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Juncaceae (Rush Family) of New York State

Steven E. Clemants
New York Natural Heritage Program

Contributions to a Flora of New York State VII
Richard S. Mitchell, Editor

Bulletin No. 475

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THE UNIVERSITY OF THE STATE OF NEW YORK

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PREFACE

OUR GOAL in producing this series is to present a useful and authoritative account of the plants of New York State. These contributions are intended to reflect the knowledge and taxonomic opinions of specialists who prepare the manuscripts while following a generalized format for consistency. Inclusion of ecological, distributional, medical, and economic information on each species is also one of our major aims. Habitat references, flowering times, pertinent synonymy, etc., often apply specifically to New York plants rather than to the entire species. Complete illustration should facilitate identification of specimens for those who are not formally trained in botany. Descriptions are original, ordered, and as complete as possible to provide sequential cross-referencing.

Distribution maps accompany species of seed plants, ferns, mosses, lichens, and some groups of fungi. These are plotted by counties to eliminate pinpointing endangered habitats, while offering an accurate visual picture of past collecting. Maps are based on the master file at the New York State Museum, Albany, and supplemented by available data (specimens examined by the authors) from herbaria housing significant New York collections. Specific data or literature citations for any map may be obtained, on approval, from the museum.

We hope that these bulletins will serve individuals with interest in the flora, as well as to provide information for State and Federal agencies, conservation organization, industry, and the scientific community. With these works go our hopes for the preservation and wise use of a precious and lifegiving resource—our State's plantlife.

The New York State Flora Committee

The steering council of the New York State Flora Committee met for the first time on January 19, 1976, and established as its goals the promotion of study of the State's plant resources and the publication of this series of museum bulletins. These contributions will be continually updated after publication for possible incorporation into larger volumes at a later date.
Members of the council at the time of this publication are:

Richard S. Mitchell, Chairman, State Botanist, N. Y. State Museum, Albany (Vascular Plants)
Charles J. Sheviak, Curator of Botany, N. Y. State Museum, Albany (Vascular Plants)
Norton G. Miller, Chief Scientist, N. Y. State Biological Survey, Albany (Bryophytes)
Clark T. Rogerson, The New York Botanical Garden, Bronx (Fungi)
George J. Schumacher, Biology Dept., SUNY, Binghamton (Algae)
Gordon C. Tucker, N.Y. State Museum (Vascular Plants)

CONTENTS

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IMPORTANT NOTE

All economic uses, folklore, medical and pharmaceutical notes, uses as foodstuffs, etc., are compiled from the literature and do not represent an endorsement by the authors or the New York State Museum. Some of the uses may, indeed, be dangerous if incorrectly employed. Some are not effective and are presented for historical interest only.

LEGEND

FOR ALL MAPS IN THE FOLLOWING PUBLICATION THE FOLLOWING SYMBOLS APPLY

Solid dot—specimen seen by author: data on file at the State Herbarium (NYS)

Circle—field observation with location data and observer's name on file (NYS)

Hollow triangle—literature citation on file (NYS)

FOR ALL ILLUSTRATIONS IN THIS PUBLICATION, THE FOLLOWING LETTER-DESIGNATIONS APPLY:

A. Habit sketch
B. Perianth with fruit
C. Seed with testa removed
D. Seed with testa intact
E. Close-up of stem
F. Inflorescence
G. Auricle
H. Cross-section of leaf or stem
I. Summit of sheath
J. Glomerule
K. Tuberous rhizomes

Juncaceae (Rush Family)

The Juncaceae: a cosmopolitan family of annual and perennial herbs (shrubs in *Prionium*), particularly prominent in cool-temperate and mountainous regions of the world. Eight genera and about 300 species are recognized. *Juncus* and *Luzula* are widespread in both the Northern and Southern Hemispheres, whereas the other six genera are restricted in range and found only in the Southern Hemisphere. Miocene fossils of members of Juncaceae are known, and *Juncus* seeds are commonly found in Quaternary deposits. Some species of *Juncus* are used for basket making and thatch, or grown as horticultural oddities, and several species are considered weeds, but *Juncus effusus* L. is the only species that has significant horticultural or economic importance.

FAMILY DESCRIPTION

Perennial or annual herbs (rarely shrubs), from erect or horizontal subterranean stems (rhizomes), these rarely absent; plants sometimes stoloniferous. Stems terete to compressed, occasionally with subcuticular sclerenchyma bundles. Leaves simple, alternate, parallel-veined, cauline to basal. Often all leaves are basal or nearly so; the sheaths may be open or closed, usually auriculate; the blades are flat, involute, terete, or ensiform, entire or rarely serrulate, occasionally ciliate. Occasionally all leaves or the basal ones are reduced to cataphylls. Inflorescences are sympodial, terminal, and usually apical monochasia (sometimes appearing lateral by the prolongation of the erect, stem-like lowest bract), simple to decompound dichasia with monochasial branches, glomerulate with the glomerules in racemes, panicles or spikes (rarely single-flowered). Flowers usually bisexual, occasionally cleistogamous; bracteoles 2, immediately subtending the perianth, or bracteoles may be absent. The perianth is composed of 6 free tepals in 2 whorls (rarely 1 whorl suppressed, or tepals 4). Stamens are 3 or 6 (rarely otherwise), free. Ovary single, superior, tricarpellate and unilocular, trilocular, or imperfectly trilocular (with incomplete septa), the placentation is axile, parietal, or basal. Fruit is a loculicidal capsule with three or many seeds; seeds always more numerous than the locules. Seeds are tailed or not, and may bear a large caruncle. Embryo small and straight with a terminal cotyledon and a lateral plumule embedded in starchy endosperm.

KEY TO GENERA

1. Seeds many, without caruncles; leaves glabrous; sheaths open ..... 1. *Juncus*
1. Seeds three per capsule, usually with caruncles; leaves ciliate, especially at the summit of the closed sheaths ..... 2. *Luzula*

1. JUNCUS

Common Name: Rush

Authority: Linnaeus, Species Pl. 1, p. 325, 1753

There are about 240 species of *Juncus*, native to all continents except Antarctica. They are most diverse in the Northern Hemisphere. Rushes can be found in a wide variety of habitats from aquatic to xeric. Some species (particularly *J. effusus*) are used in weaving, thatching, and making candle wicks. Only a few species are planted as horticultural oddities.

Description: Plants with **bisexual** flowers; **stigmas** 3, filiform, mostly erect and entwined (spirally twisted) prior to anthesis and spreading at anthesis; **style** 1, cylindrical or filiform, short (sometimes obscure) or long; **ovary** tricarpellate, unilocular, trilocular, or imperfectly trilocular (*i.e.* with incomplete septa, usually trilocular below and unilocular above); **ovules** anatropous; **placentation** axillary or parietal depending on the number of locules; **fruit** a many-seeded loculicidal capsule; **seeds** numerous, usually ellipsoid or ovoid, sometimes tailed (the tails are extensions of the outer integument); **embryo** small, straight, imbedded in starchy **endosperm**; **stamens** 3 or 6 (rarely otherwise), when 3 then opposite the outer tepals; **filaments** linear; **anthers** oval to elliptical, opening by vertical slits; **perianth** two whorls of three tepals each; **tepals** free, **inner** and **outer tepals** usually similar; **flowers** subtended by two bracteoles (prophylls) or bracteoles absent; **pedicels** long, short or nearly absent, the flowers often clustered into multi-flowered glomerules; **bracts** present at the base of the pedicels and peduncles; **inflorescence** monochasial or dichasial, usually with monochasial branches or in glomerules, the glomerules 1-2 or many in racemes or panicles, or flowers borne singly; **lowest bract** usually leaf-like, occasionally stem-like; **leaves** flat, involute, ensiform or terete, sometimes septate; **sheaths** open (in ours); **cataphylls** often present at stem base; **stems** erect or sometimes decumbent; **rhizomes** usually present, horizontal or ascending; **stolons** occasionally present; **root system** fibrous.

GUIDE TO IDENTIFYING RUSHES

Because many immature, overly mature and sterile collections of *Juncus* are to be found in herbaria, the following notes on identification of such specimens may be helpful. Certain terms employed in the key to *Juncus* species are also defined, and the subgeneric classification of *Juncus* is discussed.

The genus *Juncus* is often divided into two groups, based on the presence or absence of bracteoles. **Bracteoles** (also known as prophylls) are small bracts inserted on the pedicel immediately below the perianth. Care must be taken not to confuse the bracteoles with the two bracts inserted on the peduncle at the base of the pedicel. For example, *J. pelocarpus* plants, without bracteoles, appear to have bracteoles because the pedicel is very short and the bracts subtending the pedicel seem to subtend the perianth. Similarly, *J. bufonius*, with two bracteoles, appears to possess four, because the pedicel is very short and the bracts subtending simulate bractioles. In New York State there are three subgenera with true bracteoles (**Genuini**, **Poiophylli** and **Pseudotenageia**) and five subgenera without them (**Graminifolii**, **Ensifolii**, **Juncus**, **Alpini** and **Septati**).

Glomerules are densely crowded, head-like cymes of flowers. Plants of the subgenera with bracteoles usually lack glomerules, while those of the subgenera without bracteoles usually have them. Pedicels and peduncles within the glomerules are often very difficult to differentiate. Fortunately only a few species in the subgenera with bracteolate individuals appear to have glomerules. *Juncus bufonius* var. *halophyllus* has loose clusters of 2-3 flowers at the ends of monochasia, but elsewhere in the inflorescence the flowers are inserted singly at the nodes; *J. effusus* var. *conglomeratus* has dense, spherical masses of flowers that might be interpreted as glomerules, but its inflorescences are pseudolateral (see below). In addition, only one New York species that lacks bracteoles also lacks glomerules: *J. pelocarpus* has flowers inserted singly or in pairs at the nodes of the inflorescence. Further division of bracteolate and ebracteolate groups into subgenera is based predominantly on vegetative characters. The more important of these are leaf traits, such as the shape of the leaf in cross-section, the occurrence of septations and the presence or absence of a blade. The following paragraphs enumerate characteristics of the subgenera and list significant characters used to separate species:

A. Subgenus **Genuini** (including *J. effusus*, *J. inflexus*, *J. filiformis* and *J. arcticus*): flowers bracteolate, the inflorescence appearing lateral due to an erect lowest bract that often simulates a continuation of the stem. These species often produce "shoots" that appear to be sterile stems but are actually leaves; therefore, some keys describe the leaves of these species as terete. In the key to *Juncus* species to follow (couplet 1), the presence or absence of leaves should be determined using only fertile shoots. Species of this subgenus are easily separated vegetatively if the underground portion is collected. The key to species within this subgenus begins at couplet 2.

B. Subgenus **Poiophylli**: flowers bracteolate; inflorescence terminal; annual plants. *Juncus bufonius* (species 5) is the only New York representative of this subgenus. It is easily identified by the proportionally large inflorescence. The only other species with a comparable inflorescence is *J. pelocarpus*, which lacks bracteoles and is perennial. R. E. Brooks (pers. comm.) does not believe that this subgenus is distinct from the next, and discourages separating the two.

C. Subgenus **Pseudotenageia** (including *J. trifidus*, *J. gerardii*, *J. compressus*, *J. secundus*, *J. tenuis*, *J. dudleyi* , *J. dichotomus* and *J. greenei*): flowers bracteolate; inflorescence terminal; perennials. The leaves of plants of this subgenus are variable; they may be broadly channeled with margins slightly incurved or subterete (tightly involute) and slightly grooved. In all instances they have enlarged cells on the abaxial surface and lack septa. Species of this subgenus are often distinguished by their vegetative characters. The key to species with broadly channeled leaf blades begins at couplet 8, and the key to species with subterete leaves begins at couplet 16.

D. Subgenus **Graminifolii**: the flowers lack bracteoles; inflorescence terminal, glomerulate; leaves flat. *J. marginatus* (species 14) is the only New York representative of this subgenus. It is the only New York species with flat, grass-like leaves (the broad surface of the blade facing the stem) that lack septa.

E. Subgenus **Ensifolii**: the flowers lack bracteoles; inflorescence terminal, glomerulate; leaves conduplicate and flattened, with an edge toward the stem (as in *Iris*). *Juncus ensifolius* (species 15) is the only New York state representative of this subgenus. It has leaf blades that are conduplicate, with the two folds of the blade fused near the sheath. The blade is flattened, but with a different orientation to the stem than in *J. marginatus*.

F. Subgenus **Juncus**: the flowers lack bracteoles; inflorescences terminal (occasionally appearing lateral), glomerulate; leaves terete, not septate. *Juncus maritimus* (species 16), the only New York state representative of this subgenus, may be extirpated. A relative of this species, *J. roemerianus* reaches New Jersey and could possibly occur in southern New York.

G. Subgenus **Alpini**: the flowers lack bracteoles; inflorescences terminal, glomerulate; leaves terete, septate toward the apex. *Juncus stygius* (species 17) is the only New York representative of this subgenus. It has the largest capsules and seeds of any of our native rushes. Its inflorescence consists of one or a few capitate clusters, each cluster with few flowers. Technically, this species has transverse septa near the apex of the leaf blade, but they are so inconspicuous that the species is keyed here as

if it lacked septa. *Juncus stygius* has rarely been collected in New York State, and it is only to be expected in the Adirondacks or elsewhere north of the Mohawk Valley.

H. Subgenus **Septati**: the flowers lack bracteoles; inflorescence terminal, glomerulate; leaves terete, septate. Except for *J. ensifolius*, all New York specimens with obviously septate leaves are in this subgenus. Species in this subgenus are difficult to identify vegetatively because the keys are based on technical floral characters; however, several informal groups may be identified among New York specimens that are fairly easy to distinguish vegetatively.

Informal Groupings and Distinctive Species:

1. *Juncus pelocarpus* (species 18) lacks glomerules; the flowers are inserted singly or in pairs along the inflorescence branches. This species is often found totally submersed under water and sterile.
2. *Juncus militaris* (species 27) is a robust plant, with two cauline leaves, whose sheaths are inflated; the lower cauline leaf is very long, surpassing even the inflorescence. It is the only New York species that occasionally produces clusters of long, filiform leaves along the rhizome.
3. *Juncus scirpoides* group (including *J. torreyi*, *J. nodosus*, *J. scirpoides* and *J. brachycarpus*): plants with narrow, subulate tepals and spherical glomerules (when mature). Plants of the first two species listed have slender, horizontal rhizomes, occasionally with thick, tuberous nodules; there are 6 stamens, and the lowest bracts usually overtop the inflorescence. Both of these species are found throughout the State (see couplet 28). The second two species always have thick, tuberous rhizomes (without nodules), 3 stamens per flower, and the lowest bracts are much shorter than the inflorescence. Both are restricted to Long Island in New York State (couplet 31).
4. *Juncus canadensis* group (including *J. canadensis*, *J. brevicaudatus*, *J. subcaudatus*, and *J. brachycephalus*): these are usually distinguished from the *J. acuminatus* and *J. articulatus* groups by their tailed seeds. Other, less reliable, characters include the nature of the sheath and the tepals. The green part of the sheath (not the scarious margin) usually arches at the summit with prominent ribs in the *J. canadensis* group, whereas, in the next two groups, the green part of the sheath usually tapers at the summit and has faint nerves. The outer tepals are usually stiffly ribbed, whereas, in other species of subgenus *Septati*, the outer tepals are usually not stiffly ribbed, though they may be ribbed or nerved. The key to species in this group begins at couplet 23.
5. *Juncus acuminatus* and *J. articulatus* groups have different stamen numbers. Members of the *J. acuminatus* group (including *J. acuminatus* and *J. debilis*) have 3 stamens per flower (couplet 32), while flowers of the *J. articulatus* group (including *J. articulatus* and *J. alpinoarticulatus*) have 6 stamens (couplet 29). Note that the stamens sometimes break-off in very mature specimens, so remnants of the filaments may be obscure and difficult to detect.

