** acute, 2-3 mm long, scaberulous toward the apex on the keel, 1-nerved; **palea** exposed, linear, about as long as the lemma, scarious. **Grain** light brown, elongate, flattened, 1.5-2 mm long. Late Jun—Aug. Low prairie, wet meadows, shores, stream banks and moist woods; common in the e part, becoming uncommon w; (ME to B.C., s to FL, Mex. and CA; also the W.Indies).

Two varieties of *S. obtusata* occur in the region. Var. *obtusata*, has the panicle contracted and the second glume 2/3 to fully as wide as long. Var. *major* (Torr.) Erdman, also known by the name *S. intermedia* (Rydb.) Rydb., differs in having a more lax, loosely spreading panicle and the second glume 2/5 to 3/5 as wide as long. The former is more often encountered in wet places, whereas var. *major* is more typical of wooded habitats.

Reference:

Erdman, K. S. 1965. Taxonomy of the genus *Sphenopholis* (Gramineae). Iowa State Coll. J. Sci. 39:289-336.



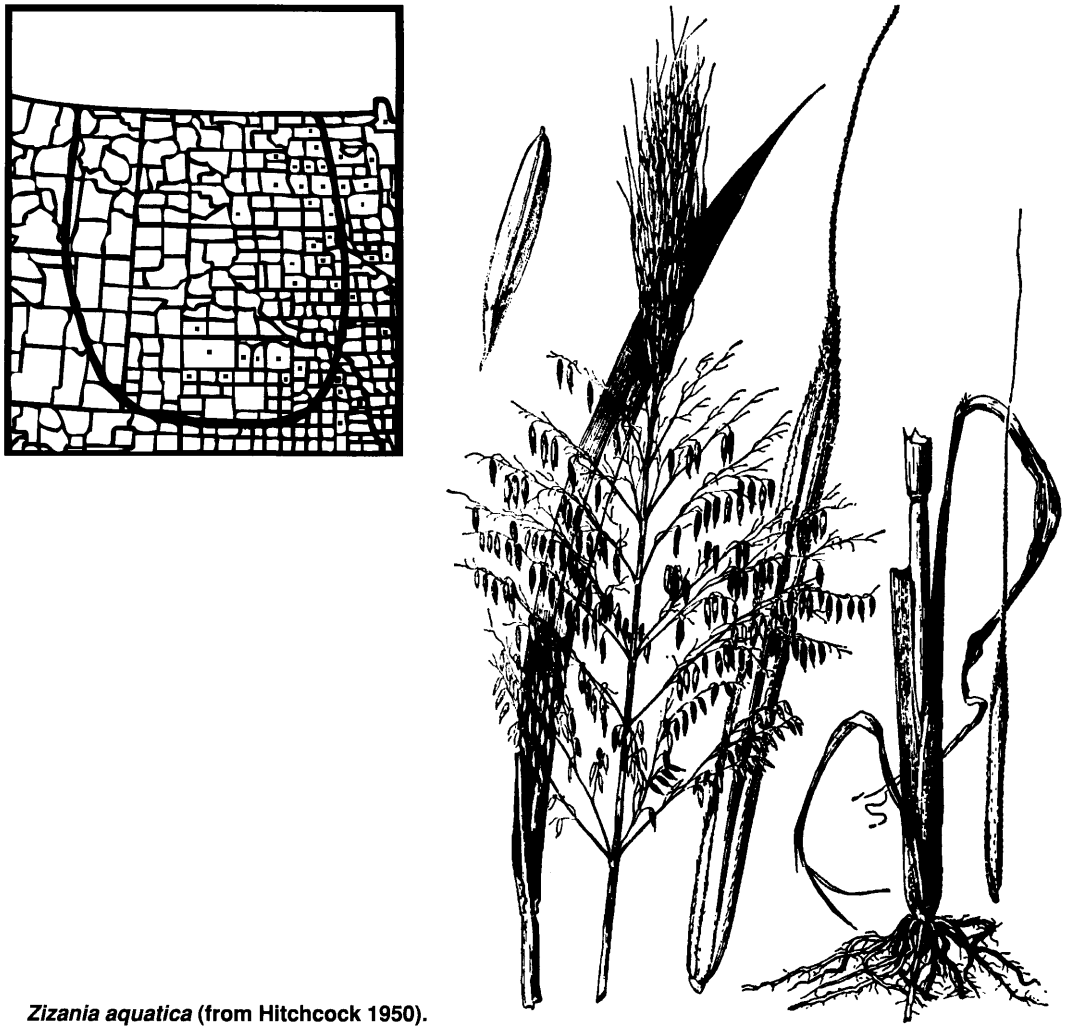


Sphenopholis obtusata **(from Hitchcock 1950).**

1. *Zizania aquatica* L. — Annual wildrice

Stout annual 5-20 dm tall, with rather fleshy yellowish-orange roots; **culms** solitary or few, robust. **Leaves** flat, 5-25 mm wide, smooth; **sheaths** puberulent at the collar, otherwise glabrous; **ligule** hyaline, striate, entire or lacerate, 5-15 mm long. **Panicle** elongate to pyramidal, 20-40 cm long, the lower staminate portion ultimately expanded, the upper pistillate portion remaining contracted. **Spikelets** unisexual, terete, the pistillate above the staminate in the panicle; **glumes** absent; **staminate florets** purple, 6-12 mm long, the lemmas linear, acuminate or short-awned, strongly 3-nerved, hispid, thin-textured; **pistillate florets** purplish or light green, the lemmas subulate, 10-14(20) mm long and tapering to a slender awn 2-4 cm long, 3-nerved, hispid, chartaceous; **palea** about as long as the lemma, 3-nerved. **Grain** dark brown to black, slender and elongate, about as long as the body of the lemma, early deciduous. Late Jul—early Sep. Shallow water or mud of streams, rivers, oxbow swamps and marshes, where water is fresh; occasional from e ND to e and n NE; (e Que. and N.S. to Man., s to FL, LA and NE).

This plant is the source of the commercial wildrice. In the northern Great Plains local populations are generally not large enough to serve this purpose, but wildrice harvesting is practiced in Minnesota where extensive areas in marshes and around lakes may be dominated by the plant. The grain is an excellent food for waterfowl.



Zizania aquatica **(from Hitchcock 1950).**

64. **Sparganiaceae**, the Burreed Family

1. ***Sparganium*** L. — Burreed

Perennial, reedlike marsh plants, colonial from rhizomes, typically emergent in shallow water. **Stems** simple, terete, stout, usually erect, clothed toward the base by the overlapping leaf bases. **Leaves** broad, long, linear, weakly sheathing, ascending and mostly overtopping the inflorescence. **Flowers** unisexual, the male and female flowers densely crowded in separate globose heads, the **staminate heads** few to many, sessile, borne above the pistillate heads in a simple or sparsely branched inflorescence, the **pistillate heads** 1-several, sessile or peduncled, axillary or supra-axillary in relation to the foliaceous bracts in the lower portion of the inflorescence; **perianth** (in both male and female flowers) of few to several chaffy, spatulate scales, these appressed to the achenes in the mature pistillate heads; **staminate flowers** of mostly 3-5 stamens; **pistillate flowers** each consisting of a simple or 2-carpellary pistil, stigmas 1 or 2. **Fruit** a beaked, nutletlike achene, sessile or short-stipitate in the head.

Reference:
Fernald, M. L. 1922. Notes on *Sparganium*. Rhodora 24:26-34.

1 Stigma 1; achenes fusiform, rounded on the sides; staminate heads usually 2-5.

2 Achene body (excluding stipe and beak) 3.5-5 mm long at maturity; achene beak (including stigma) 2-4.2 mm long; leaves mostly 3-5(7) mm wide; bracts usually not dilated at the base . . . . . 1. *S. chlorocarpum*

2 Achene body (excluding stipe and beak) 2-3.5 mm long at maturity; achene beak (including stigma) 2-3 mm long; leaves mostly (5)6-12 mm wide; bracts usually strongly dilated at the base, with broad, scarious margins . . . . . 2. *S. emersum*

1 Stigmas 2; achenes obconic to obpyramidal, angled on the sides; staminate heads many . . . . . 3. *S. eurycarpum*

1. *Sparganium chlorocarpum* Rydb. — Greenfruit burreed

Erect or sometimes lax and trailing in the water, at least the upper leaves and inflorescence emergent, 1-6 dm tall (to 10 dm or more long when deeply submersed). **Leaves** yellow-green, flat to keeled, mostly 3-5(7) mm wide, often scarious-margined toward the base but not strongly dilated. **Inflorescence** 1-2 dm long, unbranched, one or more of the lower pistillate heads usually peduncled, at least one supra-axillary; **staminate heads** usually 2-5, ca. 1.5 cm in diameter at anthesis; **anthers** linear, 1-1.4 mm long; **pistillate heads** 1-4, (1)1.5-2.5 cm in diameter at maturity; **stigma** 1, linear, 1-1.5(2) mm long. **Achenes** stipitate in the head, on stipes 2-3 mm long, green to brown-olivaceous on the upper 1/2, lighter and usually reddish-brown spotted on the lower 1/2, fusiform, rounded on the sides, slightly constricted at the middle, the body 3.5-5 mm long, the beak with the stigma 2-4.3 mm long, curved, the persistent perianth of 4-5 scales reaching to ca. 2/3 the length of the achene. Mid Jun—Aug. Shallow water or mud of marshes, streams, ditches and ponds, where the water is fairly fresh; occasional from e MT to e ND and ne SD; (Newf. and Que. to n ID, s to WV, IN, IA, SD and MT).

Reports of *S. americanum* Nutt. and *S. angustifolium* Michx. for our region are apparently based on misidentifications of this species. See also the comments under the following.





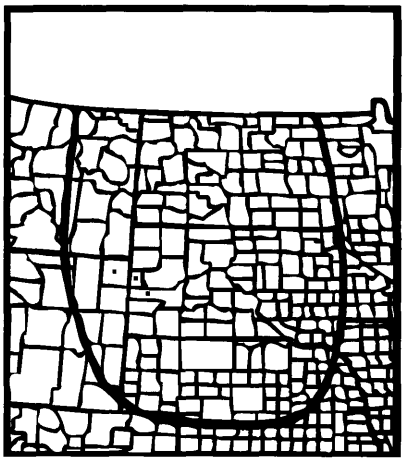
Sparganium chlorocarpum. **The lax, sprawling habit shown here is typical when the plant is mostly submersed. The plant assumes a more rigid, erect habit when emersed.**

2. *Sparganium emersum* Rehm.

Quite similar to the preceding, differing chiefly as follows: **Leaves** averaging broader, mostly (5)6-12 mm wide, these and the bracts usually strongly dilated at the base with broad scarious margins. **Achenes** smaller, the body 2-3.5 mm long at maturity, the beak (including the stigma) 2-3 mm long. Jul—Sep. Usually in shallow water of streams and ponds; occasional in the Black Hills and reputedly e MT; (Labr. to AK, s to PA, Ont., Man., SD, NM, AZ and CA). *S. multipedunculatum* (Morong) Rydb., *S. simplex* Huds.

Our representatives are assigned to var. *multipedunculatum* (Morong) Rydb.

The distinctions between this entity, *S. chlorocarpum* and *S. angustifolium* Michx. are far from clear. The latter is generally separated from the other two by its floating-leaved habit, smaller pistillate heads 1-2 cm in diameter and shorter fruit beaks 0.5-2 mm long. *S. emersum* in many respects seems to represent an intermediate between *S. angustifolium* and *S. chlorocarpum*, yet the latter two appear quite distinct where they are sympatric in eastern North America and where *S. emersum* is supposedly absent. Until this complex is studied in greater detail, we have the unsatisfactory situation of relying too heavily on geographical criteria for separating *S. chlorocarpum* and *S. emersum* with the latter being the western North American counterpart of the former.