KEY TO JUNCUS SPECIES

1. Inflorescences terminal, the lowest bract erect to ascending, flat, involute or terete; basal leaves present (usually along with cataphylls); cauline leaves present or absent ..... (5)
1. Inflorescences appearing lateral, the lowest bract terete, erect, seeming to be a continuation of the stem; basal leaves absent, only cataphylls present; cauline leaves absent ..... (2)
   2. Stems densely tufted on short, inconspicuous rhizomes; anthers about the same length as the filaments; stamens 3 or 6 ..... (3)
   2. Stems well spaced along creeping rhizomes (or rarely solitary); anthers either much longer (3-5 times) or shorter (1/3-1/2 the length) than filaments; stamens 6 ..... (4)
3. Stamens 3; mature capsules olive-green to brown, the apex obtuse to truncate or sometimes retuse ..... 1. *J. effusus*
3. Stamens 6; mature capsules reddish-brown to castaneous, the apex acute to obtuse ..... 2. *J. inflexus*
   4. Anthers 3-5 times the filament length; tepals brown with castaneous bands between the midvein and the margins; rhizomes 4-6 mm in diameter ..... 3. J. *arcticus* var. *littoralis*
   4. Anthers 1/3-1/2 the filament length; tepals green to stramineous, without castaneous bands; rhizomes 1.0-1.5 mm in diameter ..... 4. *J. filiformis*
5. Leaves flat or broadly channeled ..... (6)
5. Leaves terete or tightly involute and narrowly channeled [they may be flattened in pressing] ..... (15)
   6. Flowers in dense head-like clusters (glomerules); leaves 1.5 mm or more wide; bracteoles absent ..... (14)
   6. Flowers borne singly on the inflorescence branches; leaves usually less than 1.5 mm wide; bracteoles present ..... (7)

7. Plants annual with soft bases; inflorescences 1/4-9/10 the height of the plant; basal leaf sheaths without auricles....5. *J. bufonius*
7. Plants perennial, often tufted, with short (inconspicuous) to long rhizomes; inflorescences usually less than 1/4 the height of the plant; leaf sheaths with auricles ....(8)
8. Auricles lacerate, the free portion deeply cleft, commonly 3-lobed; inflorescence with 1 to 3 (rarely 4) flowers in a helicoid cyme (monochasium); capsule distinctly beaked; leaf blades serrulate ....6. *J. trifidus*
8. Auricles entire or occasionally erose, the free portion uncleft, rounded or tongue-shaped; inflorescence usually with many flowers (at least more than 3) in a compound cyme (a dichasium with monochasial branches); capsule rounded to retuse at the apex, unbeaked; leaf blades entire ....(9)
9. Uppermost leaves attached at or above the middle of the culm; inner tepals 1.5-2.0 (-3.0) mm long, with broad, scarious margins near the obtuse apex; rhizomes elongate laterally; culms not tufted ....(10)
9. Uppermost leaves attached much below the middle of the culm, usually arising from the lower 1/5 of the culm; inner tepals 2.5-5.2 mm long, without broad scarious margins, apex acute to acuminate; underground stems short, erect or ascending and inconspicuous; culms tufted ....(11)
10. Stamens 1.5-2.2 mm long; anthers 2-6 times the filament length (usually about 3 times); capsules about equaling the perianth ....7. *J. gerardii*
10. Stamens 0.8-1.0 mm long; anthers less than 2 times the filament length (usually equaling the filament length); capsules usually exceeding the perianth ....8. *J. compressus*
11. Capsules trilocular; placentation axile, with partitions extending to a central axis; leaf tips rarely surpassing half the height of the plant; auricles membranaceous, rounded, the free portion scarcely prolonged ....9. *J. secundus*
11. Capsules unilocular or imperfectly trilocular; placentation parietal, the partitions extending at most half-way to the central axis of the capsule; leaf tips usually surpassing half the height of the plant; auricles varied ....(12)
12. Auricles scarious or hyaline, the free portion narrowly deltoid to tongue-shaped, 1-2 (-6) mm long; sheath margins scarious, friable ....10. *J. tenuis*
12. Auricles cartilaginous to membranaceous, the free portion rounded, less than 1 mm long; sheath margins cartilaginous to membranaceous, brittle but not friable ....(13)
13. Auricles cartilaginous, yellow and glossy; inner leaf sheaths brown ....11. *J. dudleyi*
13. Auricles membranaceous, stramineous, not glossy; inner leaf sheaths pinkish ....12. *J. dichotomus*
14. Leaf folded (conduplicate) and connate above, with one edge facing the stem [as in *Iris*]; leaves with incomplete septa; capsules ellipsoid, 3.0-3.5 mm long, tapering to a short beak ....15. *J. ensifolius*
14. Leaf not folded or connate, with the leaf surface facing the stem [as in grasses]; leaves lacking septa; capsules obovoid to globose, 1.8-2.9 mm long, blunt to rounded at the apex ....14. *J. marginatus*
15. Leaves involute, with an evident, but shallow, adaxial groove; bracteoles present ....(16)
15. Leaves terete, usually septate, never channeled; bracteoles absent ....(17)
16. Capsule included to slightly exserted from the perianth; tepals spreading from the base of the capsule ....12. *J. dichotomus*
16. Capsule exserted; tepals appressed to the capsule ....(18)
17. Seeds not tailed; capsules castaneous or darker ....13. *J. greenei*
17. Seeds distinctly tailed, the tail at least half the length of the seed body; capsules golden tan ....*J. vaseyi* (report only)
18. Leaf blades with cross-partitions at regular intervals (septate) [if this is not evident in a dry leaf, lay the leaf on a hard surface and run your fingernail along it] ....(20)
18. Leaf blades without cross-partitions (not septate) ....(19)
19. Capsules 2.5-3.5 mm long; seeds 0.8-1.2 mm long; inflorescence with 50-100 clusters of flowers (glomerules); lowest bract 7-16 cm long ....16. *J. maritimus*
19. Capsules 6-7 mm long; seeds 3.0-3.5 mm long; inflorescence often capitate, with 1-3 glomerules; lowest bract 0.6-1.4 cm long ....17. *J. stygius* var. *americana*
20. Flowers in clusters (glomerules) of usually 3 or more; inflorescence a raceme or panicle of glomerules usually less than 1/4 the total height of the plant ....(21)
20. Flowers borne singly or in pairs; inflorescence a compound cyme [technically a dichasium with monochasial branches] usually 1/4 or more the total height of the plant ....18. *J. pelocarpus*
21. Lowest cauline leaf surpassing the inflorescence, the blade 50-70 (-90) cm long; filiform leaves produced from the rhizome ....27. *J. militaris*
21. Lowest cauline leaf never surpassing the inflorescence, the blade usually 2-30 cm long (rarely up to 50 cm); filiform leaves not produced ....(22)
22. Seeds 0.7-1.9 mm long, tailed; seed body covered with a semi-opaque, whitish veil; leaf sheath usually distinctly ribbed, the ribs arching to the base of the blade ....(23)
22. Seeds 0.3-0.7 mm long, not tailed; seed body clear yellow-brown, not veiled; leaf sheaths smooth or nerved, rarely deeply ribbed, the nerves or ribs usually tapering to the base of the blade ....(26)

23. Outer tepals obtuse to subacute; capsules 2.4-3.8 mm long; seeds with short tails (ca. 1/10 the body length) ..... 19. *J. brachycephalus*
23. Outer tepals acuminate; capsules 3.0-4.8 mm long; seeds with short or long tails ..... (24)
24. Inflorescence narrowly cylindric, the branches erect; capsules exserted more than 0.7 mm beyond the perianth; glomerules 2-5 flowered; seeds with tails 1/3 - 1/2 the body length ..... 20. *J. brevicaudatus*
24. Inflorescence ovoid or broadly ovoid, the branches stiffly ascending to divergent; capsules exserted less than 0.6 mm beyond the perianth or included; glomerules 5-many flowered; seeds with tails 1/3 to equal the body length ..... (25)
25. Seeds with tails 2/3 to as long as the body; all inflorescence branches similarly stiffly ascending to spreading .21. *J. canadensis*
25. Seeds with tails about 1/3 the body length; some inflorescence branches divergent ..... 22. *J. subcaudatus*
26. Stamens 6 [in very mature fruiting materials, remnants of the filaments may be found opposite the inner tepals] ..... (27)
26. Stamens 3 ..... (30)
27. Lowest bract longer than the inflorescence; capsule subulate, the valves cohering at the apex after dehiscence; tepals subulate; glomerules spherical ..... (28)
27. Lowest bract shorter than the inflorescence; capsule lanceolate, the valves not cohering; tepals lanceolate; glomerules hemispherical to turbinate ..... (29)
28. Outer tepals 2.4-4.1 mm long, equaling the inner tepals; auricles with free portions 0.5-1.0 mm long ..... 23. *J. nodosus*
28. Outer tepals (3.7-) 4.2-6.0 mm long, longer than the inner tepals; auricles with free portions 2-4 mm long ..... 24. *J. torreyi*
29. Inflorescence branches ascending; inner tepals obtuse to acute, slightly shorter than the outer ones ..... 28. *J. alpinoarticulatus*
29. Inflorescence branches spreading; inner tepals acute to acuminate, about the same length as the outer ones or slightly longer ..... 29. *J. articulatus*
30. Tepals subulate; glomerules globose; rhizomes tuberous ..... (31)
30. Tepals lanceolate; glomerules usually hemispherical to turbinate; rhizomes never tuberous ..... (32)
31. Capsules subulate, exserted; valves cohering at the apex after dehiscence ..... 25. *J. scirpoides*
31. Capsules ovoid, included; valves not cohering after dehiscence ..... 26. *J. brachycarpus*
32. Tepals 2.6-3.5 (-3.9) mm long; capsule about equaling the perianth; plants erect ..... 30. *J. acuminatus*
32. Tepals 1.8-2.3 (-2.5) mm long; capsule exserted; plants weakly erect to decumbent ..... 31. *J. debilis*

A. *Juncus* Subgenus *Genuini* Buch.

Perennials; rhizomatous; leaves absent (rarely with one cauline leaf near the inflorescence), with only basal cataphylls present; inflorescence appearing lateral because of the erect, stem-like lowest bract (rarely the inflorescence is obviously apical); bracteoles 2; seeds not tailed (rarely short tailed).

1. *Juncus effusus* L.

Common Names: Common Rush, Smooth Rush, Soft Rush, Candle Rush

Type Description: Linnaeus, Species Pl. I, p. 326, 1753

Habitats: Swamps and their edges, marshes, moist meadows and moist or saturated soils; often conspicuous in pasture meadows where it is shunned by grazing animals

Habit: Erect, densely cespitose, terrestrial to semiaquatic perennial herbs

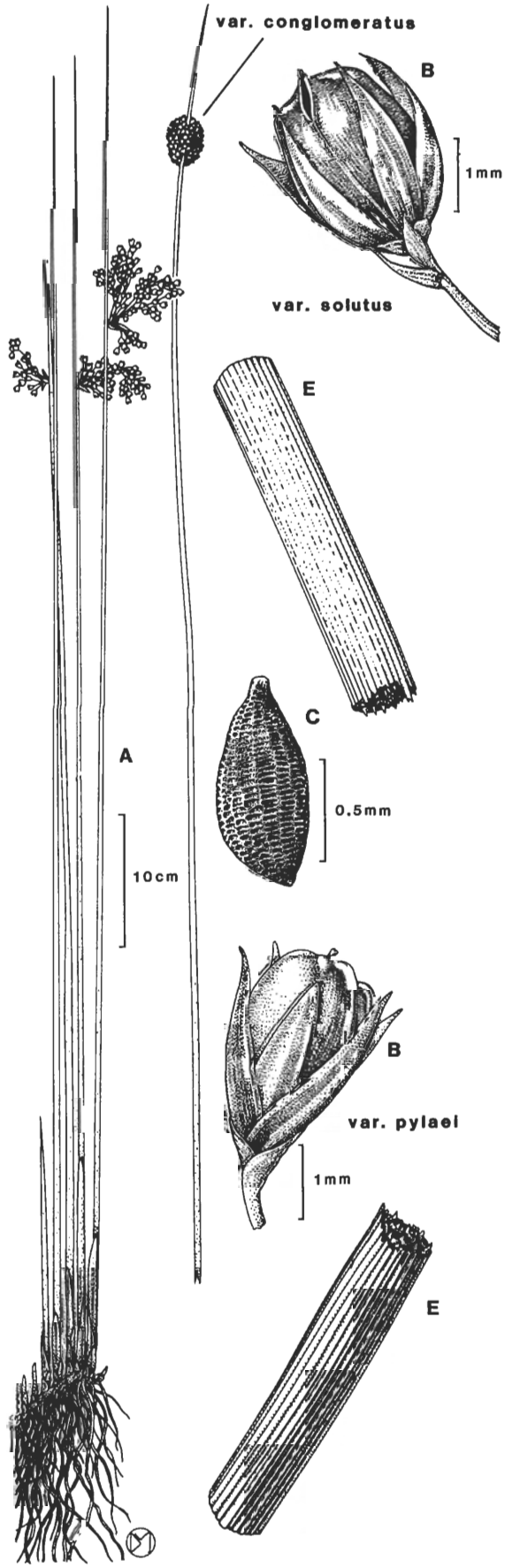
Flowering: June-July

Fruiting: July-October

General Distribution: Eurasia to North and South America; in North America from Newfoundland to Alaska south to Mexico and Florida

Description: Flowers **bisexual**; **stigmas** erect and entwined to spreading, 0.5-1.0 mm long; **style** 0.1-0.2 mm long; **ovary** ovoid to obovoid; **fruit** a trilocular, olive green to brown, ellipsoid to broadly ovoid capsule, 1.7-3.0 mm long, subequal, apex obtuse to truncate to retuse, sometimes apiculate, broadly mucronate; **valves** 1.1-1.5 mm broad; **seeds** obliquely fusiform to ellipsoid, light brown, 1.0-1.2 mm long, ends often dark pointed, tegmen with transversely elliptical areolae (appearing scalariform under low magnifications); **stamens** 3, 1.0-1.6 mm long; **filaments** reddish brown; **anthers** yellowish-white, equal to the filament length or slightly shorter; **tepals** spreading, green to stramineous sometimes with brown bands between midvein and margin, lanceolate, apex acuminate or occasionally cuspidate, margin scarious; **inner tepals** 1.9-3.0 mm long, 0.5-0.7 mm broad; **outer tepals** 1.9-3.6 mm long, 0.5-0.8 mm broad; **bracteoles** scarious, widely ovate, 1.0-1.5 mm long, apex acute to cuspidate; **pedicels** 0-5 mm long; **bracts** scarious, narrowly lanceolate, 2-8 mm long, apex acuminate to cuspidate, margin entire; **rachis** 2-20 mm long; **inflorescence** appearing lateral, sympodial, a decompound dichasium often with monochasial branches, diffuse to capitate, 1.5-4.0 cm long; **monochasia** 2-4 flowered, erect to depressed, 5-20 mm long; **lowest bract** erect, terete, seemingly a continuation of the stem, 10-29 (-35) cm long, exceeding the inflorescence, apex acuminate; **cauline leaves** absent; **basal leaves** absent; **cataphylls** 1-4, dark red to dark brown, 3-23 cm long, summit of sheaths rounded, long mucronate; **stems** erect, terete, (50-) 60-100 (-130) cm tall to the base of the inflorescence, 1-5 mm diameter immediately above the basal sheaths, subepidermal schlerenchyma bundles present, densely cespitose; **rhizomes** erect to ascending, dark brown, 2-4 mm thick; **roots** few, to 1 mm diameter (2n = 40, 42).

Infraspecific Variation: *Juncus effusus sensu lato* is a widespread, polymorphic species that has been widely studied in Europe (Agnew, 1968; Hård and Segerstad, 1940; Krísa, 1962), in North America (Fernald &



Wiegand, 1910; Hämet-Ahti, 1980; Sohmer, 1970) and in New Zealand (Edgar, 1964). A testament to the complexity of this species complex is that, after all these studies, there is still no consensus on the taxonomy of the group. *Juncus effusus* is often subdivided into two assemblages based on anatomy: 1) the conglomeratus group with few, coarse, subcuticular sclerenchyma bundles, and 2) the effusus group with numerous, fine, subcuticular sclerenchyma bundles. Edgar (1964) found that other characters (such as number and disposition of the first leaves) supported this division of the complex in New Zealand; unfortunately these observations have not been extended to North American taxa. Representatives of both groups occur in New York; *J. effusus* var. *pylaei* and *J. effusus* var. *conglomeratus* have few, coarse bundles and *J. effusus* var. *solutus* has numerous, fine bundles. Some authors treat the infraspecific taxa of the *J. effusus* complex as distinct species, but so much morphological overlap occurs that the taxa can not always be reliably identified. In Europe only two taxa occur, *J. effusus sensu stricto* and *J. conglomeratus*, yet the situation is not much clearer there. At their extremes, the two taxa are easily separated, but they frequently intergrade (Agnew, 1968; Krísa, 1962).

KEY TO VARIETIES

1. Inflorescence a densely congested, nearly spherical cluster of flowers; sheath of the primary bract inflated ..... 1a. *J. effusus* var. *conglomeratus*
1. Inflorescence diffuse, spreading, rarely somewhat congested but never subspherical; sheath of the primary bract not inflated ..... (2)
   2. Stems coarsely sulcate with 10-20 strong ridges (subepidermal sclerenchyma bundles) just below the inflorescence; outer tepals (2.4-) 2.7-3.6 mm long, usually longer than the inner tepals, usually green with brown bands between the midvein and the scarious margin; stems 1.0-3.0 (-4.0) mm broad immediately above the cataphylls ..... 1b. *J. effusus* var. *pylaei*
   2. Stems smooth or with 25-30 fine striations (weak subepidermal sclerenchyma bundles) just below the inflorescence; outer tepals 1.9-2.8 mm long, usually about the same length as the inner tepals, stramineous, usually without brown bands between the midvein and the scarious margin; stems (2.1-) 3.0-5.0 mm broad immediately above the cataphylls ..... 1c. *J. effusus* var. *solutus*

1a. *Juncus effusus* var. *conglomeratus* (L.) Engelm. in Gray

Synonyms: *J. conglomeratus* L., *J. effusus* var. *compactus* of authors, not Lej. & Courtois, *J. leersii* T. Marsson

Origin: Europe

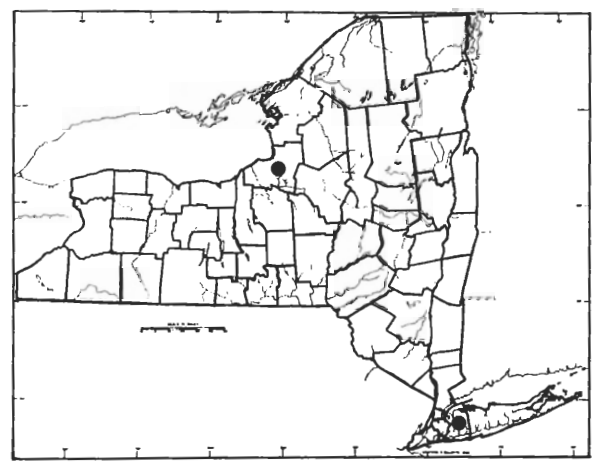
Flowering: July

Fruiting: July

General Distribution: Europe; in North America this variety is introduced in a few widely scattered localities from Newfoundland to Quebec south to New York

Ploidy: 2n = 40, 42

Note: Plants of this variety is often difficult to separate from compact-headed individuals of the following variety.



1b. *Juncus effusus* var. *pylaei* (La Harpe) Fern. & Wieg.

Synonyms: *J. effusus* var. *costulatus* Fern., *J. effusus* var. *decipiens* of Amer. authors, not Buch., *J. pylaei* La Harpe

Origin: Northeastern North America

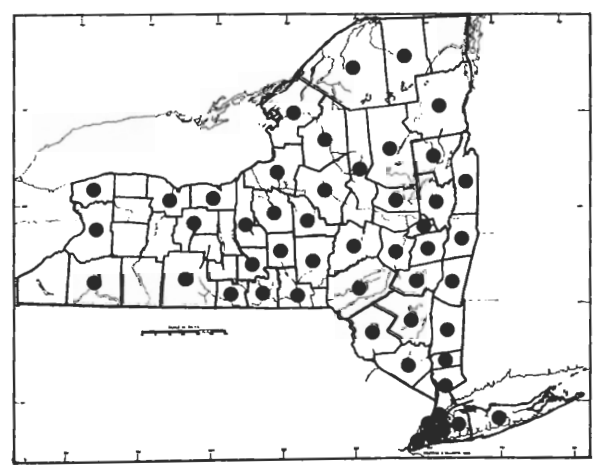
Flowering: (April) June-July (August)

Fruiting: late June-October

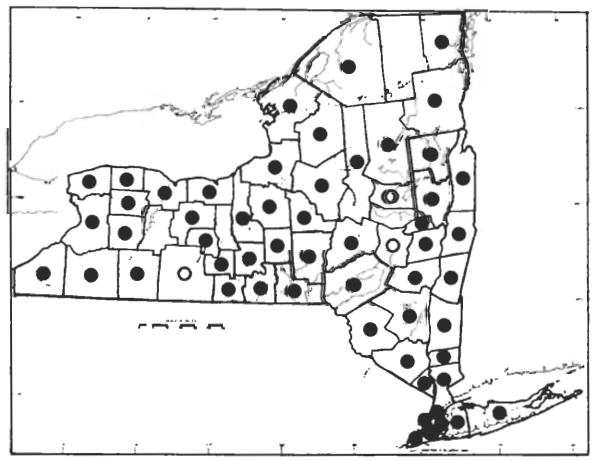
General Distribution: Eastern North American from Newfoundland to Ontario south to Minnesota and North Carolina, a few specimens from Montana and Idaho have also been referred to this variety

Ploidy: (2n = 40)

Note: This variety occurs over much the same range as the next and may intergrade with it.



1c. *Juncus effusus* L. var. *solutus* Fern. & Wieg.



Synonyms: *J. effusus* ssp. *solutus* (Fern. & Wieg.) Hämet-Ahti

Origin: Temperate, eastern North America

Flowering: June-July (late August)

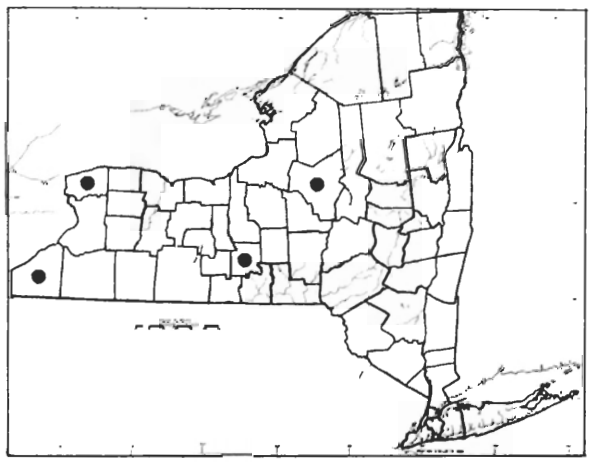
Fruiting: mid June-October

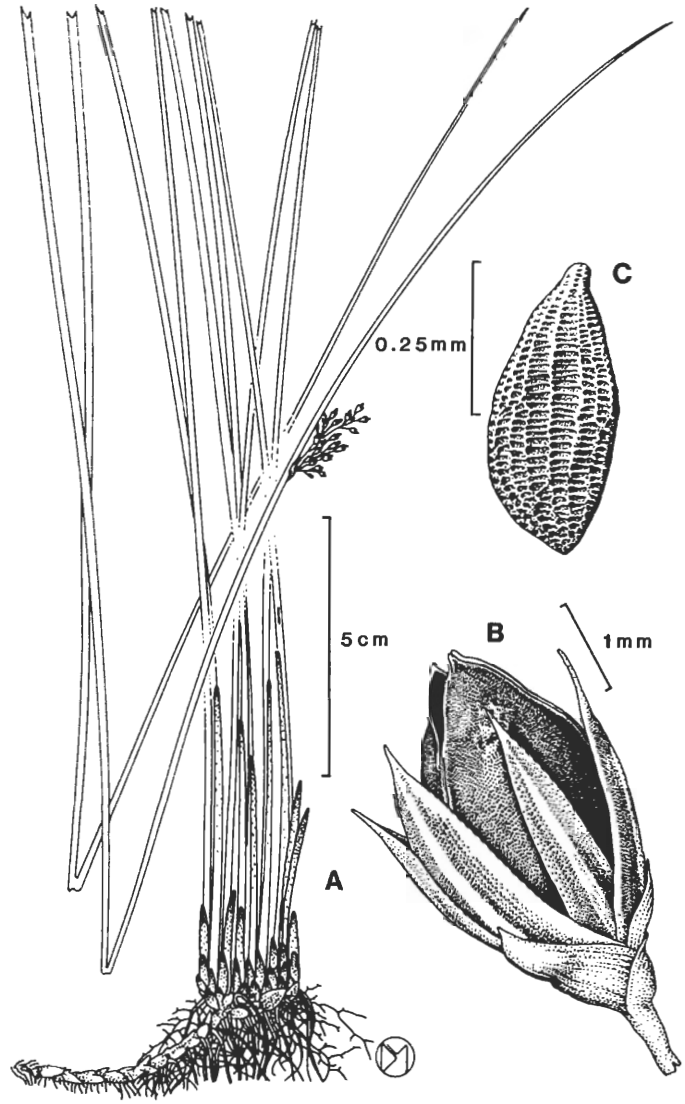
General Distribution: Newfoundland to Minnesota south to Mexico and Florida, and a single collection from British Columbia.

Ploidy: unknown

Note: This variety occurs over much the same range as the preceding one, and may intergrade with it. A fourth variety, *J. effusus* var. *effusus*, should be expected in New York. Typical *J. effusus* resembles *J. effusus* var. *solutus* in its numerous, fine sclerenchyma bundles and open inflorescence, but differs in having soft perianth segments that spread from the base of the capsule and in its ovoid to globose capsules. Typical *J. effusus* has been introduced to eastern North America, where it has become established in certain areas, but there are currently no verified records from New York State.

Importance: *Juncus effusus* is the common rush used in weaving, particularly for floor mats, baskets and chair seats, and it is cultivated in China and Japan for that purpose. The pith is used as a candle and lamp wick; when mashed and treated with alkali it makes a fiber that can be spun into thread. In Asia and the Pacific, decoctions of the pith are considered antilithic (used to counteract bladder stones), pectoral, discutient (used to dissolve stones), diuretic and depurative, the seeds are considered cathartic, while the roots are diuretic, used especially to treat strangury (slow and painful urination). The Cherokee made an emetic by boiling *J. effusus* together with soft bulrush (*Scirpus tabernaemontanii* Gmel.), crown vetch (*Coronilla varia* L.), wood-vetch *Vicia caroliniana* Walt. and the bark of poison ivy [*Toxicodendron radicans* (L.) Kuntze]. The resulting decoction was drunk every day for four days and reboiled before each use. The pith has been used as a convenient medium to keep fistulous sores open for healing purposes. Cultivars, selected for their cork-screw or twisted stems, have long been grown as horticultural curiosities. Such forms are reported in horticultural literature as "cv. Spiralis," *J. spiralis* or *J. effusus spiralis*. Forms with color banding on the leaves are called "Zebrinus" (with white stripes) and "Aureus Striatus" (with yellow).





2. *Juncus inflexus* L.

Common Name: Blue Rush

Type Description: Linnaeus, Species Pl. I, p. 326, 1753

Synonym: *J. glaucus* Ehrh.

Origin: Uncertain; the species is a widespread native in Eurasia and Africa

Habitats: Wet soils along streams, ditches and on wet, sandy and peaty hillsides. In Europe it grows in fens, wet grasslands and other damp, open, usually calcareous habitats

Habit: Erect, cespitose and stool forming, perennial herbs

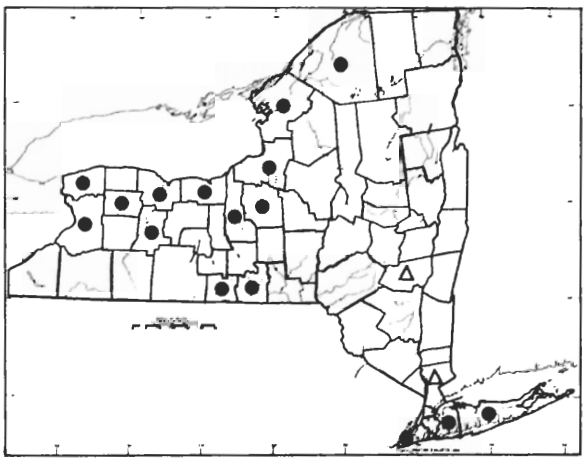
Flowering: July

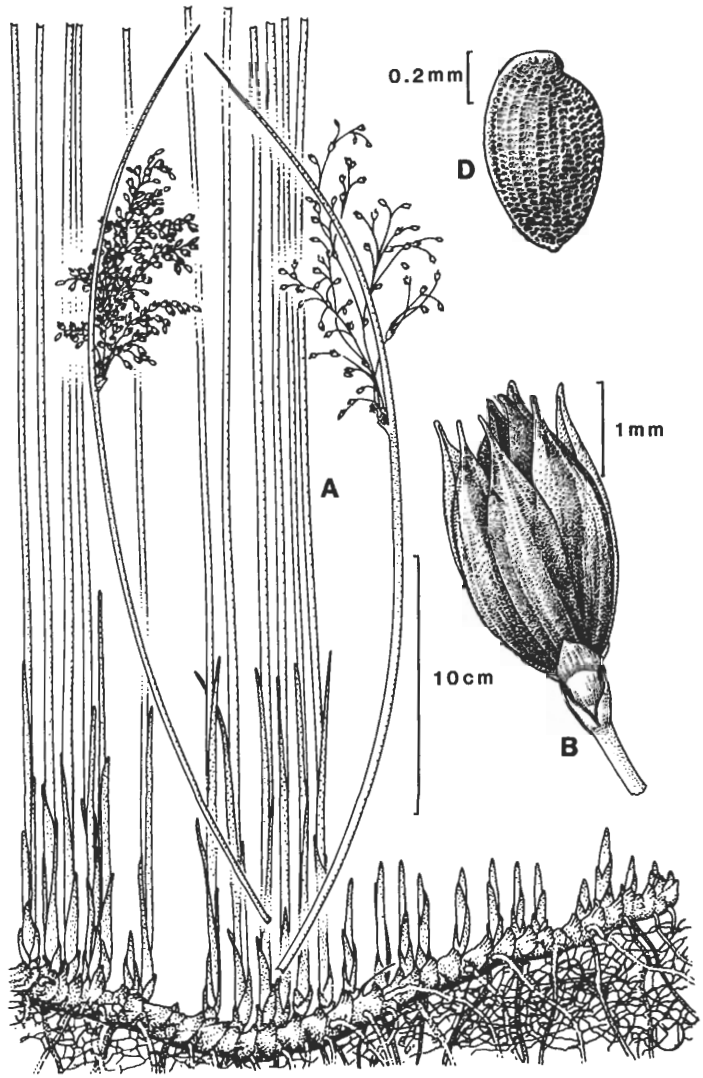
Fruiting: July-September

General Distribution: Asia, Africa, and Europe; in North America it is locally naturalized in New York, Michigan and Ontario.

Description: Flowers **bisexual**; **stigmas** 0.8-1.0 mm long; **style** 0.4-0.5 mm long; **ovary** ellipsoid; **fruit** a trilocular, reddish-brown or castaneous, ovoid to widely ellipsoid and slightly trigonous capsule, 2.5-3.0 mm long, exserted, apex obtuse to acute and mucronate; **valves** 1.3-1.5 mm broad; **seeds** obliquely ovoid, brown, 0.3-0.5 mm long, ends darkened, tegmen with transversely elliptic areolae; **stamens** 6, 1.0-1.5 mm long; **filaments** reddish-brown; **anthers** yellowish-white, equal to the filament length or slightly longer; **tepals** spreading, stramineous to reddish-brown with castaneous to reddish bands between midvein and margin, lanceolate, apex acuminate, margin scarious; **inner tepals** 2.5-3.0 mm long, 0.5-0.8 mm broad; **outer tepals** 3.0-3.5 mm long, 0.6-0.8 mm broad; **bracteoles** scarious, ovate to widely ovate, 1.0-1.5 mm long, apex acute; **pedicels** 0-4 mm long, flowers which appear to be on long pedicels are on single-flowered peduncles; **bracts** scarious, ovate to lanceolate, 1.5-3.0 mm long, apex acuminate, margin erose or entire, bracts near flowers bracteole-like in size and appearance; **rachis** 3-40 mm long; **inflorescence** appearing lateral, sympodial, a compound dichasium often with monochasial branches, open, 2.5-6.5 mm long; **monochasia** 2-3 flowered, erect to spreading, 5-10 mm long; **lowest bract** erect, terete, seemingly a continuation of the stem, 11-23 cm long, exceeding the inflorescence, apex acuminate; **cauline leaves** absent; **basal leaves** absent; **cataphylls** 1-4, dark red, 2.0-10.5 cm long, rounded, usually long mucronate, mucro to 1.5 mm long; **stems** erect, terete, 33-95 cm tall to the base of the inflorescence, 1-2 mm diameter immediately above the basal sheaths, subepidermal sclerenchyma-bundles present, cespitose and forming dense round stools; **rhizomes** erect, reddish-brown to black, 3-5 mm thick; **roots** few, up to 2 mm diameter ($2n = 40, 42$).

Importance: *Juncus inflexus* has been reported to be poisonous to cattle in Asia and Europe when eaten to the exclusion of everything else. The poison causes irritation of the stomach and diarrhea, followed by nervousness and progressive blindness. The animal may die of cerebral hemorrhage preceded by convulsions. The stems are sometimes use to make baskets and mats. It is also occasionally grown as an ornamental and is known as "Jonc des jardiniers" in parts of France.