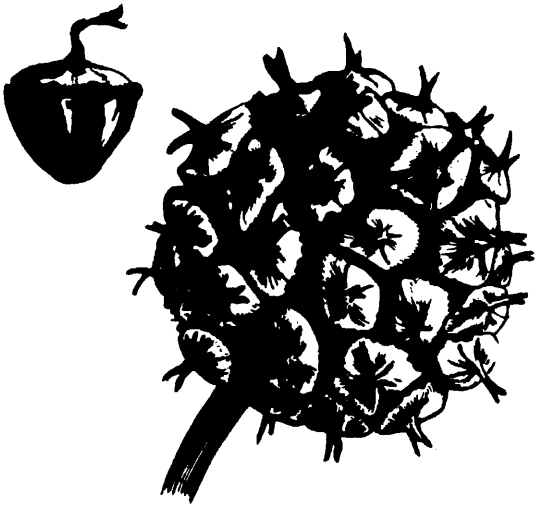
3. *Sparganium eurycarpum* Engelm. — Giant burreed

Rather robust, typically emergent plants 4-10 dm tall. **Leaves** bright green, 4-11 mm wide, spongy toward the base, sharply keeled on the back, the margins scarious toward the base. **Inflorescence** 1-3 dm long, sparsely branched from the axils of foliaceous bracts, the branches simple, loosely spicate; **staminate heads** numerous, 1-2 cm in diameter at anthesis; **anthers** linear, 1-1.8 mm long; **pistillate heads** 1-4(8), 1.5-2.5 cm in diameter in fruit; **stigmas** 2, linear, 2-4 mm long. **Achenes** sessile to short-stipitate, brown on the summit, golden-brown on the sides, obconic to obpyramidal, angled on the sides, the body 6-8 mm long, 4-7 mm wide at the summit, the beak (excluding the stigmas) 1-4 mm long, the persistent perianth of 4-8 scales appressed to the achene, the scales about equaling the achene body. Mid Jun—Aug. Usually in shallow water of marshes, streams, ditches, ponds and lakes, often occurring with cattails; common, often abundant; (Newf. to B.C., s to NJ, OH, IN, MO, OK, AZ and CA).





a)



b)

***Sparganium eurycarpum*: a) in flower. b) enlargement of a fruit cluster.**

65. **Typhaceae**, the Cattail Family

1. ***Typha*** L. — Cattail

Tall, stout, reedlike marsh plants, perennial, extensively colonial from fleshy rhizomes. **Stems** simple, terete, erect, sheathed for most of the length by overlapping leaf sheaths. **Leaves** alternate in 2 ranks, erect, broad, linear, rather spongy, sheathing at the base, the sheaths open, scarious-margined. **Flowers** unisexual, minute, the male flowers above the female in a solitary, terminal, dense, cylindrical spike, the male and female portions of the spike contiguous or separated; **perianth** absent; **staminate flowers** usually of 3-5 stamens, the anthers linear, filaments often connate, subtended by numerous slender hairs; **pistillate flowers** each comprised of a simple pistil, intermixed with some sterile flowers, the ovary on a short stipe called the gynophore, this with numerous long, slender hairs (the gynophore hairs) near the base, the hairs surpassing the ovary; **bracteoles** also sometimes present, these intermixed with and about as long as the gynophore hairs, filiform with a broadened, brown tip. **Fruit** a fusiform achene, golden or tawny, 1-1.5 mm long, the style persistent, long and slender with an expanded stigma; **mature spike** thick, brown and fuzzy in appearance due to the crowded stigmas and gynophore hairs, the upper staminate portion of the spike eventually naked.

Reliable separation of the two common species of *Typha* and their hybrid, *T.* X *glauca* Godr., is best achieved with floral characters. The reduced size and crowded condition of the flowers in the spike requires that a cluster of female flowers be removed from the spike and observed under magnifications of 20-30X. Higher magnifications may be needed for pollen grains. If the material is dried, the flowers or pollen should be wetted with a wetting solution, e.g., soap-water solution, to restore structures to natural size and shape.

References:

Fassett, N. C. and B. M. Calhoun. 1952. Introgression between *Typha latifolia* and *T. angustifolia*. Evolution 6:367-379.

Hotchkiss, N. and H. L. Dozier. 1949. Taxonomy and distribution of North American cattails. Amer. Midl. Naturalist 41:237-254.

Lee, D. W. 1975. Population variation and introgression in North American *Typha*. Taxon 24:633-641.

Smith, S. G. 1967. Experimental and natural hybrids in North American *Typha* (Typhaceae). Amer. Midl. Naturalist 78:257-287.

1 Pistillate bracteoles absent; stigmas dark brown, lanceolate to ovate-lanceolate; staminate and pistillate portions of the spike usually contiguous; pollen released predominantly in tetrads ..... 2. *T. latifolia*

1 Pistillate bracteoles present (these reduced and appearing like gynophore hairs with slightly broadened brown tips in *T.* X *glauca*); stigmas pale brown, linear to linear-lanceolate; staminate and pistillate portions of the spike usually separated; pollen released in monads or in a mixture of monads, diads, triads and tetrads.

2 Pistillate bracteoles broader than the linear stigmas; pollen in monads ..... 1. *T. angustifolia*

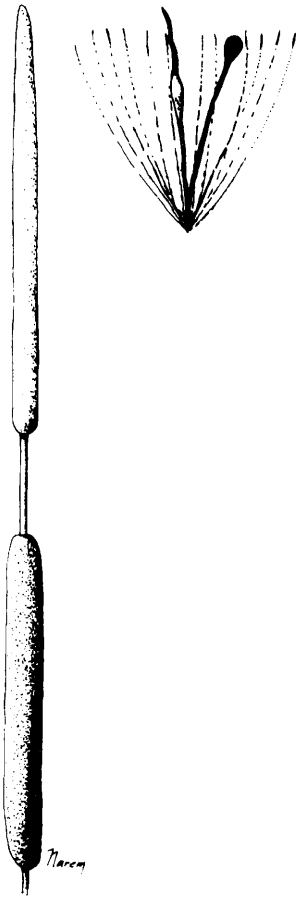
2 Pistillate bracteoles narrower than the linear-lanceolate stigmas; pollen usually in a mixture of monads, diads, triads and tetrads ..... 3. *T.* X *glauca*

1. *Typha angustifolia* L. — Narrowleaf cattail

Plants mostly 1.5-3 m tall. **Leaves** erect, green, mostly 3-10 mm wide, the auricles of the leaf sheath rounded and surpassing the base of the blade. **Staminate and pistillate portions** of the spike separated by an interval of usually 1-8 cm; **staminate portion** 7-20 cm long, 7-15 mm thick at anthesis, staminate bracteoles brown, anthers 2-3 mm long, **pollen** released in monads; **pistillate portion** of the spike dark brown, 8-18 cm long, to 2 cm thick at maturity, **pistillate bracteoles** present, these dark brown at the expanded tip, about equaling the gynophore hairs in length, broader than the linear stigmas, the gynophore hairs brown-pigmented toward the tips; **stigmas** pale brown, linear, curved with age, 0.8-1.2 mm long. Flowering Jun, fruiting late Jul—Sep. Marshes, shores, stream banks, ditches and margins of lakes and ponds, usually in shallow water; common in the e and c parts, apparently rapidly increasing in the w part, more characteristic of unstable water regimes than the following, although often occurring with it; also more tolerant of brackish or saline conditions than the following; (Nearly cosmopolitan; apparently rather recently adventive to much of our area; in N.Amer. from ME to Man. and s MT, s to SC, KY, MO, and TX; also c CA).

Barely entering our range in the s is the similar *T. domingensis* Pers. We have records from along the North Platte River in Garden and Morrill Counties, NE, and also from Lancaster Co., NE. The plant is generally more robust with yellowish to light brown pistillate spikes 2-3 cm thick in fruit. It is most readily distinguishable from *T. angustifolia* by the presence of brown mucilage glands on the upper surface of the leaf blades near their bases. These glands are confined to the inside of the leaf sheaths in *T. angustifolia*. Like *T. angustifolia*, *T. domingensis* hybridizes with *T. latifolia* to produce intermediate offspring.

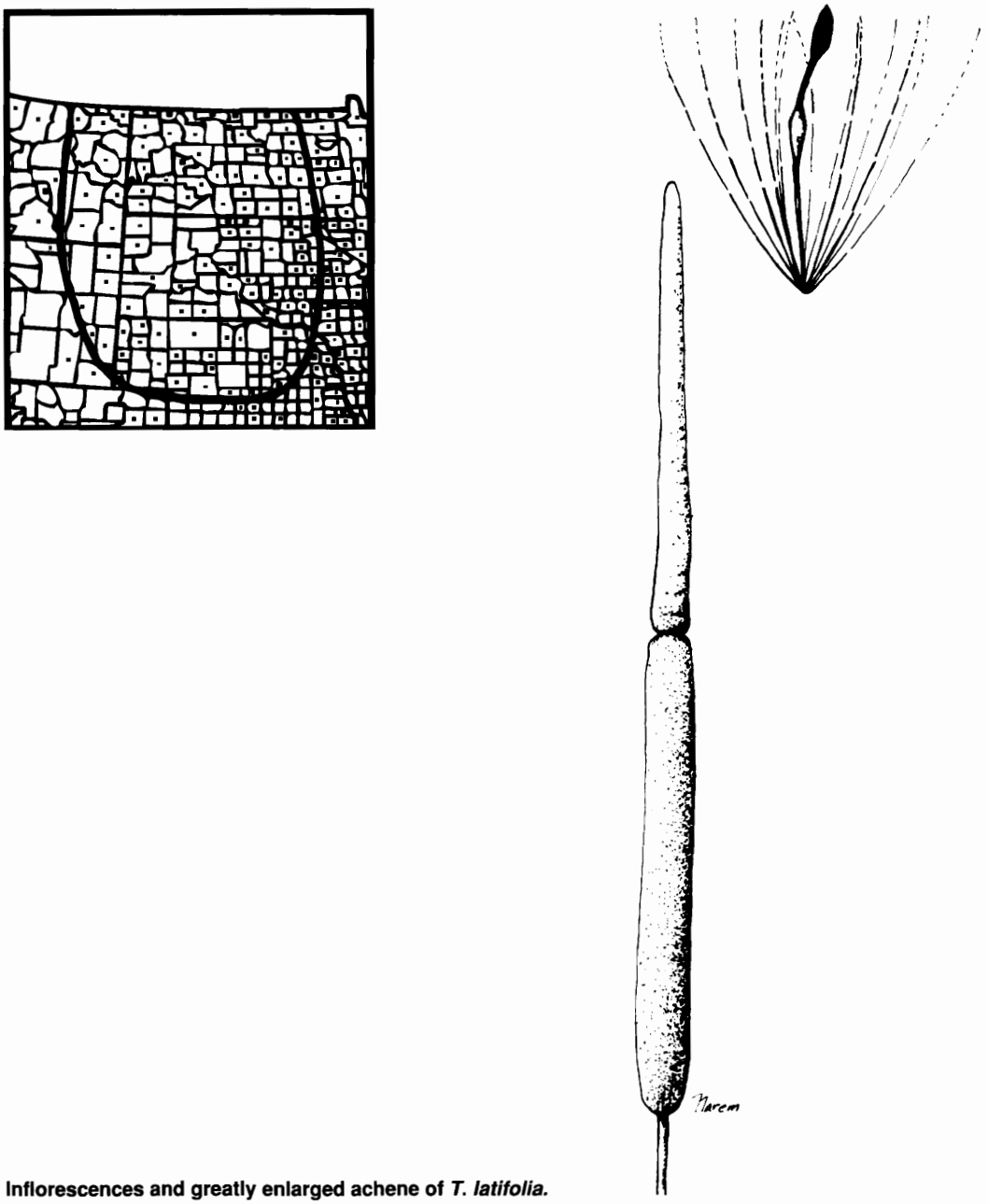




Inflorescences and greatly enlarged achene of *T. angustifolia*.