3. *Juncus arcticus* Willd.
var. *littoralis* (Engelm.) Boivin

Common Names: Baltic Rush, Arctic Rush

Type Description: Willdenow, Species Pl. II, p. 206, 1799

Synonyms: *J. arcticus* L. ssp. *littoralis* (Engelm.) Hultén, *J. balticus* Willd. var. *littoralis* Engelm., *J. balticus* var. *littoralis* forma *dissitiflorus* Engelm. ex Fern. & Wieg., *J. litorum* Rydb.

Origin: The species is widespread in arctic and boreal Eurasia and North America; var. *littoralis* probably originated in boreal or temperate, eastern North America

Habitats: Wet, sandy or gravelly shores and flats between sand dunes, especially along the Great Lakes; moist meadows, swamps, fresh and saline marshes

Habit: Erect, rhizomatous, perennial herbs

Flowering: June-August

Fruiting: July-August

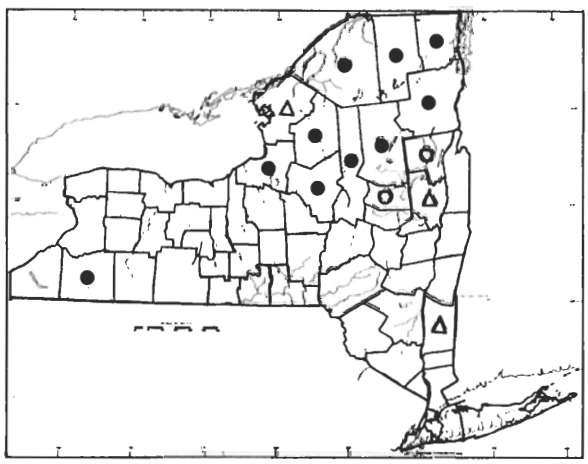
General Distribution: *Juncus arcticus sensu lato* is arctic-circumboreal, ranging widely across Eurasia and North America; var. *littoralis* is transcontinental in North America from Labrador to British Columbia south into more temperate Missouri and Pennsylvania.

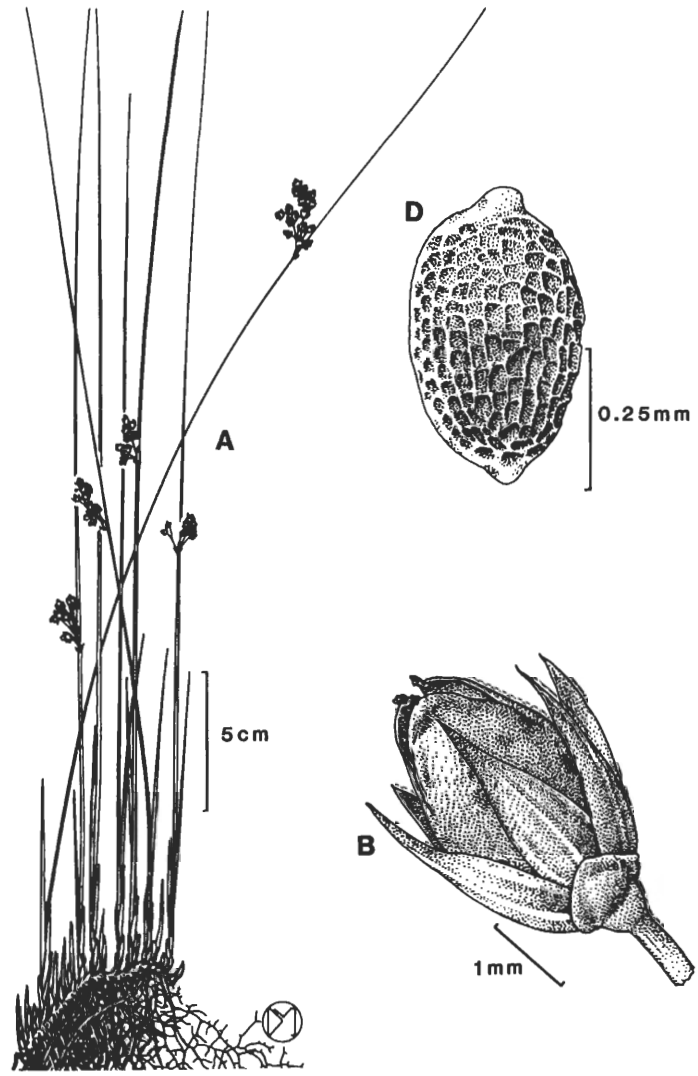
Description: Flowers **bisexual**; **stigmas** 1.0-1.5 mm long; **style** 0.8-1.0 mm long; **ovary** ovoid; **fruit** an imperfectly trilocular, reddish-brown, ovoid and slightly trigonous capsule, 3.0-4.0 (-4.5) mm long, included to slightly exserted, apex acute and mucronate; **valves** 1.0-1.5 mm broad; **seeds** oblong, dark brown, 0.7-0.8 mm long, often dark pointed, tegmen with transversely rectangular areolae; **stamens** 6, 1.5-2.0 mm long; **filaments** castaneous; **anthers** yellowish-white, 3-5 times the filament length; **tepals** erect to slightly spreading, brown with castaneous bands between midvein and margin, narrowly lanceolate, 2.5-4.0 mm long, 0.5-1.0 mm broad, apex acuminate to cuspidate, margin scarious; **bracteoles** scarious, ovate to widely ovate, 1-2 mm long, apex acute; **pedicels** 0-5 mm long, flowers which appear to be on long pedicels are on single-flowered peduncles; **bracts** scarious, lanceolate, 2-5 mm long, apex acute to cuspidate, margin entire to erose; **rachis** 5-70 mm long; **inflorescence** appearing lateral, sympodial, a simple to compound dichasium usually with monochasial branches, diffuse to capitate, 1-17 cm long; **monochasia** 2-6 flowered, erect to spreading, 3-50 mm long; **lowest bract** erect, terete, seemingly a continuation of the stem, 9-17 cm long, longer than the inflorescence, apex acuminate; **cauline leaves** absent; **basal leaves** absent; **cataphylls** 1-4, brown to castaneous, 1.5-13 cm long, rounded, occasionally long mucronate; **stems** erect, terete, 6-9 dm tall to the base of the inflorescence, 1.0-2.5 mm diameter immediately above the basal sheaths, without subepidermal sclerenchyma-bundles, closely or loosely arising from creeping rhizomes; **rhizomes** horizontal, dark brown to blackish, 4-6 mm diameter; **roots** few, up to 2 mm diameter (2n = 40, 80, 84).

Infraspecific Variation: The inflorescence of *J. arcticus* var. *littoralis* varies from diffuse to congested. The extremes have been recognized as forms under the names *J. balticus* var. *littoralis* (typical) and *J. balticus* var. *littoralis* forma *dissitiflorus* Engelm. The distinction is minor, and forma *dissitiflorus* has not been transferred to *J. arcticus* var. *littoralis*.

Taxonomic Note: *Juncus arcticus* and *J. balticus* are often considered distinct at the species level, treated as members of a widespread species complex. *Juncus arcticus sensu stricto* is an arctic species. It is distinguished from *J. balticus sensu lato* (including *J. arcticus* var. *littoralis*) by the ratio of anther to filament length and by the inflorescence type. *Juncus arcticus sensu stricto* has anthers 0.5-0.7 mm long, no longer than the filaments and few-flowered, compact inflorescences, whereas *J. balticus sensu lato* has anthers 0.8-1.8 mm long, usually two or more times the filament length and few to many-flowered, congested to open inflorescences. Although these species appear distinct at their extremes, the anther/filament ratio of *J. arcticus* is also found in *J. balticus* var. *hankei* (E. Mey.) Buchenau (Buchenau, 1906) and the few-flowered, compact inflorescence of *J. arcticus* is approached in *J. balticus* var. *montanus* Engelm. (Buchenau, 1906). Hultén (1962) and Hylander (1953, pp. 177-179) have shown that *J. arcticus* and *J. balticus* in northern Europe are usually found in slightly different habitats, but they occasionally grow together. When the two species grow together, they intergrade. Snogerup (1980), on the other hand, records hybrids between *J. arcticus* and *J. balticus* as well established in Fennoscandia and in the Alps, but there they are reported to have low pollen fertility and to reproduce only vegetatively. The morphological and ecological intergrade and the presence of well established hybrids between the species suggest that the taxa are not distinct at the species level. The current treatment follows several recent authors (Hultén, 1962; Balslev, 1983; Boivin, 1979) in recognizing a single species, *J. arcticus* to include the entire complex. Within *J. arcticus sensu lato*, variety *littoralis* is one of the more distinctive taxa; it is the only variety with very large anther-filament length ratios (4:1-5:1).

Importance: *Juncus arcticus sensu lato* is sometimes planted as a curiosity. *Juncus balticus* var. *japonicus* Buch. from China is called "Dragon's-beard" and is reported to have medicinal uses (Read, 1936).





4. *Juncus filiformis* L.

Common Name: Thread Rush

Type Description: Linnaeus, Species Pl. I, p. 326, 1753

Origin: Arctic

Habitats: Wet, sandy or rocky shores, river banks, wet meadows, ditches, seepage areas, wet mountain summits and talus slopes, usually at higher elevations in New York State

Habit: Erect, rhizomatous, terrestrial to semiaquatic perennial herbs

Flowering: June-August (September)

Fruiting: late June-early October

General Distribution: Circumboreal; in North America from Newfoundland to Alaska south to Oregon, Colorado, Minnesota, and West Virginia

Description: Flowers **bisexual**; **stigmas** 0.5-1.0 mm long; **style** 0.3-0.5 mm long; **ovary** ellipsoid to ovoid; **fruit** an imperfectly trilocular, light brown, broadly ovoid to nearly globose and occasionally slightly trigonous capsule, 2.5-3.0 mm long, included to more commonly exserted, apex obtuse and mucronulate; **valves** 1.5-1.8 mm broad; **seeds** ellipsoid to obovoid, light brown, 0.5 mm long, ends dark pointed, tegmen with transversely elliptical areolae; **stamens** 6, 1.0-1.5 mm long; **filaments** light brown; **anthers** white, 0.3-0.5 times the filament length; **tepals** spreading, green to stramineous, margins broad and scarious; **inner tepals** lanceolate or occasionally oblong, 2.0-3.0 (-3.5) mm long, 0.5-0.8 mm broad, apex obtuse or acute (acuminate); **outer tepals** lanceolate, 2.5-3.0 mm long, 0.5-1.0 mm broad, apex (acute) acuminate to aristate; **bracteoles** scarious, widely ovate, 1.0-1.4 mm long, apex rounded; **pedicels** 1-6 (-13) mm long; **bracts** scarious, ovate, 1-2 mm long, apex acute, margin entire; **rachis** 30-90 mm long; **inflorescence** appearing lateral, sympodial, a simple to compound dichasium often with monochasial branches, congested to capitate, 3-27 mm long; **monochasia** 2-3 flowered, erect or spreading, 5-20 mm long; **lowest bract** erect, terete, seemingly a continuation of the stem, 6-21 cm long, exceeding the inflorescence, apex acuminate; **cauline leaves** absent; **basal leaves** absent; **cataphylls** 1-4, stramineous to reddish, 1-7 cm long, rounded, usually long mucronate, mucro to 1 mm long; **stems** erect, terete, 10-35 cm tall to the base of the inflorescence, 0.5-1.0 mm diameter immediately above the basal sheaths, subepidermal sclerenchyma-bundles present, closely set along creeping rhizomes; **rhizomes** horizontal, stramineous, 1.0-1.5 mm thick; **roots** few, to 1 mm diameter (2n = 40, 70, 80, ca. 80, 84).

B. *Juncus* Subgenus *Poiophylli* Buch.

Annuals; rhizomes absent; leaves flat or subterete; inflorescence terminal; bracteoles 2; seeds not tailed.

5. *Juncus bufonius* L.

Common Name: Toad Rush

Type Description: Linnaeus, Species Pl. 1, p. 328, 1753

Origin: Uncertain; a cosmopolitan species

Habitats: Damp sandy to clay soils of clearings, roadsides, paths, shores, fresh and salt water marshes and other open areas

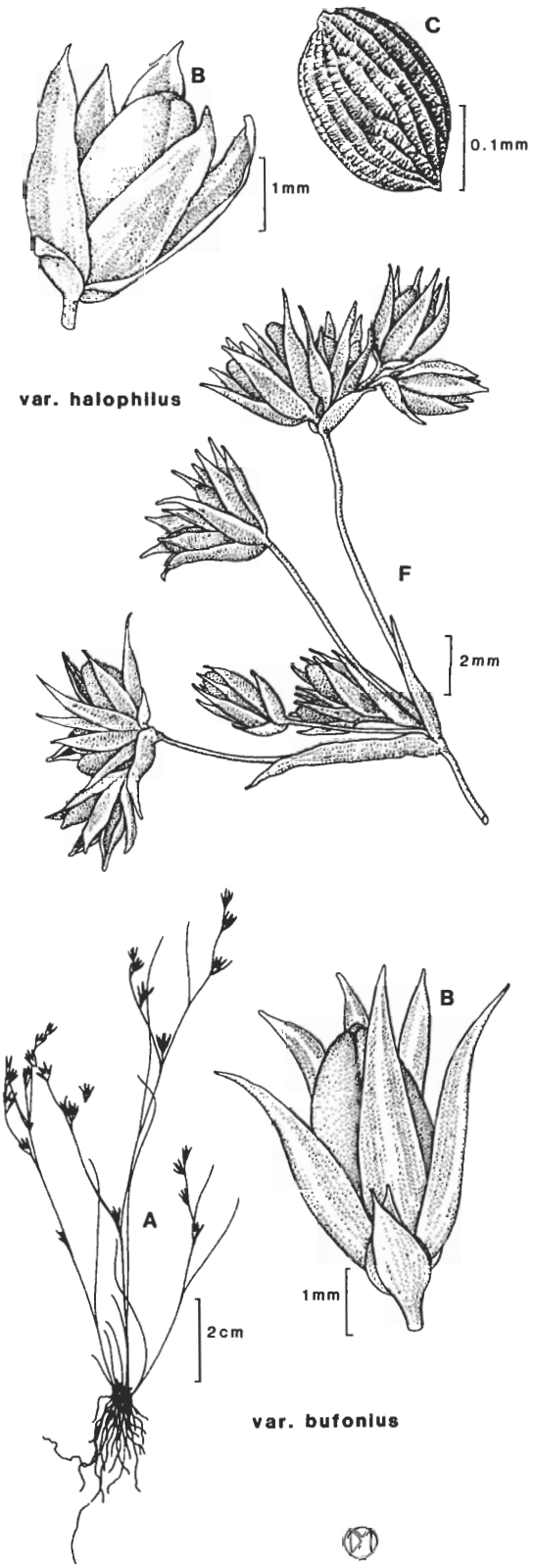
Habit: Erect to spreading, terrestrial to semi-aquatic, annual herbs

Flowering: June-November

Fruiting: late June-November

General Distribution: Cosmopolitan; throughout North America from Newfoundland to Alaska south to California and Florida

Description: Flowers **bisexual**, usually cleistogamous; **stigmas** 0.8-1.5 mm long, caducous; **style** 0.1-0.2 mm long; **ovary** ovoid; **fruit** a trilocular, tan to brown or green, ovoid to ellipsoid capsule, (2.5-) 3.0-4.0 (-4.9) mm long, included, apex acute to obtuse or rounded, rarely truncate; **valves** 1.1-1.5 mm broad; **seeds** obliquely obovoid to barrel-shaped or ovoid, light brown, 0.3-0.5 mm long, ends very short, dark, pointed, the tegmen with transverse, elliptical areolae; **stamens** 3 or 6, 1.5-2.0 mm long; **filaments** whitish; **anthers** white, 0.3-1.0 times the filament length, rarely much longer; **tepals** appressed to spreading, stramineous, lanceolate, margins broad and scarious; **inner tepals** 3.0-4.8 (-5.8) mm long, 0.7-0.9 (-1.3) mm broad, apex subacute to acuminate; **outer tepals** 3.5-6.0 (-7.3) mm long, 0.9-1.2 mm broad, apex acuminate; **bracteoles** scarious, ovate to widely ovate, 1.5-2.0 (-3) mm long, apex acute to acuminate; **pedicels** 0.1-0.3 mm long; **bracts** scarious, ovate to lanceolate, 2-7 mm long, apex acuminate, margin entire, lower bracts leaf-like; **rachis** 2-3 mm long; **inflorescence** sympodial, a compound to decompound dichasium with monochasial branches, diffuse to compact, 1-15 cm tall, 1-12 cm broad; **monochasia** 1-7 flowered, erect to spreading, 5-80 mm long; **lowest bract** erect, channeled, 1.2-7.5 (-12) cm long, shorter than the inflorescence, apex acuminate; **cauline leaves** 1-5, sheaths open, 0.5-1.5 cm long, auricles rounded, scarious, not prolonged, blades flat or channeled, 1.5-5.5 cm long, 0.3-1.0 (-1.5) mm broad, apex acuminate; **basal leaves** 1-4, sheaths open, 0.1-0.3 cm long, auricles scarious, rounded, not prolonged, blades flat to slightly channeled, 0.5-6.5 cm long, 0.5-1.0 (-1.5) mm wide, apex acuminate; **cataphylls** 0-2 per stem; **stems** erect or ascending to horizontally spread-



ing, sometimes slightly recurved, usually branching near base, (0.05-) 0.5-3.7 (-5) dm tall to the base of the inflorescence, 0.5-1.0 mm diameter immediately above the basal leaf sheaths; **rhizomes** absent; **roots** numerous, up to 0.2 mm in diameter. (2n = 30, ca. 30, 32, 34, ca. 54, ca. 60, 80, 108, ca. 120, 120).

Infraspecific Variation: *Juncus bufonius sensu lato* is a confusing assemblage of diploid, tetraploid and hexaploid entities. Thorough studies of the group in Europe (Cope and Stace, 1978, 1983, 1985; Van Loenhoud and Sterk, 1976) have shown that, in Europe, five segregate taxa occur, four diploids [*J. foliosus* Desf. (2n = 26), *J. ambiguus* Guss. (2n = 34), *J. hybridus* Brot. (2n = 34), and *J. sorentinii* Parl. (2n = 28)] and one tetraploid/hexaploid (*J. bufonius*). All four diploids are fairly distinct from each other, but the tetraploid/hexaploid complex (*J. bufonius sensu stricto*) appears to include elements from all four diploid taxa. When found growing sympatrically with one of the diploid taxa, *J. bufonius* populations may exhibit some of its attributes, a circumstance suggesting genetic bridges between ploidy levels. Cope and Stace also showed (1983) that there are no characters that will always separate segregate taxa; instead, there are "mode[s] of variation" requiring several characters to distinguish them. The complex is treated here as a single species, contrary to Cope and Stace, because: a) there are apparently no effective genetic barriers to hybridization among the various members of the complex, b) the characters used to separate the taxa are not reliable, and, c) there are difficulties in separating the members of this complex without resorting to chromosome counting. Two varieties are recognized here, one a diploid, *J. bufonius* var. *halophilus* Fern. & Buch. (=*J. ambiguus*) and the other a hexaploid-tetraploid, *J. bufonius* var. *bufonius*.

KEY TO VARIETIES

1. Inner tepals acute to acuminate; inflorescence open; capsule acute to subacute or rarely truncate, clearly shorter than the inner tepals .....5a. *J. bufonius* var. *bufonius*
1. Inner tepals mostly rounded, occasionally acute, often emarginate and mucronate at the tip; inflorescence partly to wholly contracted; capsule truncate, as long as or longer than the inner tepals .....5b. *J. bufonius* var. *halophilus*

5a. *Juncus bufonius* L. var. *bufonius*

Synonyms: *Juncus bufonius* var. *genuinus* Coutinho

Origin: Northern Hemisphere

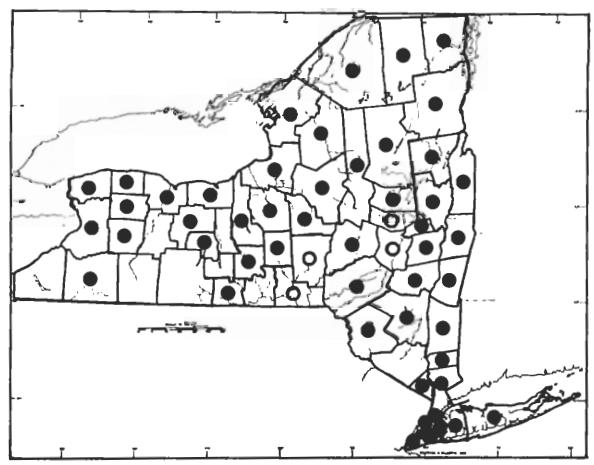
Habitats: Muddy, sandy or gravelly shores of streams, lakes, and ponds, sometimes in brackish areas such as coastal dunes, often associated with agricultural fields; these areas have a high water table, at least seasonally, and little or no competition from other species

Flowering: June-early August

Fruiting: Late June-November

General Distribution: Cosmopolitan; but native only to Eurasia, North Africa and North America

Ploidy: 2n= 108, other counts include ca. 54, ca. 60, 80, and 100-110



5b. *Juncus bufonius* L. var. *halophilus* Fern. & Buch.

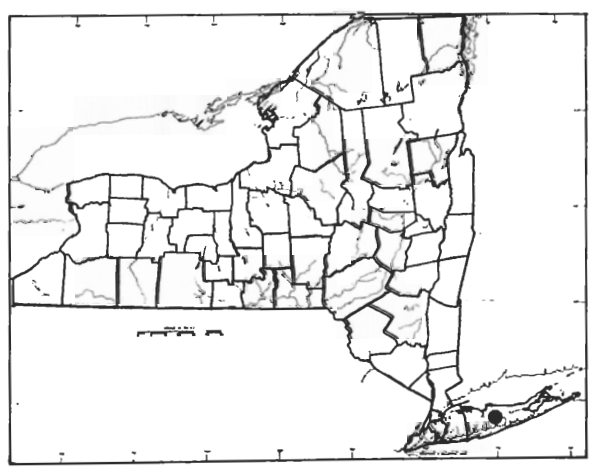
Synonyms: *J. ambiguus* Guss., *J. bufonius* var. *ambiguus* (Guss.) Husnot, *J. bufonius* var. *ranarius* (Song. & Perr.) Hayek, *J. bufonius* ssp. *ranarius* (Song. & Perr.) Hiit., *J. bufonius* ssp. *ambiguus* (Guss.) Schinz & Thell., *J. ranarius* Song. & Perr.

Origin: North Atlantic shore of North America

Habitats: Halophytic, occurring along the coast on mud and sand flats above high-tide and on margins of saline and brackish lakes; also occurring inland on bare mud and disturbed ground near salt-works, in roadside ditches, and on highly basic substrates

Flowering: June-July

Fruiting: August-November



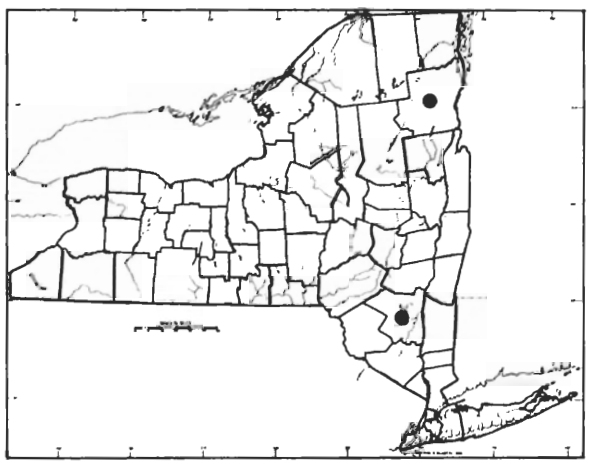
General Distribution: Europe, North America and parts of North Africa and Asia; in North America from Labrador to Saskatchewan south to Colorado and New York

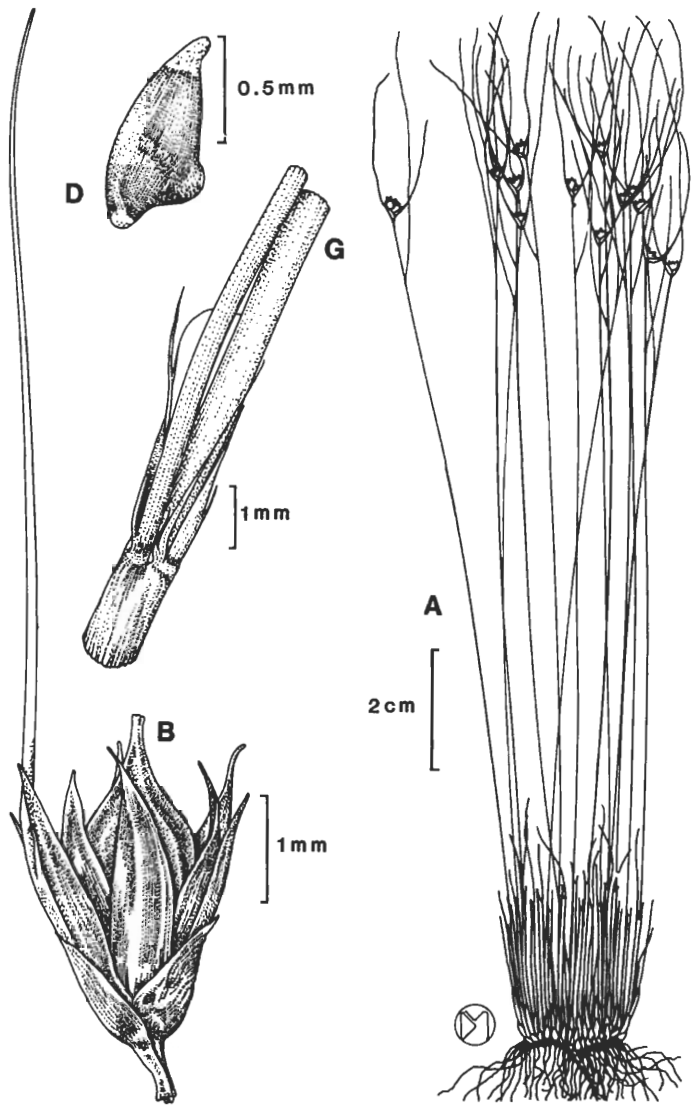
Ploidy: 2n = 34 (other counts include 30 and 32)

Importance: *Juncus bufonius* is often a weed in agricultural fields, but it is also considered good to excellent forage for all classes of livestock in the western United States.

C. *Juncus* Subgenus *Pseudotenageia* Krecz. & Gontsch.

Perennials; rhizomes present; leaves flat or canaliculate; inflorescence terminal; bracteoles 2; seeds with or without tails.





6. *Juncus trifidus* L.

Common Names: Highland Rush, Arctic Rush

Type Description: Linnaeus, Species Pl. I, p. 326, 1753

Synonym: *Juncus trifidus* ssp. *carolinianus* Hämet-Ahti; *J. trifidus* var. *monanthos* of Amer. auth. not (Jacq.) Bluff & Fing.

Origin: Arctic

Habitats: Dry, granitic conglomerate or quartzite ledges in New York; elsewhere also occurring on dry barrens and sands

Habit: Erect, cespitose, perennial herbs

Flowering: June-July

Fruiting: June-August

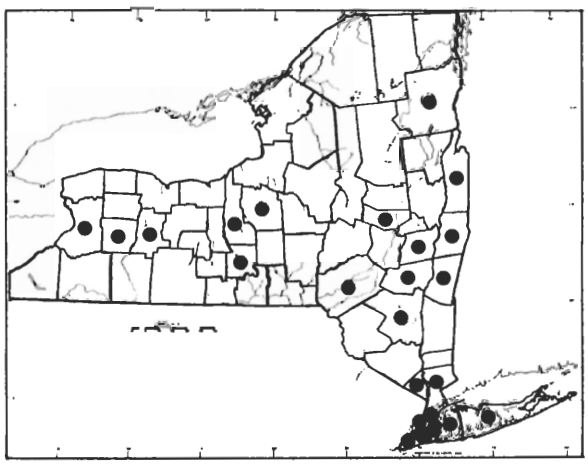
General Distribution: Europe, Asia and North America; in North America from Newfoundland to Quebec, south to northern New England, New York and disjunct in North Carolina

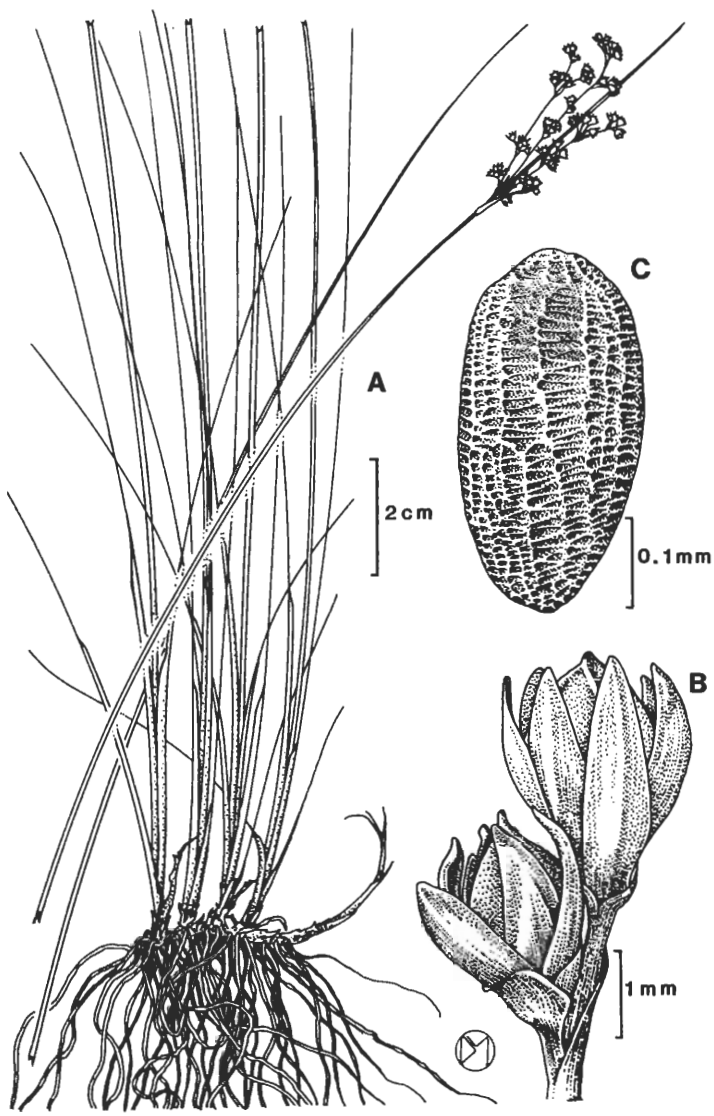
Rarity Status: Listed as Threatened by NY State; NYNHP rank G5 S1

Description: Flowers **bisexual**; **stigmas** 1.5-3.0 mm long; **style** 1.5-2.0 mm long; **ovary** ellipsoid; **fruit** an imperfectly trilocular, lustrous brown, ovoid, trigonous, rostrate capsule, 2.5-3.7 mm long (including the beak), the body of the capsule included to slightly exserted, the beak up to 0.7 mm long, exserted, apex tapering to the beak; **valves** 0.5-0.8 mm broad; **seeds** oblong and irregularly angled, light brown, 0.8-1.0 (-1.3) mm long, ends with short appendages, tegmen with transversely elliptical areolae; **stamens** 6, 1.7-2.0 mm long; **filaments** brown; **anthers** yellow, 1.5 times the filament length; **tepals** spreading, deep reddish brown often with green midveins, lanceolate, margins scarious; **inner tepals** 2.0-3.2 mm long, 0.7-1.0 mm broad, apex acute; **outer tepals** 2.5-4.0 mm long, 0.7-1.0 mm broad, apex acuminate to apiculate; **bracteoles** scarious, ovate to widely ovate, 1.0-1.5 mm long, apex acute to acuminate and often lacerate; **pedicels** 1-11 mm long,

usually very short; **bracts** sheathing, auricle prolonged and often lacerate, blades flat, 2.5-6.0 cm long, apex acuminate, essentially like the lowest bract; **rachis** 2 mm long; **inflorescence** monopodial, a simple monochasium or a single flower, 0.5-1.0 cm tall, 0.2-0.5 (-1.0) cm broad; **monochasia** 2 (-3) flowered, erect, 3-7 mm long; **lowest bract** erect, sheath 2-4 mm long, auricle prolonged and often lacerate, blades flat, 2.5-6.0 cm long, exceeding the inflorescence, apex acuminate; **cauline leaves** 1-2 (-4), often just below the lowest bract, sheaths open, 0.2-1.1 cm long, auricles lacerate, prolonged 1-2 mm, blades flat or channeled, 5-6 cm long, 0.5 mm wide, apex acuminate, margin serrulate; **basal leaves** 4-6, sheaths open, 1.0-3.5 cm long, auricles hyaline, three parted, lacerate, prolonged 2.5-4.0 mm, blades channeled, 0.2-1.5 (-13) cm long, apex acuminate, margin serrulate; **cataphylls** several to many, mucronate; **stems** erect, terete, 0.5-2.6 (-4) dm tall to the base of the inflorescence, 0.3-0.6 mm diameter immediately above the basal sheaths, cespitose to mat-forming; **rhizomes** erect and branching, dark reddish brown, 0.5-0.8 mm diameter; **roots** few to numerous, up to 0.2 mm in diameter (2n = ca. 20, 30).