2. *Typha latifolia* L. — Common cattail

Plants mostly 1-2.5 m tall. **Leaves** erect-ascending, glaucous-green when fresh, 5-20 mm wide, the auricles of the sheath round to truncate, not surpassing the base of the blade. **Staminate and pistillate portions** of the spike usually contiguous or separated by an interval of up to 1.5 cm; **staminate portion** 5-15 cm long, 1.5-2 cm thick at anthesis, staminate bracteoles white, anthers 3-4 mm long, **pollen** released predominantly in tetrads; **pistillate portion** of the spike dark brown, 4-15 cm long, 1.5-3 cm thick at maturity, **pistillate bracteoles** absent, gynophore hairs white, **stigmas** dark brown with age, especially toward the tip, lanceolate to ovate-lanceolate, 0.4-0.8 mm long. Flowering Jun, fruiting late Jul—Sep. Same habitats as the preceding, except not found where excessively saline; common, often abundant; (s Can. except the extreme w, c AK, throughout the U.S. and into Mex.; also Eurasia and n Africa).



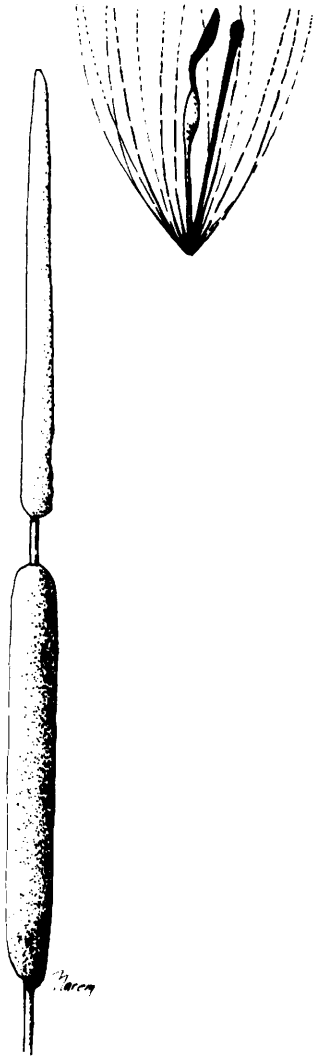
Inflorescences and greatly enlarged achene of *T. latifolia*.

3. *Typha* X *glauca* Godr. — Hybrid cattail

The sterile hybrid between *T. angustifolia* and *T. latifolia*, usually more robust than the parents, mostly 2-3 m tall, intermediate between the parental spp. in nearly all other details. **Leaves** green to glaucous-green, mostly 5-12 mm wide, the auricles of the leaf rounded, usually surpassing the base of the blade. **Staminate and pistillate portions** of the spike occasionally contiguous or more commonly separated by an interval of up to 4 cm; **staminate portion** 6-18 cm long, 0.8-1.2 cm thick at anthesis, staminate bracteoles pale brown, anthers 2-3 mm long, **pollen** usually released in a mixture of monads, diads, triads and tetrads; **pistillate portion** of the spike dark brown, 10-20 cm long, 1-2 cm thick at maturity, **pistillate bracteoles** present, reduced and appearing like gynophore hairs with slightly broadened brown tips, about equaling the gynophore hairs, narrower than the linear-lanceolate stigmas, the gynophore hairs white or slightly brown-pigmented toward the tips, **stigmas** linear-lanceolate, curved with age, 0.6-1.2 mm long. Flowering Jun, fruiting late Jul—Sep. Same habitats as *T. angustifolia*; common, often abundant; (Occurs wherever the ranges of *T. angustifolia* and *T. latifolia* are sympatric).

Since *T.* X *glauca* is sterile, reproduction is totally vegetative by rhizomes and clone fragmentation. The hybrid cattail is competitively superior to both parents under unstable water conditions and is often viewed as a problem to maintaining open areas in semipermanent marshes.





Inflorescences and greatly enlarged achene of *T.* X *glauca*.

66. **Pontederiaceae**, the Pickerelweed Family

Aquatic or amphibious annuals and perennials with short to elongate stems. **Leaves** alternate, sessile and straplike or differentiated into petiole and expanded blade, membranous-sheathing at the base in the latter instance. **Flowers** solitary (in those included here) from the axils, subtended by a sheathing spathe, pale yellow or white to purplish-blue, perfect, regular, hypogynous; **perianth** of 6 petaloid lobes, united below into a tube, salverform; **stamens** 3 (in ours), all alike or 1 unlike the other 2, the filaments adnate to the throat of the perianth tube; **pistil** 3-carpellary, stigma 3-lobed, style 1, ovary incompletely 3-celled by intrusion of the parietal placentae. **Fruit** a many-seeded, often indehiscent capsule retained inside the spathe; **seeds** conspicuously ribbed.

1 Leaves differentiated into petiole and expanded blade, emersed or floating; flowers white to purplish-blue ..... 1. *Heteranthera*

1 Leaves linear, straplike, not differentiated into petiole and blade, usually submersed; flowers light yellow ..... 2. *Zosterella*

1. ***Heteranthera*** R. & P. — Mud plantain

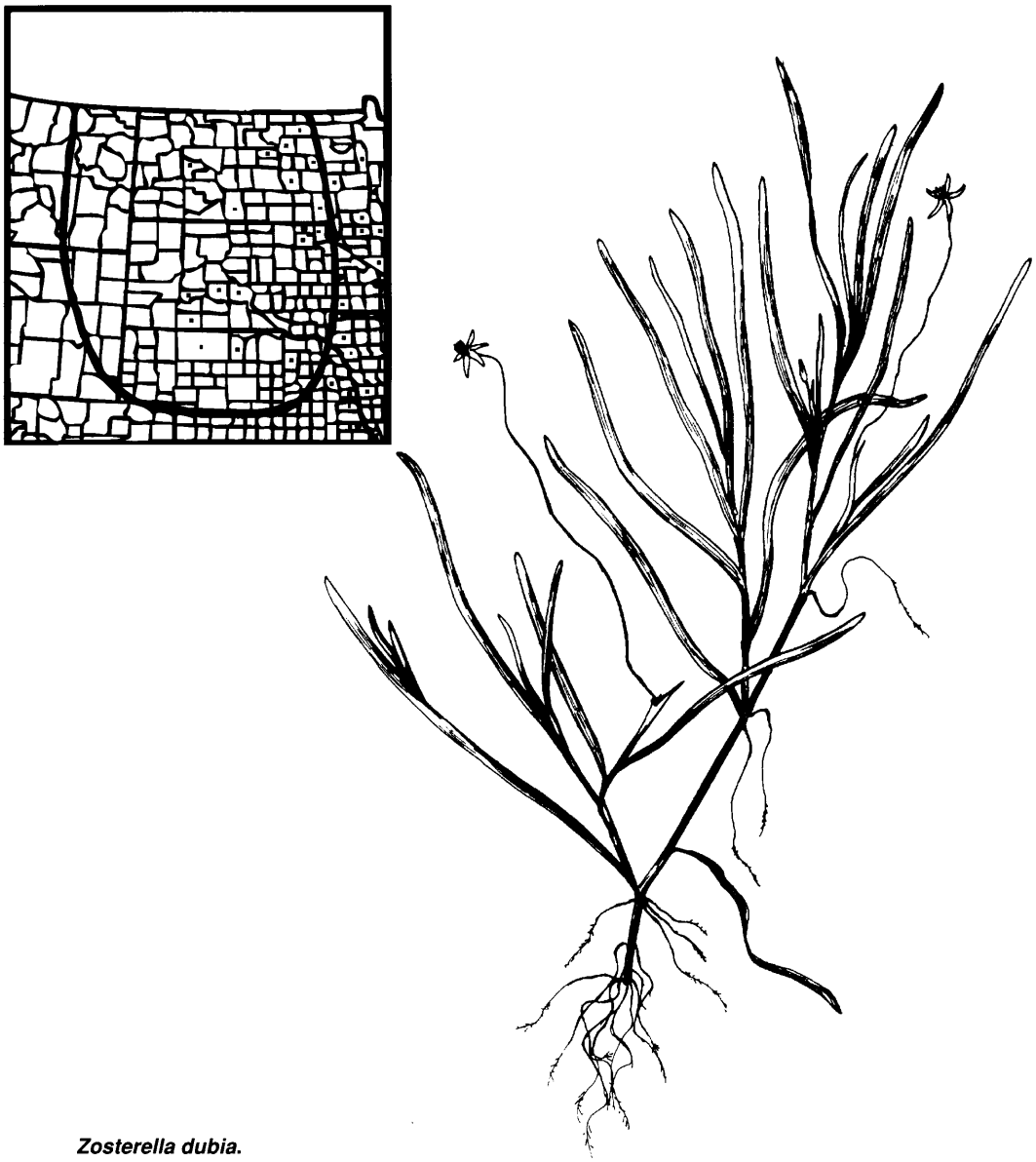
1. *Heteranthera limosa* (Sw.) Willd.

Small amphibious annual (in this region), with stems short when emersed to somewhat elongated and sprawling when in water. **Leaves** differentiated into petiole and blade, with the blades emersed or floating, ovate to elliptic or elliptic-lanceolate, mostly 2-10 cm long, rounded at the tip, subcordate to truncate or sometimes tapered at the base; **petioles** mostly 4-20 cm long, with a membranous sheath at the base. **Flower** and its elongate spathe borne on a stout peduncle; **spathe** abruptly caudate at the apex, 2-4 cm long, enclosing the tubular portion of the perianth; **perianth segments** white to usually purplish-blue, the upper 1-3 yellow at the base, linear-lanceolate, 5-10 mm long, the perianth tube 1-3.5 cm long; **stamens** dissimilar, 2 with short yellow anthers and the other with a more elongate, blue or yellow anther. Jun—Sep. Shallow water or mud of ponds and marshes, uncommon and sporadic, c and s SD and NE; (KY to MN and SD, s to MS, TX and into Mex., also AZ).



1. *Zosterella dubia* (Jacq.) Small — Water stargrass

Usually submersed or partly floating perennial with lax stems and leaves, or occasionally stranded and forming tiny leafy rosettes on exposed mud or sand. **Stems** slender, elongate, freely branched, often rooting at the lower nodes, to 1 m long. **Leaves** alternate, sessile, stipitate, linear, obtuse to rounded or apiculate at the tip, 2-10(15) cm long, 2-5(7) mm wide, several-nerved, the midvein and others inconspicuous, stipular-winged at the base but not sheathing the stem. **Flowers** solitary in upper leaf axils, the membranous spathe surrounding the perianth tube for much of its length, 10-15 mm long, cuspidate to caudate at the apex; **perianth tube** slender, often curved, 15-35(70) mm long, the perianth segments pale yellow, linear, 4-6 mm long; **stamens** alike. Jun—Sep. Streams, lakes, ponds and impoundments; occasional in the e and c parts, especially in tributaries of major rivers; (Que. to ND and WA, s to FL, TX, CA and into Mex.). *Heteranthera dubia* (Jacq.) MacM.



Zosterella dubia.

67. **Liliaceae**, the Lily Family

Caulescent or acaulescent perennial herbs from corms or scaly bulbs. **Leaves** mostly basal and grasslike or the leaves cauline and alternate to opposite or whorled, linear to linear-lanceolate, parallel-veined. **Flowers** perfect, regular, often showy; **perianth** of 6 petaloid tepals in 2 series of 3; **stamens** 6; **stigma** capitate or 3-lobed, style simple (in those included here), ovary superior or inferior, 3-celled, many-ovuled with axile placentation, maturing into a many-seeded capsule.

1 Leaves mainly basal; flowers yellow, the tepals 5-12 mm long; ovary inferior . . . . . 1. *Hypoxis*

1 Leaves cauline; flowers orange-red with dark spots (very rarely solid yellow), the tepals 4-8 cm long; ovary superior . . . . . 2. *Lilium*

1. ***Hypoxis*** L. — Stargrass

1. *Hypoxis hirsuta* (L.) Cov. — Yellow stargrass

Low, acaulescent perennial 6-25 cm tall, from a small shallow corm. **Leaves** grasslike but lacking sheaths, 1-5 mm wide, equaling or surpassing the inflorescence, mostly 5- to 9-nerved. **Scapes** 1-few, slender, lax, sericeous in the upper part. **Flowers** 1-6 (usually 2) per scape, yellow, 1-2.5 cm across, pubescent on the outside of the tepals and ovary; **tepals** spreading in flower, 5-12 mm long, closing up and turning green after flowering, persistent; **ovary** inferior. **Capsule** ellipsoid, 3-6 mm long; **seeds** round, black, muricate, 1-1.5 mm in diameter. Late May—Jul. Wet meadows and low prairie; frequent in the e and c parts; (ME to Man., s to GA and TX).



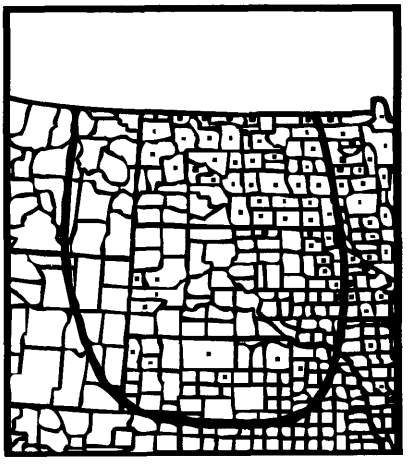


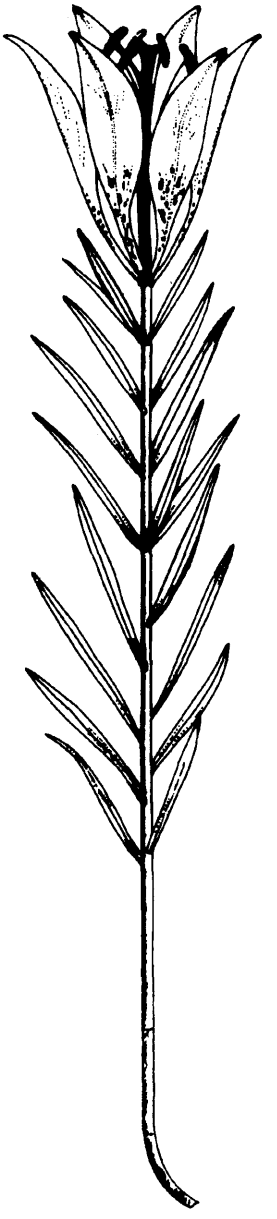
Hypoxis hirsuta.

1. *Lilium philadelphicum* L. — Wild lily

Erect, glabrous perennial 2-9 dm tall, from a scaly bulb. **Leaves** cauline, sessile, mostly alternate below to opposite or whorled above, linear to linear-lanceolate, 3-8 cm long, 3-9 mm wide, parallel-veined, blunt-tipped. **Flowers** 1-3, terminal, erect, large and showy, on peduncles 1-8 cm long; **tepals** orange-red, yellow and dark-spotted toward the clawed base (very rarely the tepals solid yellow), 4-8 cm long, 0.8-2.8 cm wide; **stamens** and **pistil** prominent, abut equaling the perianth; **anthers** 6-10 mm long; **stigma** 3-lobed, style elongate, ovary superior. **Capsule** loculicidal, oblong, 2.5-4 cm long; **seeds** flat, closely packed. Late Jun—Jul. Wet meadows, low prairie, boggy places, seepage areas and ditches, also prairie hillsides, woodlands and thickets; frequent from nw and e ND to e SD, also the Black Hills and n NE; (NH to B.C., s to NC, KY, IA, NE and NM).

Plants of this region belong to var. *andinum* (Nutt.) Ker.





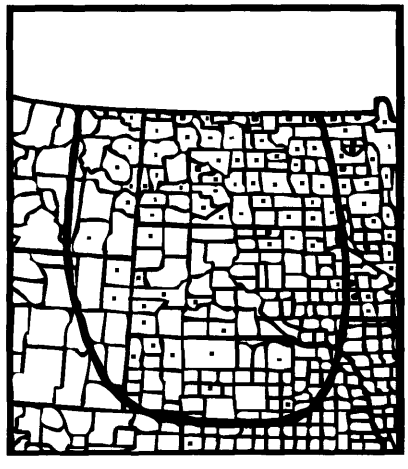
Lilium philadelphicum.

1. ***Sisyrinchium*** L. — Blue-eyed grass

1. *Sisyrinchium montanum* Greene

Fibrous-rooted perennial 1-4.5 dm tall, often tufted, with mostly basal, grasslike leaves 1-3 mm wide and scapose inflorescences, the plants glaucescent, drying pale, sometimes purplish at the base; **scapes** narrowly to broadly winged, 1.5-3 mm wide. **Inflorescence** of 1-several flowers, terminal on the scape, subtended by a 2-bracted spathe, the outer bract (2.5)3.5-6(8.5) cm long, mostly 1.5-3X longer than the inner bract, the margins of the outer bract united for 1-3 mm above the base. **Flowers** blue-violet with a yellow center, perfect, regular; **perianth** of 6 membranous tepals (5)7-14 mm long, apiculate to emarginate at the tip; **stamens** 3, united by their filaments around the style; **style** 3-branched, ovary inferior, 3-celled, globose. **Fruit** a subglobose, loculicidal capsule, pale to stramineous, 4-7 mm in diameter; **seeds** many, black, globular, shallowly pitted. Late May—Jul. Wet meadows, ditches, swales and floodplains, also in drier situations; ND and e MT, s to NE and e WY, most common in the n and w parts; (Que. to AK, s to NY, IN, IA, KS and CO).

See the discussion on the following page.





Sisyrinchium montanum.

S. montanum belongs to a complex of closely related species which includes the eastern *S. angustifolium* and several western species. Although *S. angustifolium* has been attributed to our region, my attempts to discern it among plants of the northern plains have been unsuccessful. A few white-flowered dwarf plants from nw ND do not fit *S. montanum* well, nor any other species attributed to the region.

Also occurring in the extreme e and s parts of the region is *S. campestre*, white-eyed grass. Although occasionally found in wet meadows, this plant is more characteristic of mesic sites, especially in tallgrass prairie. It is easily distinguished from *S. montanum* by its white to light blue-violet flowers and the fact that the margins of the outer spathe bract are free to the base. The plant is generally smaller and earlier flowering than *S. montanum*.

69. **Orchidaceae**, the Orchid Family

Perennial herbs from rather fleshy, strongly mycorhizal roots. **Leaves** simple, cauline and alternate or mostly basal, sessile and usually sheathing the stem, parallel-veined. **Inflorescence** of 1 or 2 terminal blossoms or of few to many flowers in a terminal bracteate spike or raceme. **Flowers** perfect, strongly irregular, epigynous, very showy in some spp.; **perianth** comprised of 6 segments, although this is sometimes obscured by fusion; **calyx** consisting of the uppermost segment and the 2 outermost lateral segments, the sepals sometimes resembling the lateral petals, the lateral sepals free or (in *Cypripedium*) connate to form a single appendage below the lip or (in *Spiranthes*) connivent with the lateral petals to form a hood over the lip; **corolla** white or otherwise colored, the 2 lateral petals alike, the third petal (the lowermost perianth segment) typically modified and referred to as the lip; **stamens** 1 or 2, attached to the style and along with the style and stigma forming a short to prominent **column**, the **stigma** borne on the lower side near the base of the column, pollen shed in waxy pollinia; **ovary** inferior, 1-celled, with 3 parietal placentae, or 3-celled, maturing into a many-seeded capsule, the seeds very numerous and minute. The second largest family (or largest by some estimates) of vascular plants, with most representatives occurring in the tropics where many grow as epiphytes.

Within the Orchidaceae are a few of our most beautiful and rarest wildflowers, such as the ladyslippers (*Cypripedium* spp.) and the prairie fringed orchid (*Platanthera praeclara*). The latter has recently been listed as an endangered species by the federal government.

References:

Luer, C. A. 1975. The native orchids of the United States and Canada excluding Florida. The New York Botanical Garden.

Magrath, L. K. 1973. The native orchids of the prairies and plains region of North America. Unpubl. Ph.D. thesis, Univ. Kans., Lawrence.

1 Flowers 1 or 2 per stem, the lip much inflated and pouchlike.... 2. *Cypripedium*

1 Flowers few to many (2-12 in *Liparis*) in a bracteate spike or raceme, the lip not inflated.

2 Perianth prolonged backward into a spur.

3 Spur pouchlike, 2-3 mm long..... 1. *Coeloglossum*

3 Spur cylindric, 4-50 mm long..... 4. *Platanthera*

2 Peyianth not spurred.

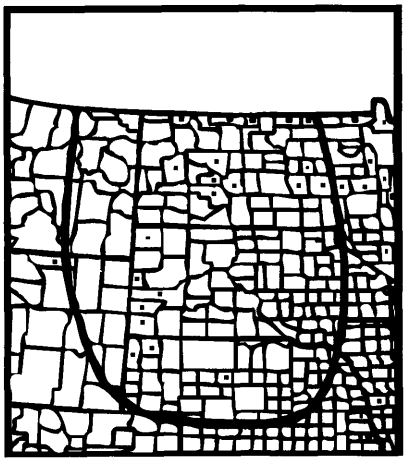
4 Flowers in a loose raceme; foliage leaves consisting of a pair of basal leaves ..... 3. *Liparis*

4 Flowers in a twisted spike; foliage leaves best developed at the base and reduced upward on the stem ..... 5. *Spiranthes*

1. *Coeloglossum viride* (L.) Hartman — Long-bracted orchid

Plants 2-5 dm tall, glabrous. **Leaves** elliptic to elliptic-oblanceolate or elliptic-obovate, 4-12 cm long, 1-3(5) cm wide, acute to rounded, reduced in size upward; **flowers** usually many, ascending, greenish, sometimes tinged with purple, small, not showy; **sepals** green, 4-6 mm long, the upper sepal broadly ovate and hoodlike, the lateral sepals broadly lanceolate, incurved; **petals** green, the lateral ones lanceolate, curved upward, shorter than the lateral sepals and nearly hidden by them; **lip** oblong, 2- or 3-toothed at the tip, the middle tooth shorter than the lateral 2 or obsolete; **spur** pouchlike, 2-3 mm long, projected forward under the lip; **ovary** cylindric, 7-11 mm long. Jun—Jul. Wet meadows, seepage areas, moist or wet woods and thickets; occasional in the n and w parts; *Habenaria bracteata* (Willd.) R.Br.; *H. viridis* (L.) R.Br.

American plants are longer-bracted than Eurasian and Arctic counterparts and are distinguished as var. *virescens* (Muhl. ex Willd.) Luer.



2. *Cypripedium* L. — Ladyslipper

Erect plants from coarsely fibrous roots, with rather broad, cauline leaves and 1 or 2 large showy flowers on each stem; **stems** simple, usually clumped in groups of few to several. **Flowers** terminal each subtended by a foliaceous bract; **lateral sepals** resembling the lateral petals in color and texture, connate to form a single, apically bidentate or entire appendage below the lip, **upper sepal** similar to the lower appendage but with an entire apex; **lateral petals** free and spreading, **lip** much inflated and pouchlike, projecting forward; **column** bent over the orifice of the lip, **stamens** 2, one on each side of the column, a petaloid staminode projected forward over the column and exceeding it; **ovary** elongate and curved.