Infraspecific Variation: Hämet-Ahti (1980) has recently suggested that the eastern North American representatives of *J. trifidus* (including all New York materials) are distinct from European plants. She based the North American taxon (*J. trifidus* ssp. *carolinianus* Hämet-Ahti) on the relative lengths and positions of the upper cauline leaves, and the presence of a blade on the basal leaves. In the New York materials studied, these characters are variable. Some specimens from the same site, mounted on the same herbarium sheet, have a cauline leaf just below the inflorescence appearing much like a primary bract, while others have cauline leaves at some distance below the inflorescence. Because of such variation, it seems inadvisable to recognize subspecies within this taxon.





7. *Juncus gerardii* Loisel.

Common Name: Black Grass

Type Description: Loiseleur-Deslongchamps, J. Bot. 2: 284, 1809

Synonyms: *J. bulbosus* of authors, including L. (1762) not L. (1753), *J. bulbosus* var. *gerardii* (Loisel.) Gray, *J. fucensis* St. John

Origin: Probably the Arctic Zone

Habitats: Salt marshes, brackish meadows and inland salt marshes, escaping inland along railroads and roadsides where salt is applied

Habit: Erect, cespitose to mat-forming, perennial herbs

Flowering: late May-August

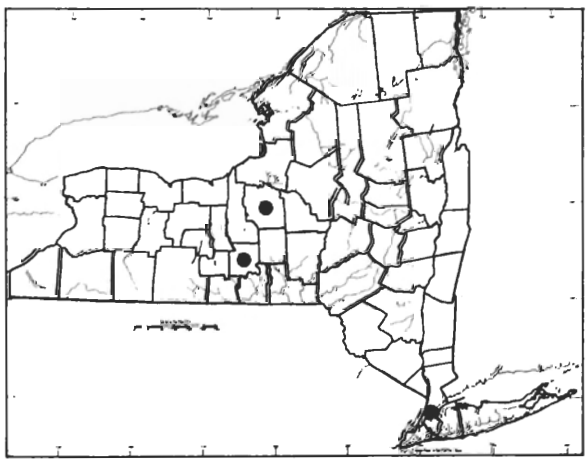
Fruiting: late June-September (April)

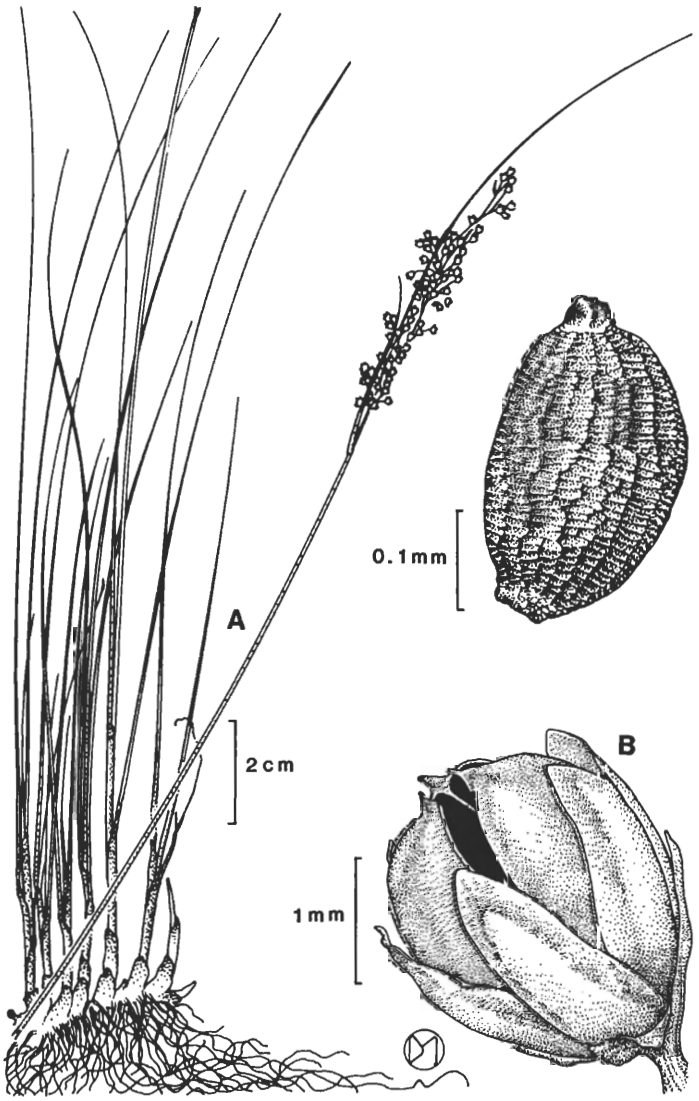
General Distribution: Europe, Northern Asia and North America; in North America along the Atlantic coast from Newfoundland to Virginia, on the Pacific coast from British Columbia south to Washington; also adventive along railroads and roadsides from Quebec to Manitoba south to Colorado, Utah, Kansas and upstate New York (though the population near Salina, NY is possibly native)

Description: Flowers **bisexual**; **stigmas** 1.5-2.5 mm long; **style** 0.5-1.0 mm long; **ovary** ovoid; **fruit** a trilocular, brown, ovoid to widely ellipsoid capsule, 2.0-3.4 mm long, slightly exserted, apex obtuse to rounded, mucronate; **valves** 1.2-1.5 mm broad; **seeds** oblong, light brown, 0.5-0.6 (-7) mm long, ends blunt and darkened, tegmen with transversely elliptical areolae; **stamens** 6, 1.5-2.2 mm long; **filaments** stramineous; **anthers** light yellow, 3 times the filament length; **tepals** appressed, stramineous with deep reddish brown bands near the margin, margins scarious near the apex; **inner tepals** elliptic, (1.5-) 2.0-3.0 mm long, 0.8-1.0 mm broad, apex obtuse to rounded; **outer tepals** ovate, elliptic, or oblong, 2.0-3.2 mm long, 0.7-1.0 mm broad, apex acute to obtuse; **bracteoles** scarious, ovate to widely ovate, 0.7-2.0 mm long, apex acute and erose; **pedicels** 1-5 mm long; **adaxial bracts** scarious, lanceolate, 1.5-4.0 mm long, apex retuse and erose, margin entire; **abaxial bracts** scarious to herbaceous, lanceolate, 2-6 mm long, apex long acuminate, or lower and well developed bracts with blades and prolonged, pointed auricles; **rachis** 3-6 mm long; **inflorescence** sympodial, a decompound dichasium with monochasial branches, usually obpyramidal or obovoid, 2-11 cm tall, 1.0-3.5 cm broad; **monochasia** 1-2 flowered, erect to ascending, 5-25 mm long; **lowest bract** erect, sheath 3-20 mm long, auricles slightly prolonged with acuminate or retuse apices, blade flat, 1-5 cm long, shorter than to equaling the inflorescence; **cauline leaves** 1-2, sheaths open, 2.0-4.5 cm long, auricles rounded, not prolonged, blades flat to involute, 5-20 cm long, 0.5 mm wide, apex acuminate or bifurcate with two acuminate tips; **basal leaves** 3-6, sheaths open, 1.5-8.0 cm long, auricles not prolonged, blades flat, 3-20 cm long, apex acuminate or bifurcate with two acuminate apices; **cataphylls** 1-2; **stems** erect, terete or sometimes compressed, 1.0-7.5 dm tall to the base of the inflorescence, 0.7-2.0 mm diameter immediately above the basal sheaths, cespitose or loosely arising from creeping rhizomes, often forming extremely dense mats; **rhizomes** horizontal, branching, burnt red to tan, 1.0-1.5 mm diameter; **roots** few to numerous, up to 0.5 mm diameter (2n = 80, ca. 80, 84).

Infraspecific Variation: Plants from the north fork of Long Island, with long cymes and long perianth parts, approach *J. gerardii* var. *pedicellatus* Fern.; other New York specimens represent typical *J. gerardii*.

Importance: *Juncus gerardii* is occasionally harvested as salt-hay. In Russia it has been said to equal quack grass in quality and to be of lactiferous value, but in some parts of Russia its feeding value is reported to be medium to low. In pasture and in hay it is eaten readily by cattle, but much less so by other kinds of livestock. The flowers are also eaten by rabbits.





8. *Juncus compressus* Jacq.

Common Name: Compressed Rush

Type Description: Jacquin, Enum. Stirp. Vindob., p. 235, 1762

Synonym: *J. bulbosus* of authors, including L. (1762), but not L. (1753).

Origin: Eurasia

Habitats: Saline, disturbed habitats in New York; in Europe, damp grasslands and pastures, meadows, roadsides, edges of fields, riverbanks and disturbed ground, preferring loamy or clay soils

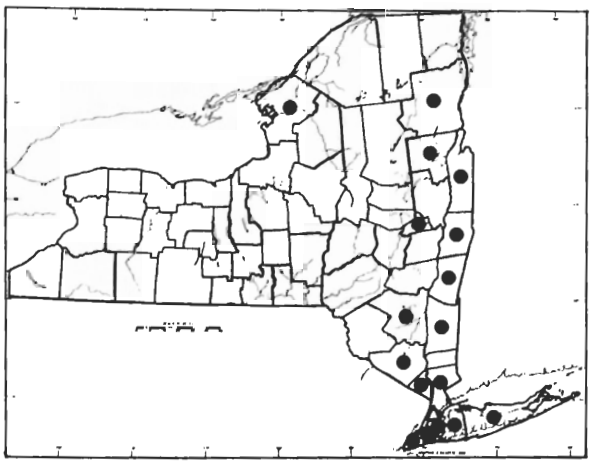
Habit: Erect, cespitose, perennial herbs

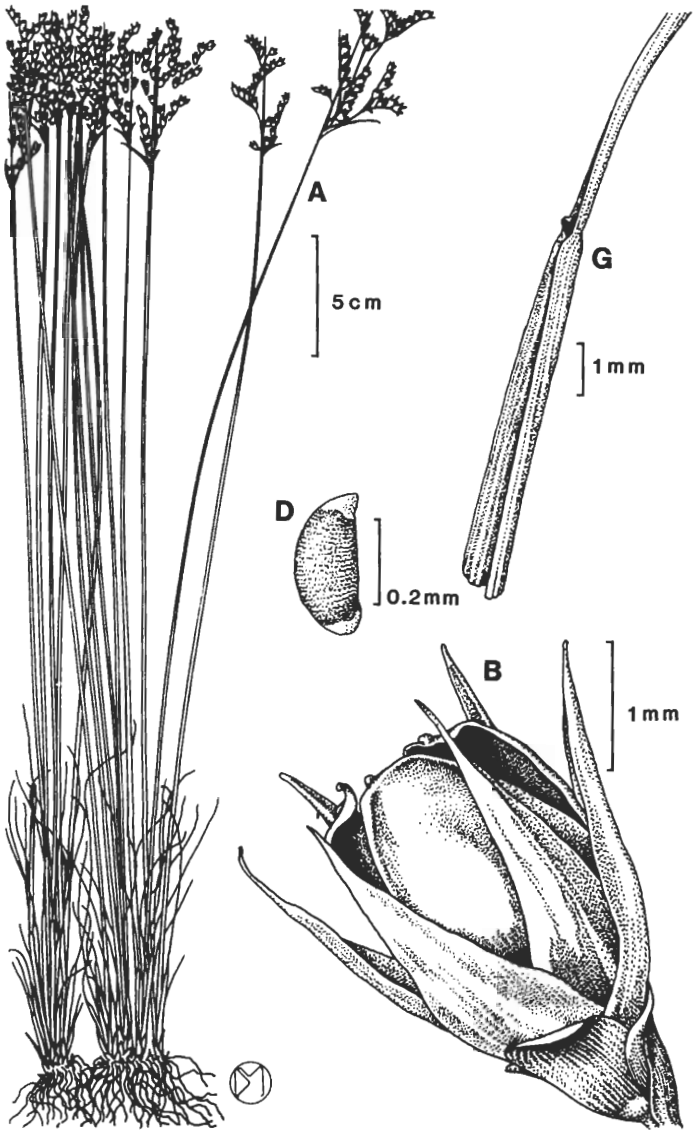
Flowering: June-July

Fruiting: July-August

General Distribution: A native of Eurasia; naturalized in North America from Newfoundland to Manitoba, Montana, Wyoming and Colorado south to Utah, Minnesota, Wisconsin, Michigan and New York

Description: Flowers **bisexual**; **stigmas** 1.0 mm long; **style** 0.5 mm long; **ovary** obovoid or ellipsoid; **fruit** an imperfectly trilocular, light brown, widely ellipsoid (almost globose) to ovoid or obovoid, slightly trigonous capsule, (2.0-) 2.5-3.0 mm long, exserted, apex obtuse to truncate, mucronate; **valves** 1.5-1.8 mm broad; **seeds** ellipsoid to oblong or obliquely obovoid, light brown, 0.3-0.5 mm long, ends blunt and slightly darkened, tegmen with numerous transversely elliptical areolae; **stamens** 6, 0.8-1.0 (-1.5) mm long; **filaments** stramineous; **anthers** light yellow, 1-2 times the filament length; **tepals** appressed, light to dark brown with a green central band and occasionally with reddish-brown bands near margin especially near apex, lanceolate-ovate to elliptic, 0.8 mm broad, hyaline margins; **inner tepals** 0.7-1.2 mm long, apex obtuse to rounded; **outer tepals** 1.5-2.0 (-3.0) mm long, apex obtuse or bluntly acute, usually slightly convex; **bracteoles** scarious, ovate lanceolate to widely ovate or triangular ovate, 0.7-2.0 mm long, apex obtuse to acute; **pedicels** 1-5 mm long; **adaxial bracts** scarious, lanceolate, 1-3 mm long, apex bifurcate, margin entire; **abaxial bracts** scarious, lanceolate, 4-5 mm long, apex long acuminate to apiculate; **rachis** 2-5 mm long; **inflorescence** sympodial, a decompound dichasium with monochasial branches, 0.3-0.7 cm tall, 1.0-3.5 cm broad; **monochasia** 1-2 flowered, erect to ascending, 5-25 mm long; **lowest bract** erect, flexuous, flat or folded, 2.0-7.5 (-13) cm long, often longer than the inflorescence, apex acuminate; **cauline leaves** 1-2, sheaths open, 3-5 cm long, auricles membranaceous, rounded, prolonged less than 1 mm, blades with a broad central channel, 5-20 cm long, 0.7-1.0 mm broad, apex acuminate; **basal leaves** 2-4, sheaths open, 4.5-7.5 cm long, auricles membranaceous, rounded, not prolonged, blades flat, rarely subterete and channeled, 10-20 cm long, 1.0-1.5 mm wide, apex acuminate; **cataphylls** several; **stems** erect, flattened, (1.0-) 2.0-5.5 (-8) dm tall to the base of the inflorescence, 1-2 mm diameter immediately above the basal leaf sheaths, closely set along creeping rhizomes; **rhizomes** horizontal, brown, 1.5-2.5 mm diameter; **roots** numerous, up to 0.5 mm in diameter (2n = 40, 44).





9. *Juncus secundus* Beauv. ex Poir.

Common Name: Rush

Type Description: Beauvois ex Poir., Encycl., Suppl. 3, p. 160, 1813

Synonym: *Juncus tenuis* var. *secundus* (Beauv. ex Poir.) Engelm.

Origin: Eastern North America

Habitats: Dry fields and rock ledges, nearly always associated with acid, sandy soil

Habit: Erect, cespitose, perennial herbs

Flowering: June-early July

Fruiting: late June-August

General Distribution: Maine to Indiana, south to eastern Oklahoma, northern Alabama and northern Georgia

Description: Flowers **bisexual**; **stigmas** 1.5-2.5 mm long; **style** 0.2-0.3 mm long; **ovary** ovoid; **fruit** a trilocular, stramineous, ovoid to short-cylindric, trigonous capsule, 2.0-3.3 (-4.7) mm long, included or equaling the perianth, apex rounded to slightly retuse; **valves** 1.0-1.8 mm broad; **seeds** ellipsoid, light brown, 0.5-0.6 mm long, ends pointed, translucent or darkened, tegmen with transversely elliptical areolae; **stamens** 6, 1.0-1.5 mm long; **filaments** scarious; **anthers** light yellow, 0.6-1.0 times the filament length; **tepals** spreading stramineous, lanceolate, (2.5-) 2.9-3.5 (-4.5) mm long, 0.8-1.0 mm broad, apex acuminate, margin scarious; **bracteoles** scarious, ovate to widely ovate, 1.0-1.3 mm long, apex acute to rounded and often erose; **pedicels** 0-3 mm long; **adaxial bracts** scarious, slightly sheathing, 1-2 (-5) mm long, apex bifurcate, margin entire; **abaxial bracts** scarious, lanceolate, 1.0-2.2 (-8) mm long, apex acuminate or prolonged into a short blade, margin entire; **rachis** 2-7 mm long; **inflorescence** sympodial, a decompound dichasium with monochasial branches, the flowers secund along the monochasia, diffuse, (2-) 3.0-6.5 (-14) cm tall, 1-4 cm broad; **monochasia** (1-) 3-5 (-7) flowered, erect to ascending and often incurved, 5-25 mm long; **lowest bract** erect, flat, 1.5-6.0 (-10) cm long, shorter to equaling the inflorescence, apex acuminate; **cauline leaves** absent; **basal leaves** 1-4, usually less than 1/3 the plant height but never more than 1/2 the plant height, sheaths open, 1.5-9.0 cm long, auricles membranaceous, rounded, slightly prolonged, blades broadly channeled, 5-15 (-20) cm long, 0.2-0.7 mm wide, apex acuminate; **cataphylls** 1-2; **stems** stiffly erect, terete, (0.6-) 1.5-4.8 (-6) dm to the base of the inflorescence, 0.5-1.0 mm diameter immediately above the basal sheaths, often pink to light purple near the base, loosely or densely cespitose; **rhizomes** erect, stramineous, 1-2 mm diameter, forming hard crowns; **roots** numerous, up to 0.2 mm diameter (2n = ca. 42).