1 Lip yellow . . . . . 1. *C. calceolus*

1 Lip predominantly white, with pink or purple markings.

2 Sepals and lateral petals white; lip 3-5 cm long . . . . . 3. *C. reginae*

2 Sepals and lateral petals greenish; lip 1.5-2 cm long . . . . . 2. *C. candidum*

1. *Cypripedium calceolus* L. — Yellow ladyslipper

Stems 1.5-6 dm tall, pubescent, the hairs often glandular. **Leaves** ascending, sheathing at the base, elliptic, 5-18 cm long, 2-7 cm wide, acute to acuminate, sparsely pubescent. **Flowers** 1 per stem or less often 2, each subtended by an erect leaflike bract 2.5-6 cm long; **sepals and lateral petals** greenish-yellow to purplish-brown, **sepals** 2-6 cm long, the upper sepal lanceolate to ovate-lanceolate, acuminate, the lateral sepals connate below the lip, lanceolate, bidentate at the tip; **lateral petals** lanceolate to linear-lanceolate, acute to attenuate, usually twisted 1-several times, 2-5 cm long; **lip** yellow, often purple-veined and purplish-dotted around the orifice, 1.5-4 cm long; **ovary** strongly glandular-pubescent, 1.5-3 cm long. Jun—Jul. Wet meadows, bogs, swampy areas and moist forest; rare from nc and e ND to extreme e NE, also the Black Hills; (Circumboreal, in N.Amer. from N.S. to AK, s to GA, AL, TX, NM, UT and OR). *C. parviflorum* Salisb.

In North America, *C. calceolus* has been divided into two main varieties (formerly considered separate species) on the basis of the lip size. In the e U.S., the prevailing form is var. *pubescens* (Willd.) Correll, in which the **lip** averages 3-6 cm long. The western form is var. *parviflorum* (Salisb.) Fern., distinguished by a **lip** averaging 2-3 cm long. In this region, specimens referable to both varieties are encountered, as well as intermediates which are difficult to assign to either variety.

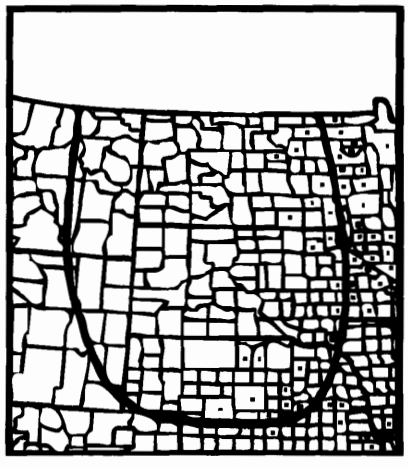




Cypripedium calceolus.

2. *Cypripedium candidum* Muhl. — White ladyslipper

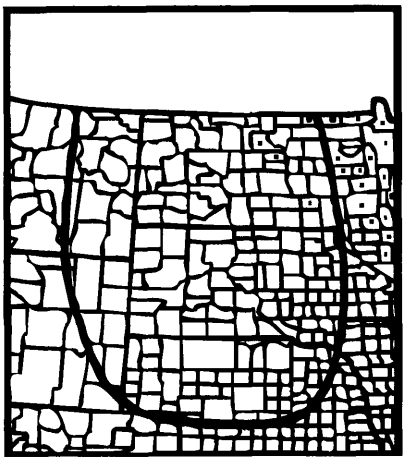
Stems 1.5-3 dm tall, glandular-hispid above. **Leaves** appressed-ascending, overlapping and strongly sheathing below, narrowly elliptic, 5-13 cm long, 2-4 cm wide, acute, sparsely glandular-pubescent, reduced to sheathing scales toward the base of the stem. **Flowers** 1 per stem, the subtending leaflike bract erect, 3-6 cm long; **sepals and lateral petals** greenish, usually purple-striate, **sepals** 1.5-3 cm long, the upper sepal ovate-lanceolate, acuminate, the lateral sepals connate below the lip with a slightly bidentate tip; **lateral petals** linear-lanceolate, acute to attenuate, sometimes twisted, 1.5-3.5 cm long; **lip** white with purple veins, 1.5-2 cm long; **ovary** densely glandular-pubescent, 1.5-4 cm long. Late May—Jun. Wet meadows and low prairie, where undisturbed; rare from e ND to e and c NE; (NY to s Man., s to PA, KY, MO and NE).



3. *Cypripedium reginae* Walt. — Showy ladyslipper

Stems 4-10 dm tall, glandular-hirsute. **Leaves** spreading-ascending, sheathing at the base, broadly elliptic, 10-25 cm long, 4-12 cm wide, abruptly acuminate, nearly glabrous to hirsute. **Flowers** 1 or 2 on a stem, the subtending leaflike bract 6-12 cm long; **sepals and lateral petals** white, **sepals** 3-4 cm long, the upper sepal broadly elliptic to obovate, obtuse to rounded, the lateral sepals completely fused to form a single, entire appendage under the lip, obtuse at the apex; **lateral petals** broadly to narrowly lanceolate, obtuse to rounded, about as long as the sepals; **lip** white, streaked and spotted with pink or purple, 3-5 cm long; **ovary** glandular-pubescent, 3.5-5 cm long. Jun—Jul. Bogs, swamps and springs; rare in e ND; (Newf. and Que. to Man., s to GA, AL, MO and ND).

Showy ladyslipper is the state flower of Minnesota.

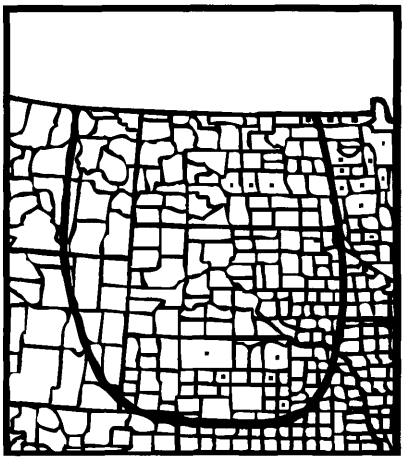




Cypripedium reginae.

1. *Liparis loeselii* (L.) Rich.

Small, erect, glabrous plant 1-2.5 dm tall, arising from a solid bulb. **Foliage leaves** consisting of a pair of basal leaves, ascending, sheathing at the base, shiny, elliptic to lanceolate, 5-15 cm long, 1.5-3 cm wide, obtuse to rounded, subtended below by 1-few basal scale leaves. **Flowers** 2-12, yellowish-green, small, erect, in an open bracteate raceme 2-8 cm long, the bracts minute; **sepals** narrowly lanceolate and spreading, 4-6 mm long; **lateral petals** linear, often twisted and bent forward under the lip, 3-5 mm long; **lip** dilated above the narrow base, decurved, 4-5 mm long; **anther** 1, terminal on the broad-based, winged column. **Capsules** persistent, short-cylindric, 7-11 mm long. Late Jun—Jul. Swampy woods, fens and boggy places; rare in c and ne ND and nc NE; (N.S. and Que. to Man., s to NJ, OH, AL, and NE, sporadically w to WA).



4. *Platanthera* Rich.

Usually stout, erect plants from a cluster of tuberous roots. **Leaves** cauline, ascending to appressed, sheathing and mostly overlapping at the base, reduced upward on the stem, the lowermost often scalelike and sheathing. **Flowers** several to many in a loose to congested, terminal bracteate spike, showy or not, white or greenish; **perianth segments** free (in those included here); **sepals** greener and thicker-textured than the white to greenish petals; **lip** ovate-lanceolate and entire or 3-lobed and fringed, prolonged backward into a spur, the spur commonly curved; **stamen** 1, the anther attached on top of the short column.

Reference:

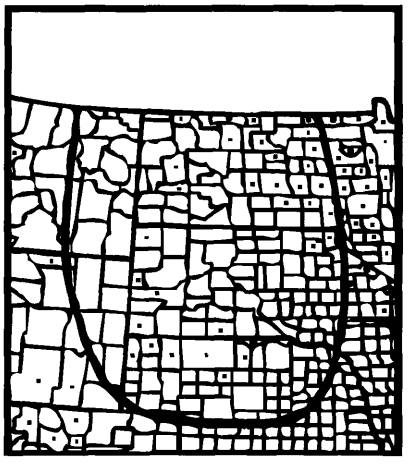
Sheviak, C. J. and M. L. Bowles. 1986. The prairie fringed orchids: a pollinator isolated species pair. Rhodora 88:267-290.

1 Flowers greenish, small, not showy, the lip entire . . . . . 1. *P. hyperborea*

1 Flowers white, large and showy, the lip 3-lobed and fringed . . . . . 2. *P. praeclara*

1. *Platanthera hyperborea* (L.) Lindl. — Northern green orchid

Plants 1.5-7 dm tall, glabrous. **Leaves** lanceolate to oblanceolate, 5-20 cm long, 1-3.5(5) cm wide, acute to rounded or mucronate, reduced in size upward. **Spike** elongate, usually dense, 4-20 cm long; **bracts** lanceolate, acute to blunt, 6-20 mm long, reduced upward; **flowers** usually numerous, erect, greenish, small, not showy; **sepals** green, 2-4 mm long, the upper sepal broadly ovate and hoodlike, the lateral sepals lanceolate to ovate and spreading; **petals** green to greenish-white, the lateral petals lanceolate, curved upward, 1.5-2.5 mm long; **lip** ovate-lanceolate, 4-7 mm long, entire; **spur** inconspicuous, curved forward under the lip, about equaling the lip; **ovary** cylindric, 6-12 mm long. Mid Jun—Aug. Springs, bogs, fens, stream margins, seepage areas and fresh wet meadows; occasional from ND and e MT to n NE and e WY, especially common in the Black Hills; (Labr. and Newf. to AK, s to RI, PA, IN, IA, NE, NM and OR; also Iceland, Greenl. and e Asia). *Habenaria hyperborea* (L.) R.Br.





***Platanthera hyperborea*. Photo by James R. Johnson.**

2. *Platanthera praeclara* Sheviak & Bowles — Western prairie fringed orchid

Plants 3-8 dm tall, glabrous. **Leaves** lanceolate to broadly linear, 8-20 cm long (including the strongly sheathing base), 1-4 cm wide, blunt-tipped. **Spike** cylindric, 5-15 cm long; **bracts** lanceolate, blunt, 1-4 cm long; **flowers** several to many, spreading, white, large and showy; **sepals** 9-12 mm long, broadly ovate to obovate; **lateral petals** broadly obovate-cuneate, erose, 10-15 mm long; **lip** deeply 3-lobed with fringed margins, 1.5-2.5 cm long and about as wide, the lobes flabelliform, deeply dissected, the spur conspicuous, 2-5 cm long, usually curved; **ovary** elongate, 2-3 cm long. Late Jun—Jul. Wet meadows and low prairie, often where sandy; occasional in se ND, otherwise rare or extinct in e SD, e and c NE; (N.S. and Ont. to ND, s to OH, LA and KS). *Habenaria leucophaea* (Nutt.) A. Gray, *Platanthera leucophaea* (Nutt.) Lindl.



5. ***Spiranthes*** Rich. — Ladies'-tresses

Slender, erect, mostly glabrous plants from a cluster of tuberous roots. **Leaves** best developed at the base, reduced and bractlike upward, the cauline leaves appressed and sheathing. **Flowers** small, usually many, arranged in usually (1)2-4 spirally twisted rows in a dense, bracteate spike, white or cream-colored; **sepals and lateral petals** similar, the lateral petals connivent with all 3 sepals or only with the upper one to form a hood over the lip and column; **lip** oblong or ovate, folded upward near the middle so that the margins embrace the column, curved downward beyond the middle, with a pair of protuberances or thickenings at the base; **anther** 1, borne on the back of the short column.

Reference:

Sheviak, C. J. 1973. A new *Spiranthes* from the grasslands of central North America. Bot. Mus. Leafl. 23:285-297.

1 Lateral petals connivent with all 3 sepals to form a hood, the lateral sepals not free; lip with a distinct constriction at ca. 3/4 of its length resulting in a round-ovate terminal lobe, the base of the lip with a pair of lateral thickenings but these not projecting* ..... 3. *S. romanzoffiana*

1 Lateral petals connivent with only the upper sepal to form a hood, the lateral sepals free on the sides; lip not constricted or only slightly so near the middle, without a distinct terminal lobe, the base of the lip with a pair of backward projecting protuberances.