Intraspecific Variation and Hybridization: This species is said to hybridize with other members of the *J. tenuis* complex (Brooks, pers. comm.).

10. *Juncus tenuis* Willd.

Common Names: Slender Yard Rush, Trail Rush

Type Description: Willdenow, Species Pl., 5th ed., II, p. 214, 1799

Synonyms: *J. bicornis* Michx., *J. macer* S. F. Gray

Origin: North America

Habitats: Open, moist, often sandy habitats, meadows, swamps, fields and roadsides

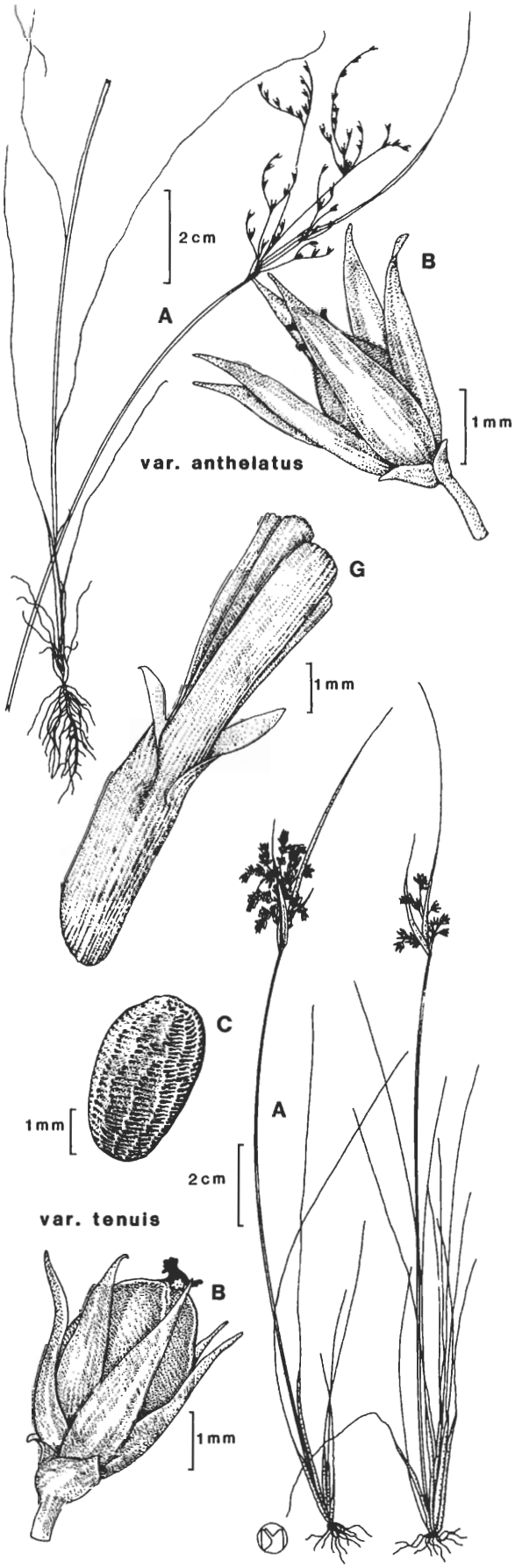
Habit: Erect, cespitose, perennial herbs

Flowering: June-early August

Fruiting: June-October

Description: Flowers **bisexual**: **stigmas** 1.5-2.5 mm long; **style** 0.2-0.3 mm long; **ovary** ovoid; **fruit** an imperfectly trilocular, green to stramineous, ovoid capsule, (2-) 2.5-4.7 mm long, included or equaling the perianth, apex obtuse to slightly retuse, usually mucronate; **valves** 1.0-1.6 mm broad; **seeds** obliquely ovoid to ellipsoid, light brown, 0.3-0.6 mm long, ends blunt, darkened and slightly tailed, tegmen with transversely elliptical areolae; **stamens** 6, 1.0-1.5 mm long; **filaments** stramineous; **anthers** light yellow, 0.4-0.6 times filament length; **tepals** spreading, green to stramineous to reddish brown with a green central band, lanceolate, 2.5-4.5 mm long, 0.8-1.0 mm broad, apex acute to subulate, margins scarious; **bracteoles** scarious, ovate to triangular ovate, 1.1-1.6 mm long, apex obtuse to acute to cuspidate; **pedicels** 0-3 mm long; **adaxial bracts** scarious, lanceolate, 1-4 mm long, apex bifurcate, margin entire; **abaxial bracts** leaf-like, sheaths scarious, auricles slightly prolonged, blade herbaceous, linear or nearly absent, 2.5-8.0 mm long, apex acuminate, margin entire; **rachis** 2-7 mm long; **inflorescence** sympodial, a compound to decompound dichasium with monochasial branches, the flowers sometimes secund along the monochasia, diffuse to congested, 3-11 cm tall, 1-7 cm broad; **monochasia** 1-7 flowered, ascending to divergent, sometimes incurled, 5-50 mm long; **lowest bract** erect, flat, 7-10 cm long, longer than the inflorescence, apex acuminate; **cauline leaves** absent; **basal leaves** 3-4 (-7), sheaths open, auricles scarious, oblong or narrowly triangular, prolonged 1-2 (-6) mm, blades broadly channeled, 10-15 cm long, 0.5-1.0 mm wide, apex acuminate; **cataphylls** 0-2; **stems** erect, terete to slightly flattened, 1-4 (-6) dm tall to the base of the inflorescence, 1 mm diameter immediately above the basal sheaths, tufted; **rhizomes** erect, brown to black, 1.5 mm diameter; **roots** numerous, to 0.5 mm diameter (2n = 30, 32, ca. 40, 40, [80, 84 reported from Europe]).

Interspecific Variation and Hybridization: *Juncus tenuis* is a highly variable and widespread member of a complex that includes *J. secundus*, *J. tenuis*, *J. dudleyi* and *J. dichotomus* as well as other species. Hybrids between *J. tenuis* and related species (particularly *J. dudleyi* and *J. secundus*) are known and add to the apparent



variability in the complex (Brooks, pers. comm.). This group has been revised by Wiegand (1908), and Brooks (pers. comm.) is currently working on a revision of the group. Species of this complex are distinguished from one another using leaf cross-sections, auricle shape and texture, and in the degree of carpel fusion. Identification of specimens in this complex requires that several characters be used.

Infraspecific Variation: Specimens with arched to recurved, short pedicels and close set flowers on the upper sides of the pedicels have been called *J. tenuis* var. *williamsii* Fern., but intergradation makes this distinction hardly worthy of recognition. More robust plants with diffuse, elongate inflorescences, small flowers and small capsules, do appear to warrant recognition. These are called *Juncus tenuis* var. *anthelatus* Wieg., usually found in wet areas, and flowering 1-2 weeks earlier than typical *J. tenuis* of drier habitats. Brooks (pers. comm.) recently found allozyme markers that distinguish var. *anthelatus* from typical *J. tenuis*, and he has proposed raising var. *anthelatus* to species status (Brooks, ined.), but morphological overlap has prompted recognition of these taxa at the varietal level in this treatment.

KEY TO VARIETIES

1. Inflorescence congested to open, usually not diffuse; branches of the inflorescence erect to divergent; longer monochasia usually 1-2 cm long; perianth (2.8-) 3.5-4.5 mm long.....10a. *J. tenuis* var. *tenuis*
1. Inflorescence diffuse; branches of the inflorescence erect to ascending, often incurved; longer monochasia 3-5 cm long; perianth 2.5-3.5 (-4.0) mm long .....10b. *J. tenuis* var. *anthelatus*

10a. *Juncus tenuis* Willd. var. *tenuis*

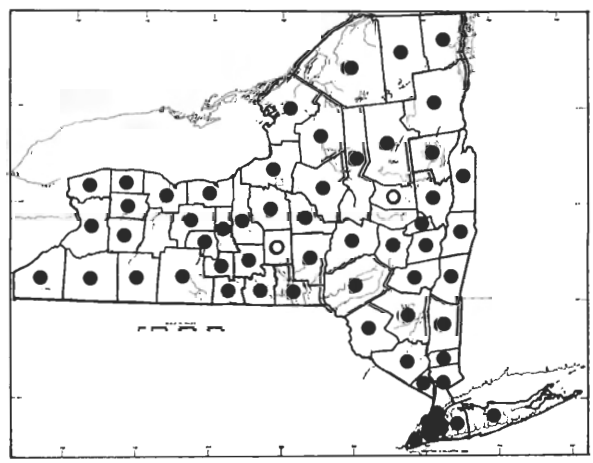
Synonyms: *J. bicornis* var. *williamsii* (Fern.) Vict., *J. macer* var. *williamsii* Fern., *J. macer* forma *williamsii* (Fern.) F. J. Herm., *J. tenuis* var. *williamsii* Fern., *J. tenuis* forma *williamsii* (Fern.) F. J. Herm.

Origin: Temperate North America

Habitats: Open, frequently disturbed places including roadsides, pathways and lake shores; often in compacted soils

General Distribution: In North America from Newfoundland to Alaska south to Mexico and Florida but much less frequent in the southeastern United States than the next variety; now widely introduced throughout the world

Ploidy: 2n = 30, 32, 40, [80, 84 reported from Europe]



10b. *Juncus tenuis* var. *anthelatus* Wieg.

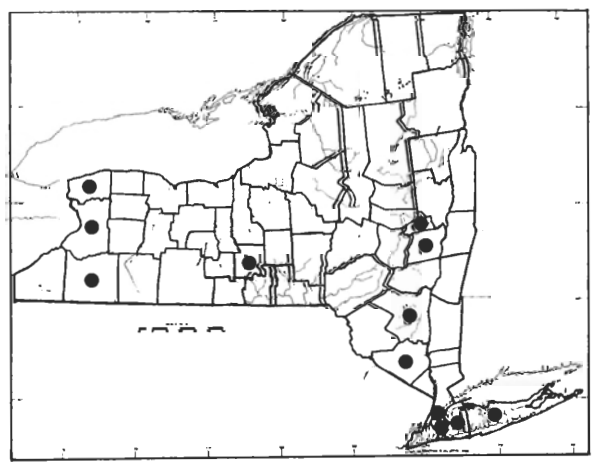
Synonyms: *J. macer* var. *anthelatus* (Wieg.) Fern., *J. macer* forma *anthelatus* (Wieg.) F. J. Herm., *J. tenuis* forma *anthelatus* (Wieg.) F. J. Herm.

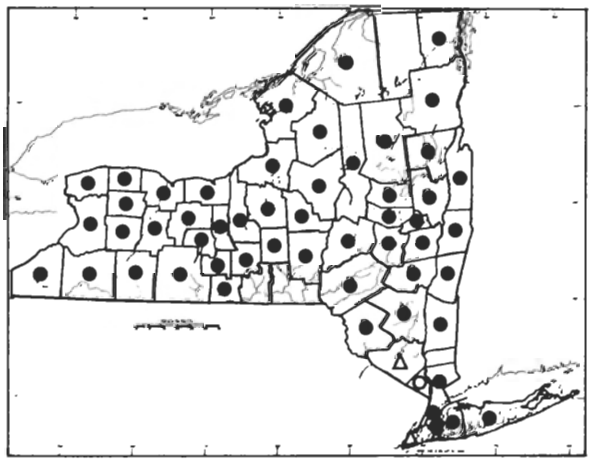
Origin: Eastern North America

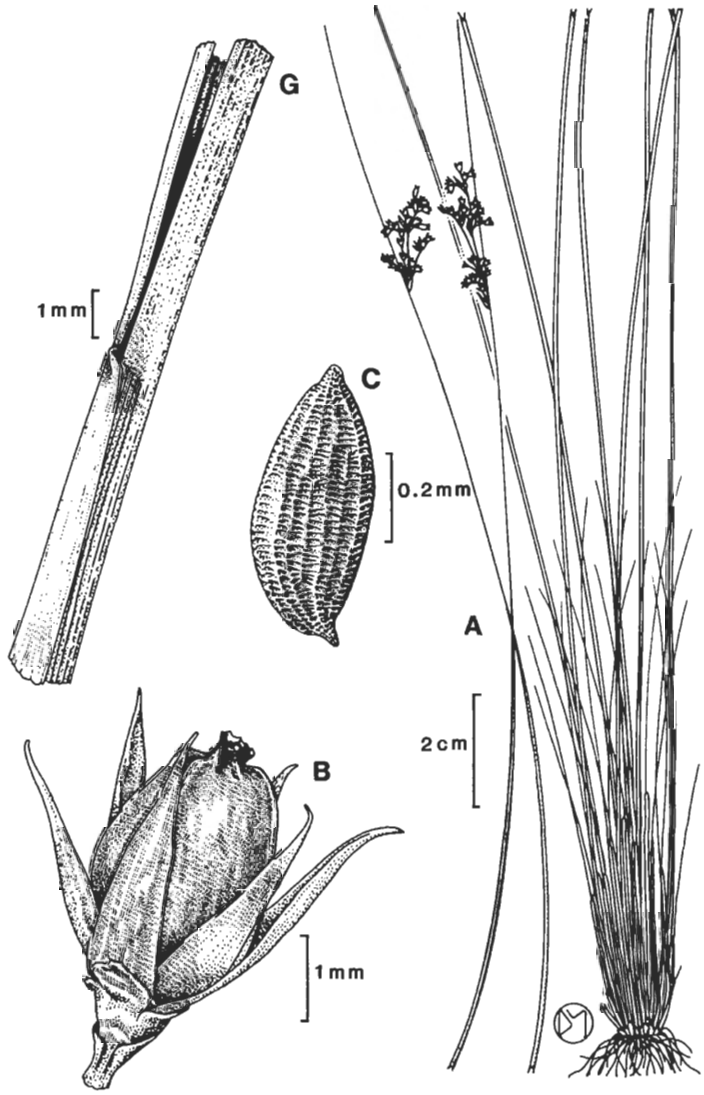
Habitats: Moist and wet sandy meadows, swamps, and fields

General Distribution: Maine to Indiana south to Missouri and Georgia

Ploidy: 2n= ca. 40







11. *Juncus dudleyi* Wieg.

Common Name: Dudley's Rush

Type Description: Wiegand, Torrey Bot. Club Bull. 27: 524, 1900

Synonyms: *J. tenuis* var. *dudleyi* (Wieg.) F. J. Herm. in I. M. Johnston, *Juncus tenuis* var. *uniflorus* Farw.