2 Flowers in a single spiral in the spike.

3 Pubescence in the inflorescence with knoblike, glandular tips; lip smooth to glandular on the underside ..... 1. *S. cernua*

3 Pubescence in the inflorescence sharp-tipped; lip prominently papillate on the underside ..... 4. *S. vernalis*

2 Flowers in 2-4 spirals in the spike.

4 Leaves becoming brown and dried by flowering time; lip not constricted near the middle ..... 2. *S. magnicamporum*

4 Leaves mostly remaining green at flowering time; lip slightly constricted near the middle ..... 1. *S. cernua*

*If working with dried material, flowers must be soaked in a wetting solution for several minutes or boiled in water to facilitate dissection.

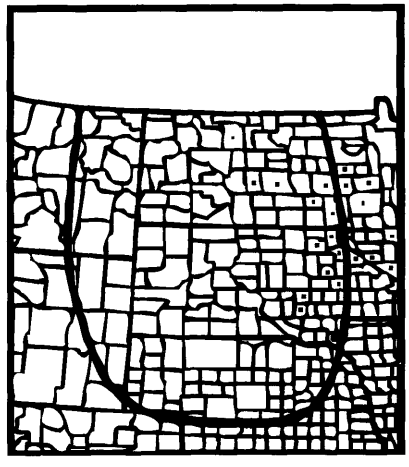
1. *Spiranthes cernua* (L.) Rich. — Nodding ladies'-tresses

Plants 1-4(6) dm tall, glabrous below, glandular-pubescent in the spike, the hairs with knoblike tips; **roots** slender but fleshy. **Leaves** mostly green at flowering time, the basal ones linear to lanceolate, mostly 10-25 cm long, 3-20 mm wide, acute to acuminate, the cauline leaves reduced and becoming bractlike upward. **Spike** with (1)2-4 spiral rows of flowers, 3-18 cm long, the bracts ovate to ovate-lanceolate with a slender, acuminate tip, 8-25 mm long. **Flowers** white, unscented or only weakly scented when fresh; **perianth segments** sparingly to moderately pubescent on the outside; **sepals** oblong-lanceolate, 6-10 mm long, the lateral ones free, projected forward and somewhat spreading; **lateral petals** connivent with the upper sepal to form a hood, linear, acute to obtuse, about equaling the sepals; **lip** white with a thickened, yellow-green center, oblong to oblong-ovate when flattened, 6-10 mm long, slightly constricted at the middle and often dilated basally curved, downward and abruptly recurved at the rounded tip, crisped to crenulate on the margins toward the tip, the base of the lip with a pair of backward-projecting protuberances. Aug—Oct. Wet meadows, floodplains and moist prairies; apparently rare in the n part of our range, where previous records were largely based on *S. magnicamporum*, otherwise occasional in the e and s parts of our range; (Newf. and Que. to e SD, s to FL, TX and NM; also UT).



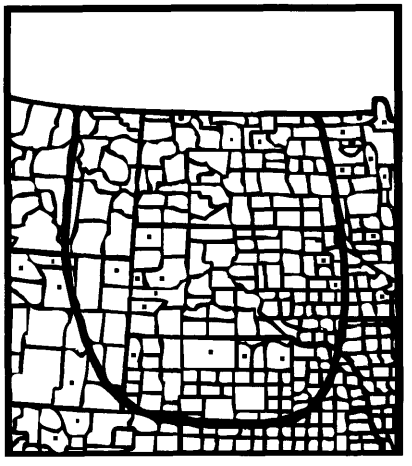
2. *Spiranthes magnicamporum* Sheviak — Great Plains ladies'-tresses

Very similar to the preceding, differing chiefly as follows: **Roots** more thickened and tuberous. **Leaves** senescent by flowering time, even the cauline ones brown and dried. **Spike** with 2-4 spiral rows of flowers, the bracts to 30 mm long. **Flowers** white to cream-colored, strongly fragrant with the scent of coumarin when fresh; **sepals** 7-14 mm long; **lip** 6-11 mm long, not constricted near the middle and not dilated at the base, rather evenly curved for its entire length, not abruptly recurved near the tip, the basal protuberances more prominent than in the preceding. Late Jul—Oct. Wet meadows, moist to dry prairies, ditches and floodplains, often where sandy; occasional in the e and c parts of our region, probably more common than present records indicate; (w OH and nw IN to ND, s to MS, AL and TX).



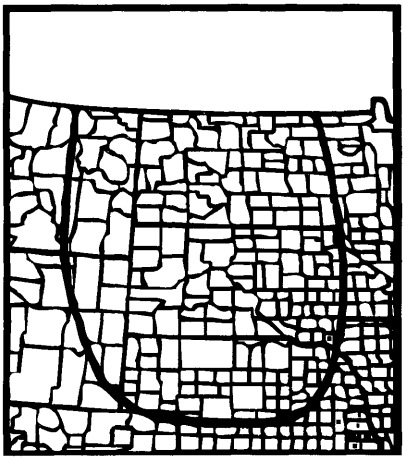
3. *Spiranthes romanzoffiana* Cham. — Hooded ladies'-tresses

Plants 1-3 dm tall, almost entirely glabrous; **roots** long and fleshy. **Leaves** usually green at flowering time, the basal leaves ascending, linear to narrowly oblong, 8-15 cm long, 2-9 mm wide, blunt, the cauline leaves bractlike. **Spike** with 1-3(4) rows of flowers, 3-8 cm long, the bracts ovate-lanceolate, 10-20 mm long, acuminate. **Flowers** white or cream-colored; **perianth segments** only slightly glandular-pubescent on the outside, if at all; **sepals and the lateral petals** alike, ovate-lanceolate, all connivent to form a hood 7-12 mm long, the lateral sepals with only the tips free; **lip** ovate when flattened, with obscure thickenings at the base which do not project backward; sharply curved downward, recurved at the erose tip, about as long as the hood. Late Jul—Aug. Springs, fens, bogs and seepage areas; rare, from scattered locations in the region; (Labr. and Newf. to AK, s to PA, MI, IA, NM, AZ and CA; also n Ireland and w Scotland).



4. *Spiranthes vernalis* Engelm. & A. Gray — Spring ladies'-tresses

Plants 2-7 dm tall, finely pubescent above with whitish or reddish-brown, septate hairs, these eglandular, sharp-pointed; roots **coarse**, fusiform. **Leaves** basal or a few cauline, usually some persistent at flowering time, linear to narrowly lanceolate, 5-30 cm long, to 16 mm wide, acuminate, the basal leaves sheathing the stem, the cauline leaves, when present, much reduced and bractlike upward. **Spike** dense to rather loose with a single twisted spiral of flowers, 3-15 cm long, the bracts ovate to oblong-lanceolate, 7-23 mm long, acuminate, scarious-margined. **Flowers** yellowish to greenish-white, often fragrant; **perianth segments** pubescent on the outside; **sepals** linear-lanceolate, 6-8 mm long, the upper acute to obtuse, the lateral ones free, projected forward, acute; **lateral petals** connivent with the upper sepal to form a hood, linear to linear-elliptic, 5-9 mm long, obtuse; **lip** broadly ovate to oblong-ovate, 4.5-8 mm long, widest just below the middle, arcuate-recurved, crenulate-wavy on the margins, strongly papillose on the underside, the basal protuberances prominent, projected backward and uncurved, pubescent. Aug—Sep. Wet meadows, moist prairies, ditches, and floodplains, usually where sandy; uncommon, extreme se SD and e NE; (MA and Que. to SD, s to FL, TX and NM; also Mex. and Guat.).



Abaxial: See dorsal.

Acaulescent: Appearing stemless, with leaves and flowers or inflorescences arising directly from the plant base.

Accrescent: Increasing in size with age, often describing a calyx that expands as the fruit matures.

Achene: A small, dry, indehiscent, single-seeded fruit in which the seed coat is separate from the ovary wall.

Achlorophyllous: Lacking chlorophyll and thus nongreen.

Acuminate: Tapering to a slender point.

Acute: Forming an acute angle at either the tip or base.

Adaxial: See ventral.

Adnate: Fused to a different structure as when stamens are attached to petals.

Aggregate: Clustered together.

Anastomosing: Branching and rejoining.

Androgynous: Describing an inflorescence of imperfect flowers in which the male flowers are borne above the female flowers.

Annulus: A row of thick-walled cells in the walls of a sporangium that shrink or expand with changes in moisture to cause rupture of the sporangium and release of the spores.

Anthesis: Flowering time.

Antrorse: Directed upward or forward toward the tip.

Apical: Positioned at the tip or apex of a structure.

Apiculate: With a short, abrupt point at the tip.

Appressed: Lying close to or parallel to an organ or surface.

Arcuate: Moderately arched or curved.

Areolate: With a surface divided into many angular sections.

Aril: An outgrowth from the stalk (funiculus) of an ovule that partly or wholly encloses a seed.

Aristate: Tapered to an awned or bristlelike tip.

Attenuate: Very gradually tapered to a slender apex or base.

Auricle: An earlike lobe or flap.

Auriculate: With earlike lobes.

Awn: A bristlelike projection, often arising from the tip of a structure.

Axil: The angle between a stem and an attached leaf.

Axile: Describing a placentation type in which ovules are attached where the septae intersect in the center of an ovary having two or more cells.

Axillary: In the axil of a leaf or bract.

Barbellate: Finely barbed.

Basal: Arising from the base of the plant.

Berry: A fleshy fruit containing few to many seeds.

Bidentate: With two teeth.

Bidentulate: Slightly two-toothed.

Bifid: Two-branched or lobed.

Bilabiate: Two-lipped.

Bract: A reduced or otherwise modified leaf that subtends a flower or inflorescence.

Bracteole: A reduced bract, often secondary to larger, main bracts.

Bractlet: A small secondary bract borne on a pedicel or hypanthium of a flower instead of below the pedicel.

Bulb: A short, subterranean stem bearing fleshy, achlorophyllous scale leaves modified for food storage.

Bulbil (bulblet): A small, secondary bulb that develops in a leaf axil, in an inflorescence or in another unusual position on the plant.

Ca.: Abbreviation for circa which means approximately.

Caducous: Early deciduous.

Calcareous: Describing soil or water with a high $CaCO_3$ (lime) content.

Callus: The thickened, sometimes pointed extension at the base of a grass floret where the lemma attaches to the rachilla.

Calyx: The sepals of a flower collectively.

Campanulate: Bell-shaped.

Canescent: With dense, fine, whitish hairs that give the surface a gray, hairy appearance.

Capillary: Very slender; hairlike or nearly so.

Capitate: Headlike or borne in a head.

Capsule: A dry, nonfleshy fruit containing few to many seeds, usually dehiscent at maturity.

Carpel: In angiosperms, a modified ovule (seed)-bearing leaf, one or more of which make up a pistil. A simple pistil is comprised of one carpel, whereas a compound pistil is composed of two or more carpels fused together. The number of carpels making up a compound pistil is often indicated by: (1) the number of styles, style branches or stigma lobes; (2) the number of locules or placentae in the ovary; (3) the number of main sutures on a dehiscent fruit; or (4) the number of angles or lobes on the sides of the ovary.

Carpophore: A slender stalk that supports the two mericarps (carpels) as they separate at maturity in fruits of the Apiaceae; an upward extension of the receptacle between the carpels.

Cartilaginous: Firm but flexible, like cartilage in texture.

Catkin: A soft, spikelike inflorescence of unisexual flowers typical of many trees and shrubs, often early deciduous.

Caudal: Taillike.

Caudex: A short, thickened, often woody, vertical or branched perennial stem, usually at or below ground level.

Caulescent: With an above-ground, leafy stem.

Cauline: Of the stem.

Cespitose: Growing in tufts or dense clumps.

Chaffy: Having the texture of the chaff (lemmas, paleas and glumes) removed from grain during harvesting or milling; or, in the Asteraceae, describing a receptacle (disk) that has chaffy bracts among the flowers.

Chartaceous: Papery-textured and opaque.

Cilia: Prominent hairs on a margin.

Ciliate: Fringed with cilia.

Ciliolate: Minutely ciliate.

Circinate: Coiled in the bud, with the apex in the center of the coil, usually describing leaves that unfurl from a coil.

Circumscissile: Describing a round fruit that dehisces horizontally so that the top portion comes off like a lid to release the seed or seeds.

Clasping: Partly or completely surrounding the stem.

Clavate: Club-shaped.

Claw: The lower portion of a petal that is long and narrow toward the base and broadened toward the tip.

Cleft: Cut into lobes.

Cleistogamous: Descriptive of the flowers that remain closed in the bud or hidden in sheaths or bracts and are thus self-pollinated and fertilized.

Coma: A ring or tuft of fine hairs on a seed, functional in wind dispersal.

Commissure: A place where two similar parts adjoin.

Compressed: Flattened.

Conduplicate: Describing a leaf or modified leaf which is folded upward along the midrib.

Confluent: Merging or blending of one part to another.

Conic: Cone-shaped.

Connate: Fused together along the margins.

Connivent: Having margins closely adherent to those of an adjacent structure but without fusion.

Contorted: Twisted or bent.

Convolute: Descriptive of perianth parts or leaves which are rolled up and often twisted apically in the bud so that the margins of the perianth members or leaves successively overlap.

Cordate: Heart-shaped at the base, with 2 rounded lobes.

Coriaceous: Thick, tough and leathery.

Corm: A short, fleshy, underground stem functioning in food storage, usually covered by papery-thin, modified leaves.

Cormose: Having a corm.

Corniculate: Having one or more small hornlike projections.

Corolla: The petals of the flower collectively, especially when united.

Corrugated: Irregularly folded or wrinkled.

Corymb: A flat-topped or convex, racemose inflorescence.

Corymbiform: Describing an inflorescence in which the flowers or flower heads are elevated to the same level on different branches so that the inflorescence or units of it appear flat-topped or convex.

Crenate: With low, rounded teeth on the margin.

Crisped: Irregularly curled or crinkled on the margin.

Cucullate: With a blunt, hood-shaped tip.

Culm: The stem of a grass or grasslike plant, especially one bearing an inflorescence.

Cuneate: Tapered to an acute base.

Cupulate: Cup-shaped.

Cuspidate: With a terminal toothlike projection.

Cylindric(al): Cylinder-shaped.

Cyme: An inflorescence in which each flower is terminal, either on the main stem or a branch.

Cystolith: An intercellular mineral deposit that accumulates in some of the epidermal cells of some plants.

Deciduous: Eventually falling off.

Decumbent: Having the lower part of the stem lying along the ground, otherwise erect or ascending.

Decurrent: Extending below the level of attachment as a wing or a ridge of tissue, e.g., as when a leaf is decurrent on a stem.

Decussate: Describing opposite leaves that alternate at right angles to the pairs directly above and below them.

Dehiscent: Splitting open or apart at maturity to release contents.

Deltate: Broadly triangular.

Dentate: Prominently toothed along the margin.

Denticulate: Finely toothed along the margin.

Depressed: Flattened or slightly indented on one end.

Diadelphous: Describing stamens that are united by their filaments in two clusters, as in many legumes which have 9 stamens fused and one separate.

Dichotomous: Forking or branching in pairs.

Didynamous: Having 4 stamens that appear as two pairs of unequal length.

Diffuse: Branched and widely spreading.

Dimorphic: Having two different forms.

Dioecious: Having male and female flowers borne on separate plants.

Distichous: In two opposite rows.

Divaricate: Widely spreading.

Divergent: Spreading away from the main axis.

Dorsal: Referring to the side of an organ oriented away from the main axis, e.g., the underside of a leaf or the outer surface or back side of an organ; abaxial.

Drupe: A fleshy or fibrous, single-seeded fruit in which the seed is contained in a stony endocarp, e.g., a peach.

Ebracteate: Without bracts.

Eglandular: Without glands.

Elater: A winglike or straplike appendage on a spore adapted for wind dispersal.

Ellipsoid: Describing a solid object which is elliptic in outline.

Elliptic(al): In the shape of a flattened circle, more than twice as long as wide.

Emarginate: Shallowly notched at the apex.

Emergent. Growing upward above the water level.

Emersed: Adapted to grow out of water.

Entire: With a smooth margin.

Epigynous: Describing a flower in which the ovary is inferior.

Epipetalous: Describing stamens that are adnate by their filaments to the corolla.

Equitant: Describing 2-ranked leaves that overlap at the base and have the blades sharply folded lengthwise so that they appear oriented edgewise toward the stem, e.g., the leaves of iris and gladiolus.

Erose: With a thin, uneven or jagged margin.

Excurrent: Extending beyond the tip or margin as a mucro or awn.

Exserted: Extended beyond the mouth of an enclosing structure, as when stamens or styles project beyond the tip of a calyx or corolla.

Exstipulate: Without stipules.

Falcate: Gently arched, sickle-shaped.

Farinose: With a whitened, mealy-textured surface.

Fascicle: A cluster arising from a common base.

Fibrillose: Having small fibers.

Fibrous: Having or containing fibers.

Filamentous: Like a filament.

Filiform: Threadlike.

Flabellate: Fan-shaped.

Flexuous: Wavy or sinuous.

Floral: Of or pertaining to the flower.

Floret: A flower greatly reduced in size as in the Asteraceae; in the Poaceae, the flower (or grain) and its enclosing lemma and palea.

Floriferous: Flower-bearing.

Foliaceous: Similar to the leaves or leaflets in shape, size, texture and/or color.

Follicle: A unicarpellary fruit containing usually (1) few to several seeds and splitting open along one suture at maturity to release the seeds.

Fornix: A small, arched scale. (pl. fornices)

Frond: The leaf of a fern, or in Lemnaceae, a single thalloid segment of a colony.

Funnelform: Funnel-shaped.

Fusiform: Oblong and tapered at both ends.

Gibbous: Enlarged toward one side, usually at the base.

Glabrate: Glabrous with age.

Glabrous: Smooth, without hairs.

Glandular: Containing or bearing glands, these sessile or stalked, often shiny and resinous in appearance.

Glaucous: Whitish or bluish in color often due to a waxy coating.

Globose: Spherical in shape.

Glomerulate: With distinct, dense clusters.

Glomerules: Small, dense clusters.

Glumes: The two empty bracts at the base of a grass spikelet, the lowermost considered the first glume, the uppermost the second, seldom borne opposite each other, rarely absent.

Grain: The fruit of almost all grasses, with the seed coat fused to the pericarp and the embryo positioned toward one side within the fruit; also termed caryopsis.

Gynaecandrous: Describing an inflorescence of imperfect flowers in which the female flowers are borne above the male flowers.

Gynobasic: Describing a style which is attached basally rather than terminally to the ovary.

Gynoecium: The female portion of the flower, i.e., the carpels collectively.

Gynostegium: A central column in a flower formed by fusion of stamens and pistil, characteristic of Asclepiadaceae and Orchidaceae.

Haploid: Containing only one set of chromosomes as a result of meiosis.

Hastate: Descriptive of leaves having two divergent lobes at the base.

Hermaphroditic: Having all perfect flowers.

Heterosporous: Producing spores of two sizes, the larger giving rise to female gametophytes, the smaller to male gametophytes.

Hispid: With long, stiff, straight hairs.

Hispidulous: Somewhat or minutely hispid.

Hirsute: With rather stiff spreading hairs.

Hirsutulous: Minutely hirsute.

Homosporous: Producing spores of all one size.

Hyaline: Thin and translucent or transparent.

Hypanthium: A floral disk, cup or tube extending from the receptacle to surround the ovary(ies) in perigynous and most epigynous flowers. The sepals, petals and stamens arise from the rim of the hypanthium.

Hypogynous: Descriptive of flowers having the ovary(ies) superior and without a hypanthium.

Imbricate: Overlapping in rows like shingles on a roof.

Imperfect: Referring to flowers that are unisexual, i.e., having either functional stamens or pistil(s) but not both.

Incised: Deeply lobed or divided, but not completely divided into separate parts.

Indehiscent: Not splitting open or apart at maturity, remaining whole and retaining the contents.

Indurate: Hardened.

Indusium: A membranous outgrowth of a fern leaf that wholly or partly covers a sorus.

Inflated: Soft and swollen or expanded.

Inflexed: Curved inward.

Inflorescence: The flowers collectively and their arrangement on the plant.

Involucel: An involucre of reduced bracts on secondary branches of a compound inflorescence.

Involucral: Of the involucre.

Involucre: One or more series of bracts that subtend a flower or inflorescence.

Involute: Having the margins curled or rolled inward toward the upper surface.

Irregular: Bilaterally symmetric so that the flower can be divided in half in only one plane to give two equal halves.

Lacerate: With an irregular, jagged margin, appearing as if torn.

Laciniate: Deeply dissected into parallel, narrow segments.

Laminate: With a flat blade.

Lanceolate: Lance-shaped, broadest near the base, tapering to the tip and narrower than ovate.

Leaflet: One of the leaflike segments of a compound leaf.

Legume: The podlike fruit of most members of the mimosa, caesalpinia and legume families (Mimosaceae, Caesalpiniaceae and Fabaceae, respectively), derived from one carpel and usually dehiscent by two sutures.

Lemma: The lower, larger bract that, together with the smaller palea, subtends and encloses the flower in grasses. The lemma, palea and their enclosed flower comprise the floret. The lemma is often awned from the tip or back.

Lenticels: Blisterlike breaks in the epidermis of woody twigs. These develop to permit aeration of internal tissues.

Lenticular: Lens-shaped.

Ligule: In grasses and grasslike plants, a membranous or hairy extension arising from the inside of the leaf sheath at its juncture with the blade; a straplike structure; in the Asteraceae, the straplike corolla of a ray floret.

Linear: Long, flat and narrow with parallel sides.

Locule: A chamber or cell, usually inside an ovary.

Loculicidal: Describing a capsule which splits open longitudinally to expose the locules of the ovary, each suture corresponding to the midrib of one of the carpels comprising the ovary.

Lyrate: Lyre-shaped, with a large, rounded terminal lobe and smaller lateral lobes.

Malpighiaceous: Describing hairs which are centrally attached and tapered to two slender tips.

Mammillate: With one or more nipplelike projections.

Marcescent: Withering but remaining attached.

Membranous: Thin, soft, flexible and usually translucent; like a membrane.

Mericarp: One of the segments of a schizocarp.

Monadelphous: Describing stamens that are united by their filaments often to form a sheath around the pistil.

Moniliform: Like a string of loosely spaced beads.

Monoecious: Having both male and female flowers on the same plant.

Mucro: A short, sharp, abrupt, terminal point or awn.

Mucronate: Having an abrupt, short-awned tip.

Mucronulate: Minutely mucronate.

Nerve: A slender vein or rib of a leaf or other organ.

Node: The point of attachment of a leaf or leaves to a stem.

Nodulose: With small swollen joints or knots.

Nutlet: A small nut, similar to an achene.

Ob-: A prefix meaning in a reversed direction, usually in reference to shape.

Oblique: Slanted; or in the case of leaf blades and other flattened structures, having unequal sides or an asymmetrical base.

Oblong: Much longer than wide with nearly parallel sides.

Obsolete: Rudimentary, nearly absent.

Obtuse: Shaped with an angle of greater than 90° at tip or base.

Ocrea: A membranous sheath at nodes of the stem in the Polygonaceae, formed by fusion of the stipules. (pl. ocreae)

Olivaceous: Olive-green.

Orbicular: Round and flattened.

Ovate: Flat and egg-shaped in outline; rounded at the base, broadest below the middle and often pointed at the tip.

Ovoid: Egg-shaped.

Ovule: The small, egg-shaped structure (megasporangium) containing the female gametophyte in seed-bearing plants. With maturation the ovule becomes a seed.

Palate: A raised portion of the lower lip of a sympetalous corolla that nearly closes the corolla tube.

Palea: The uppermost or innermost of the two bracts (lemma and palea) that subtend and enclose the flower (or grain) in grasses.

Palmate: Divergent or branched from a common point of attachment like the fingers on the hand.

Panicle: A compound inflorescence in which flowers are borne on branches which themselves are branched, the entire inflorescence usually longer than broad; often used for any branched inflorescence of a grass or grasslike plant.

Papilla: A small blunt projection arising from a flat surface. (pl. papillae)

Papillate (-ose): Covered with short, blunt, cylindric projections.

Pappus: The modified calyx of a composite flower that persists on top of the ovary or fruit as a series of bristles, scales or stiff awns.

Parietal: Attached to the inner surface or wall of an enclosed structure such as an ovary.

Pectinate: Having closely parallel, slender, toothlike projections like a comb.

Pedicel: The stalk bearing a flower in an inflorescence.

Pedicellate: Borne on a pedicel.

Peduncle: The stalk of an inflorescence or a single flower if solitary.

Pedunculate: Peduncled. Borne on a peduncle.

Peltate: Describing a leaf or other flattened organ with the stalk attached at the center of the back side.

Pendulous: Hanging downward from a support.

Perfect: Describing flowers that have both stamens and pistil(s).

Perfoliate: With the leaf base completely encircling the stem.

Perianth: The floral envelope, consisting of the sepals and petals if both are present, or either of them if the other is absent.

Pericarp: The mature fruit wall derived from the ovary wall, varying from dry and membranous or firm in dry fruit types to mostly fleshy and juicy in fleshy fruits.

Perigynium: The saclike or scalelike structure that completely encloses the ovary (achene) in *Carex*.

Perigynous: Descriptive of a flower that has a hypanthium surrounding, but not fused to or completely enclosing the ovary(ies).

Petal: One of the innermost sterile appendages of the flower, usually soft-textured and colored; one member of the corolla.

Petaloid: Petallike.

Petiolate: With a petiole.

Petiole: The stalk of a leaf.

Petiolule: The stalk of a leaflet in a compound leaf.

Phyllode: An expanded leaf which is actually bladeless and derived from a flattened petiole.

Phyllodial: Describing leaves which are phyllodes.

Pilose: With straight, spreading hairs.

Pinna: A primary segment of a pinnately compound or lobed leaf. (pl. pinnae).

Pinnate: Divided or branched with the parts attached in two opposite rows along a main axis, like the pinnae of a feather.

Pinnatifid: Pinnately lobed but not divided all the way to the midrib.

Pinnatisect: Pinnately dissected into narrow segments.

Pinnule: The ultimate segment of a leaf that is pinnately divided two or more times.

Pistil: The female unit of a flower, consisting of the ovule-containing ovary below and the pollen receptive stigma(s) above, these usually connected to each other by 1 or more slender styles. (See carpel.)

Pistillate: Female, with functional pistil(s) only.

Plano-convex: With one face flat and the other low-rounded.

Plicate: With a series of longitudinal folds, like a fan.

Plumose: Feathery due to soft spreading hairs.

Pollinium: A waxy mass of pollen. (pl. pollinia)

Procumbent: Prostrate and lying on the ground.

Pruinose: With a heavy, waxy coating.

Puberulent: Minutely pubescent.

Pubescence: A covering of hairs.

Pubescent: With hairs on the surface.

Pulverulent: With very fine waxy granules on the surface.

Punctate: Dotted, often with glands.

Puncticulate: With tiny dots on the surface.

Pyriform: Shaped like a candle flame.

Raceme: An inflorescence in which flowers are individually stalked along a main axis.

Rachilla: The axis to which florets are attached in grasses and sedges, i.e., the main axis of a spikelet.

Rachis: The main axis of an inflorescence or a pinnately compound leaf.

Ray: In Asteraceae, the straplike corolla of a ligulate or ray floret; in Apiaceae, one of the primary branches of a compound umbel.

Receptacle: The terminal portion of a pedicel or 1-flowered peduncle to which the floral organs are attached. In Asteraceae, the disk on which the ray and/or disk florets are borne.

Recurved: Curved downward or backward.

Reflexed: Projecting downward.

Remote: Widely separated.

Reniform: Kidney-shaped.

Repand: With a shallowly wavy margin.

Replum: A persistent, membranous partition (placenta) that bears ovules on its margins and separates the two valves of the capsules in members of the mustard family (Brassicaceae).

Reticulate: With a netlike pattern of markings or veins.

Retrorse: Projecting backward or downward.

Retuse: Having a notch in a rounded or obtuse apex.

Revolute: Curled or rolled backward along the edges.

Rhizoid: A nonvascularized, rootlike structure.

Rhizomatous: Having rhizomes.

Rhizome: A creeping underground stem often bearing scale leaves.

Rosette: A cluster of leaves arising from a common point, usually the plant base.

Rotate: Describing a corolla that has a short tubular portion and widely spreading lobes so that the whole corolla is saucer-shaped.

Rufous: Reddish-brown.

Rugose: With cross ridges or wrinkles.

Rugulose: With a finely wrinkled surface.

Saccate: Sac-shaped.

Sagittate: Arrowhead-shaped.

Salverform: Trumpet-shaped, usually used to describe a sympetalous corolla with a slender tube and an abruptly flared limb.

Scaberulous: Finely scabrous.

Scabrous: Roughened with tiny toothlike or stiff, hairlike projections.

Scale: A small, dry chaffy bract that subtends and often encloses a flower, especially characteristic of the Cyperaceae.

Scape: A naked (leafless) or essentially naked stem that bears an inflorescence.

Scapose: Descriptive of a leafless stem that bears an inflorescence or describing a plant that has a scape.

Scarious: Thin, dry, nongreen and membranous in texture, like onion skin.

Schizocarp: A dry fruit that breaks longitudinally into separate segments at maturity, each segment retaining the seed(s) and usually corresponding to one of the carpels comprising the ovary.

Scorpioid: Coiled like a scorpion's tail.

Secund: Having parts that appear to arise from only one side of an axis; often used to describe an inflorescence in which flowers are borne on one side of a stem or branch.

Sepal: One of the outermost sterile appendages of the flower, normally enclosing the other floral parts in the bud; one member of the calyx.

Sepaloid: Sepallike.

Septate: Divided or partitioned into sections by cross walls.

Septicidal: Describing a capsule which splits open along longitudinal sutures that correspond with where septae attach to the ovary wall.

Septum: An internal partition; in an ovary, a longitudinal partition formed where adjacent carpels are united and dividing the ovary into cells. (pl. septae)

Sericeous: With long silky hairs, these normally lying on the surface.

Serrate: With toothed edges.

Serrulate: With finely toothed edges.

Sessile: Attached directly to a stem or other structure, lacking a stalk.

Setaceous: Bristlelike.

Silique: An elongate, usually terete capsule of the mustard family (Brassicaceae).

Simple: Unbranched or undivided, usually in reference to stems or leaves.

Sinuate: Wavy-margined.

Sinus: The indentation or space between adjacent lobes or divisions of a structure such as a leaf or corolla.

Sorus: A tiny cluster of sporangia borne on ferns. (pl. sori)

Spadix: A thick, fleshy spike of small, densely crowded flowers.

Spathe: One or two closely associated bracts that subtend a flower or inflorescence, characteristic of some monocots.

Spatulate: Spatula-shaped, i.e., long and slender with a broadened tip.

Spike: An unbranched inflorescence in which the flowers are all sessile on a main axis.

Spinulose: With weakly spine-tipped projections.

Sporangium: The spore-producing structure of a plant. (pl. sporangia)

Sporocarp: A hard, nutlike structure that contains sporangia.

Spp.: Abbreviation for the plural of species.

Spur: A slender, tubular appendage extending backward from the base of a sepal or petal.

Stamen: The male, pollen-producing organ of a flower, comprised of the anther and filament.

Staminate: Male, with functional stamens only.

Staminode: A reduced or otherwise modified, nonfunctional stamen.

Stigma: The often sticky or finely hairy, pollen-receptive portion of the pistil, borne on the terminal portion of a style or sometimes sessile on the ovary.

Stipe: A supporting stalk.

Stipitate: Borne on a stalk or stipe.

Stipules: A pair of appendages at the base of the petiole of some leaves that are membranous to foliaceous, minute to conspicuous, deciduous or persistent, sometimes fused together into one structure.

Stramineous: Straw-colored.

Striate: With fine longitudinal lines or nerves that run parallel.

Strigose: With stiff hairs lying flat against the surface.

Strigulose: Minutely strigose.

Stylopodium: A swollen, disklike base of a style, as in flowers of the Apiaceae.

Sub-: A prefix meaning nearly or almost.

Submersed: Adapted to grow or occur underwater; submerged.

Suborbicular: Nearly circular.

Subtend: Attached below and extending upward.

Subulate: Awl-shaped.

Succulent: Thick, fleshy and watery.

Superior: Descriptive of an ovary or ovaries positioned on the surface of the receptacle and not embedded in other tissues.

Sympetalous: Having the petals fused together.

Taproot: A root system with 1-few dominant vertical roots.

Tendril: A threadlike, often branched appendage on a stem or leaf that coils around plants or other objects to provide support for a climbing plant.

Tepal: A sepal or petal of a perianth in which the appendages are alike in size, shape, color and texture.

Terete: Round in cross section, like the leaves of an onion.

Ternate: Divided into three's.

Thallus: A small, flattened plant body, often not differentiated into stems and leaves.

Thyrse: A paniclelike inflorescence with one main indeterminate axis and many lateral axes which are determinate.

Tomentose: With a felty covering of dense, woolly hairs.

Tomentulose: Slightly tomentose.

Trichome: An epidermal hair, scale or other outgrowth on a plant.

Trifid: Divided into three branches or lobes.

Trigonous: Three-sided and thus triangular in cross section.

Trimorphic: Having three different forms.

Tripinnate: Pinnately divided three times.

Trullate: Trowel-shaped.

Truncate: Squared or leveled off at the base or tip.

Tuber: A fleshy rhizome or portion of a rhizome that functions as a food storage organ, e.g., a potato.

Tubercle: A small swelling, nodule or projection.

Tuberculate: Having tubercles.

Tuberous: Tuberlike, as in roots which are thick and fleshy.

Tufted: Clumped, with stems clustered together at the base.

Turbinate: Top-shaped.

Turion: A specialized shoot or bud that overwinters to resume vegetative growth the following growing season, sometimes becoming detached from the parent plant to start a new plant.

Umbel: An inflorescence with several to many stalked flowers arising from a common point, like the stems of a candelabra.

Umbellet: The small, secondary umbel in a compound umbel, as in most Apiaceae.

Umbelliform: Like an umbel, umbel-shaped.

Undulate: Wavy in an up and down fashion, vertically to the surface.

Urceolate: Urn-shaped.

Utricle: A small, 1-seeded fruit in which the pericarp is thin, dry and easily removed from the seed.

Valve: One segment of the wall of a dehiscent capsule, often corresponding to one of the carpels making up the ovary.

Ventral: Adaxial; referring to the side of a structure oriented toward the main axis, e.g., the upper surface of a leaf or the inner surface of an organ.

Verticel: One whorl, i.e., a group of leaves, bracts or flowers attached at the same level on a stem.

Verticillate: Whorled in arrangement.

Vesicular: Having one or more vesicles (saclike cavities).

Villous: Covered with long, soft hairs.

Viscid: Sticky.

Whorled: With three or more attached at the same level, usually in reference to leaves on a stem.

Winter bud: A specialized vegetative bud or condensed, leafy shoot that overwinters to resume growth the following growing season.

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