Origin: North America

Habitats: Damp to dryer, calcareous, marly or sweet soil, rarely in damp, sandy soil, usually in sunny places

Habit: Erect, cespitose perennial

Flowering: June-July (September)

Fruiting: late June-September

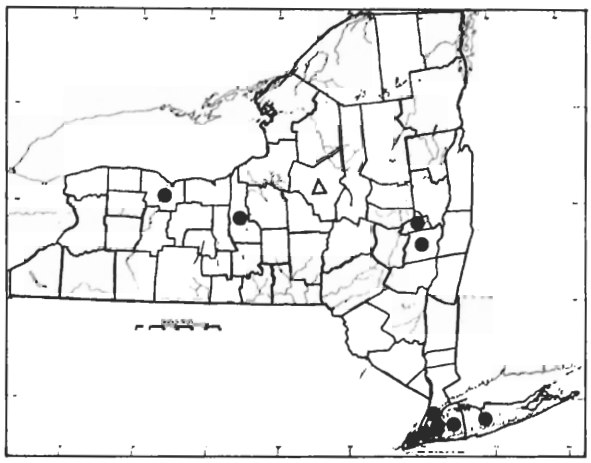
General Distribution: Newfoundland to British Columbia south to Arizona, Texas and Virginia; naturalized in Europe and elsewhere

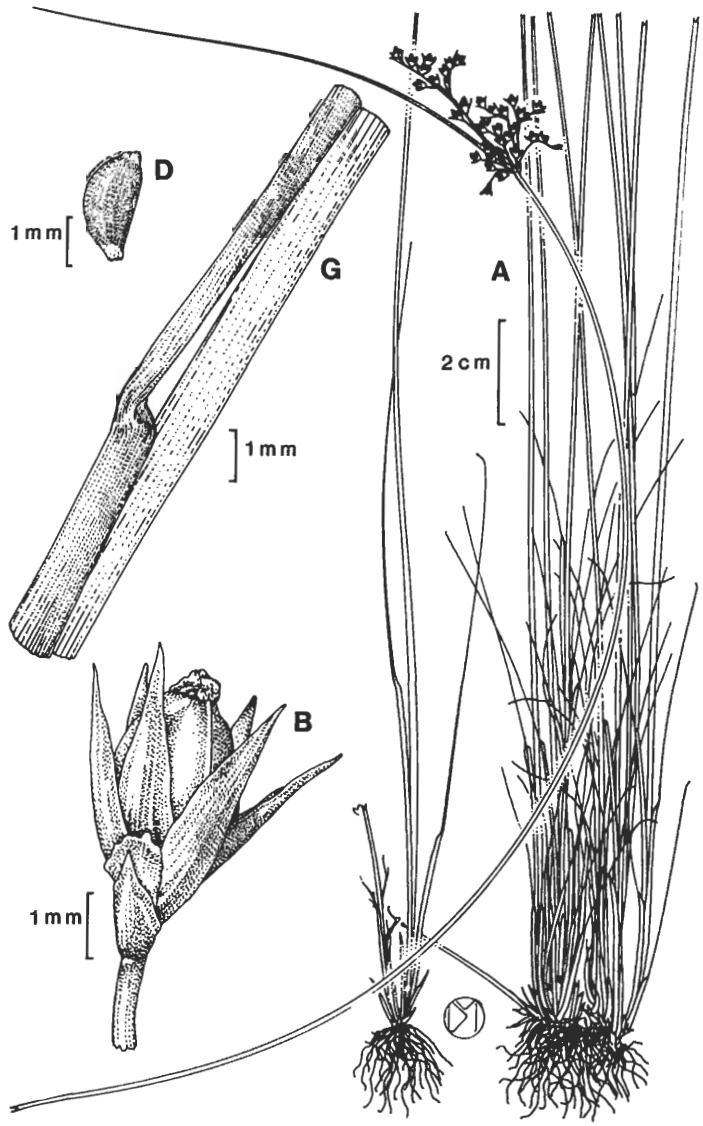
Description: Flowers **bisexual**; **stigmas** 1.5-2.0 mm long; **style** 0.2-0.3 mm long; **ovary** ovoid; **fruit** an imperfectly trilocular, green to stramineous, ovoid capsule, (1.7-) 2.9-4.2 mm long, included, apex rounded to slightly retuse; **valves** 1.6-2.1 mm broad; **seeds** ellipsoid or obliquely ovoid, light brown, (0.3-) 0.4-0.5 (-0.6) mm long, ends translucent or dark pointed, tegmen with transversely elliptical areolae; **stamens** 6, 1.3-1.5 mm long; **filaments** whitish; **anthers** light yellow, 0.5-1.0 times the filament length; **tepals** spreading, lanceolate, green to stramineous, usually with reddish-brown bands between midrib and margin, apex (acute) acuminate, margins scarious; **inner tepals** (3.3-) 3.5-5.0 (-5.2) mm long, 1.0-1.2 mm broad; **outer tepals** 3.5-5.0 (-5.4) mm long, 1.2-1.3 mm broad; **bracteoles** scarious, ovate to triangular ovate, 1.2-2.0 (-2.3) mm long, apex acute to obtuse; **pedicels** 0-5 mm long; **adaxial bracts** scarious, lanceolate, 1-4 mm long, apex bifurcate, margin entire; **abaxial bracts** leaf-like, sheath scarious, auricles prolonged and often acute, blade herbaceous, linear, 2.5-25 mm long, apex acuminate, margin entire; **rachis** 2-7 mm long; **inflorescence** sympodial, a compound to decompound dichasium with monochasial branches, compact, 1-7 cm long and 1.0-2.5 cm broad; **monochasia** 1-3 flowered, ascending to divergent or recurved, 5-20 mm long; **lowest bract** erect, flat, 3.5-16 cm long, usually longer than the inflorescence, apex acuminate; **cauline leaves** absent; **basal leaves** 2-4, sheaths open, 1-12 cm long, auricles cartilaginous or coriaceous, yellow-brown and glossy when dry, rounded, prolonged less than 1 mm, blades broadly channeled, 10-34 cm long, 0.5-1.0 mm wide, apex acuminate; **cataphylls** several; **stems** erect, terete, 1.6-6.8 (-8) dm tall to the base of the inflorescence, 0.8-1.2 mm diameter immediately above the basal sheaths, densely or loosely cespitose; **rhizomes** erect, brown to stramineous, 0.8-1.3 mm diam; **roots** numerous, up to 0.5 mm thick (2n = 80, ca. 84).

Infraspecific Variation and Hybridization: *Juncus dudleyi* is usually easily recognized by cartilaginous, yellowish-brown, auricles, but the species apparently hybridizes with other members of the *J. tenuis* complex, particularly with *J. tenuis* (Brooks, pers. comm.). Hermann and others have suggested that there is too much overlap to warrant recognition of separate

species, and he has transferred *J. dudleyi* as a variety of *J. tenuis*. In New York, at least, the overlap is not great enough to cause difficulty in identification, and this treatment follows Wiegand (1900) in recognizing *J. dudleyi* as a distinct species.

Importance: This species is an important forage plant in the northern Great Plains. As a rule, it seems somewhat more palatable than *J. tenuis*, especially to cattle and horses. It is occasionally grazed up to 80%.





12. *Juncus dichotomus* Ell.

Common Name: Forked Rush

Type Description: Elliott, Sketch. Bot. S. Carolina I, p. 406, 1817

Synonyms: *Juncus dichotomus* var. *platyphyllus* Wieg., *J. platyphyllus* (Wieg.) Fern., *J. tenuis* var. *dichotomus* (Ell.) Wood, *J. tenuis* var. *platyphyllus* (Wieg.) Cory

Habitats: Moist to wet sands, usually in open areas, marshy shores, clearings, sometimes in wet lowland forests, meadows and swamps, often brackish

Habit: Erect, cespitose, perennial herbs

Flowering: June

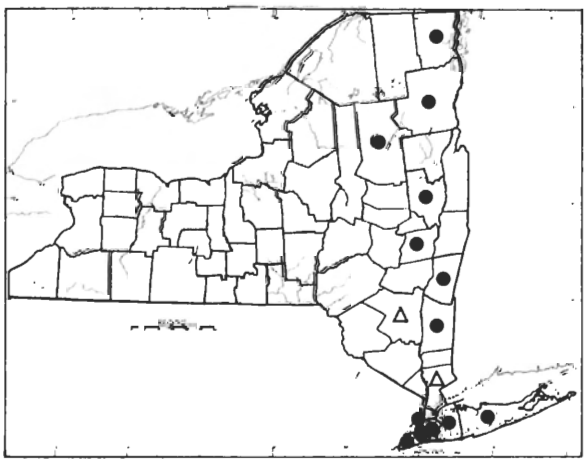
Fruiting: late June-August

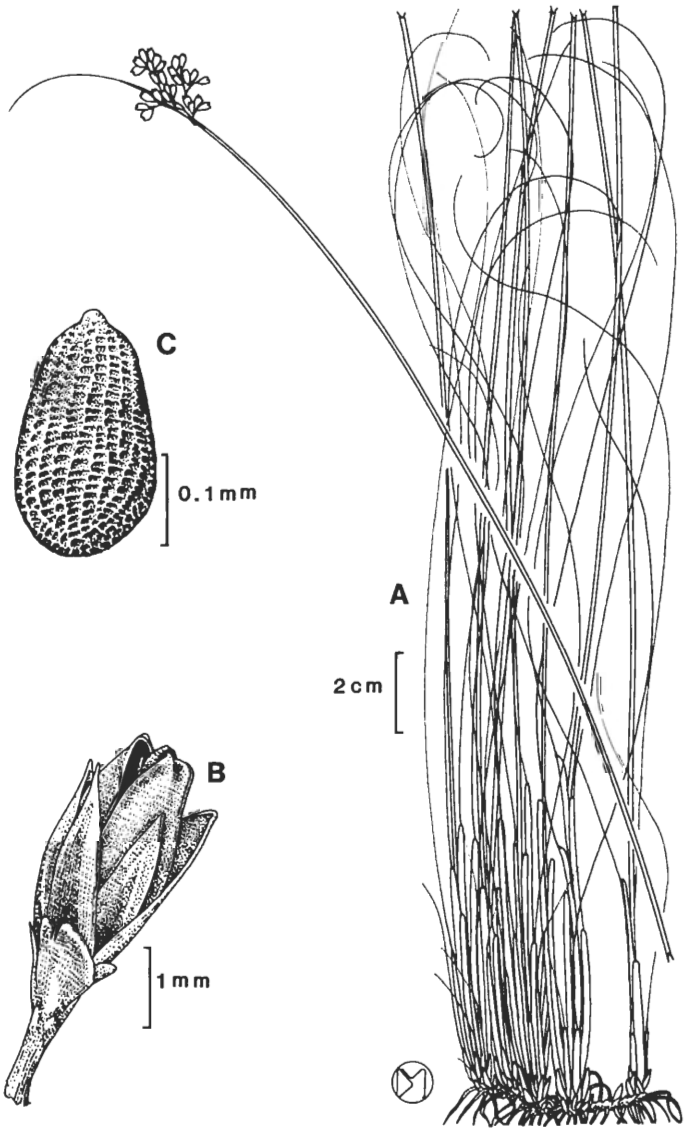
General Distribution: Maine south along the coast to Florida and west to southeastern Oklahoma and east Texas

Description: Flowers **bisexual**; **stigmas** 1.7-2.6 mm long; **style** 0.2-0.3 mm long; **ovary** ellipsoid to ovoid; **fruit** an imperfectly trilocular, lustrous reddish-brown or stramineous, ovoid to obovoid, trigonous capsule, the angles slightly ridged, 2.6-4.0 mm long, included to equaling the perianth, apex rounded to slightly retuse; **valves** 1.4-2.0 mm broad; **seeds** ellipsoid, often asymmetrical, light brown, 0.2-0.4 mm long, ends dark pointed, tegmen with transversely elliptical, nearly isodiametric areolae; **stamens** 6, 1.2-2.0 mm long; **filaments** whitish to stramineous; **anthers** light yellow, 0.5-1.0 times the filament length; **tepals** spreading, lanceolate, green to stramineous with stramineous bands between midrib and margin, apex acuminate to subulate, margin scarious; **inner tepals** 3.1-3.8 (-4.5) mm long, 0.5-1.2 mm broad; **outer tepals** 3.3-3.9 (-4.7) mm long and 0.7-1.2 mm broad; **bracteoles** cartilaginous, ovate to widely ovate, 1.0-1.7 mm long, apex acute to obtuse; **pedicels** 0-7 mm long; **adaxial bracts** scarious, lanceolate, 1-4 mm long, apex bifurcate; **abaxial bracts** leaf-like, sheath scarious, auricles slightly prolonged, blade herbaceous, linear, 1-6 mm long, apex acuminate, margin entire; **rachis** 2-7 mm long; **inflorescence** sympodial, a compound to decompound dichasium with monochasial branches, usually obovoid, diffuse, 2-11 cm long, 1.5-3.5 cm broad; **monochasia** 1-3 (-5) flowered, erect to ascending, occasionally incurved, 5-25 (-45) mm long; **lowest bract** erect, tightly involute and appearing terete with a slight adaxial channel, 3-20 cm long, equaling or much longer than the inflorescence, apex acuminate; **cauline leaves** absent; **basal leaves** 2-4, sheaths open, 2-11 cm long, auricles membranaceous to cartilaginous, rounded, slightly prolonged,

blades tightly involute with a slight adaxial channel, appearing terete, 3.5-23 cm long, 0.5-1.2 mm diameter, apex acuminate; **cataphylls** 1-3; **stems** terete, erect, 0.9-8.0 dm to the base of the inflorescence, 0.5-1.7 mm diameter immediately above the basal sheaths, densely cespitose; **rhizomes** horizontal, tan to brown, 3-4 mm diameter, **roots** numerous, up to 1 mm diameter (2n = 80).

Infraspecific Variation: Typical *J. dichotomus* has terete leaves and is therefore easily separated from other members of the *J. tenuis* complex; however, flat-leaved individuals of this species (known as *J. platyphyllus*) are frequently encountered, particularly at the northern end of the species range. Brooks (pers. comm.) has found both forms growing in the same population on numerous occasions and occasionally they have been found in the same clump. Brooks has also found the two forms to be electrophoretically similar. Therefore, it seems advisable not to recognize varieties of this species.





13. *Juncus greenei* Oakes & Tuckerman

Common Name: Greene's Rush

Type Description: Oakes & Tuckerman, Amer. J. Sci. 45: 37, 1843

Origin: Northeastern North America

Habitats: Wet to dry sandy soils, rarely rocks; on beaches, lake shores, sand dunes, roadsides, old fields and hills, from sea level to 1500 ft elevation

Habit: Erect, densely tufted, perennial herbs

Flowering: mid June-July

Fruiting: late June-October

General Distribution: Eastern North America, from Nova Scotia to Ontario and Minnesota, south to Iowa, Ohio and New Jersey

Description: Flowers **bisexual**; **stigmas** 1.5-2.5 mm long; **style** 0.2-0.3 mm long; **ovary** ellipsoid to ovoid; **fruit** a trilocular, reddish-brown to castaneous, ellipsoid to ovoid, slightly trigonous capsule, (2.5-) 3.2-3.6 mm long, exserted, apex truncate to slightly retuse; **valves** 1.3-1.5 mm broad; **seeds** ellipsoid to oblong, light brown, 0.5-0.6 mm long, ends dark pointed and usually short tailed, tegmen with transversely elliptical areolae; **stamens** 6, 1.4-1.7 mm long; **filaments** stramineous; **anthers** light yellow, equal the filament length; **tepals** appressed, green to reddish-brown with stramineous bands between midrib and margin, margins broad and scarious; **inner tepals** ovate, 2.5-2.9 (-3.5) mm long, 0.8-1.2 mm wide, apex acute to acuminate; **outer tepals** ovate to narrowly ovate, 2.8-3.2 (-4.2) mm long, 0.8-1.2 mm broad, apex acuminate to aristate; **bracteoles** cartilaginous, ovate to widely ovate, 0.9-1.5 mm long, apex acute to rounded or apiculate; **pedicels** 0-3 mm long, flowers which appear to be on long pedicels are on single-flowered peduncles; **adaxial bracts** scarious, lanceolate, 1-4 mm long, apex bifurcate, margin entire; **abaxial bracts** leaf-like, sheaths scarious, auricles slightly prolonged, blade herbaceous, linear, 1.5-8.0 mm long, apex acuminate, or bracteole-like in size and appearance; **rachis** 4-12

mm long; **inflorescence** sympodial, a compound dichasium with monochasial branches, congested, 2.0-3.5 cm tall, 0.5-4.0 cm broad; **monochasia** 1-3 flowers, erect to ascending, 3-35 mm long; **lowest bract** erect to ascending, terete with a slight channel, 4-15 (-22) cm long, longer than the inflorescence, apex acuminate; **cauline leaves** absent; **basal leaves** 2-3, sheaths open, 2.5-8.0 cm long, auricles scarious, often darkened, rounded, not prolonged, blades tightly involute with a slight adaxial channel, appearing terete, 5-20 (-30) cm long, 0.5 mm diameter, apex acuminate; **cataphylls** 0-2; **stems** erect, terete, 2.5-4.6 (-7) dm tall to the base of the inflorescence, 1-2 mm diameter immediately above the basal sheaths, tufted; **rhizomes** erect, brown, 1.0-1.5 mm diameter; **roots** few, up to 0.5 mm in diameter (2n = 80).

D. *Juncus* Subgenus *Graminifolii* Buch.

Perennials; rhizomes present; leaves flat or involute (rarely canaliculate); inflorescence terminal, the flowers glomerulate; bracteoles absent; seeds without tails.

14. *Juncus marginatus* Rostk.

Common Name: Grass-leaved Rush

Type Description: Rostkovius, De Junco p. 38, pl. 2, f. 3, 1801

Origin: Eastern North America

Habitats: Wet banks, marshes and sandy lake margins

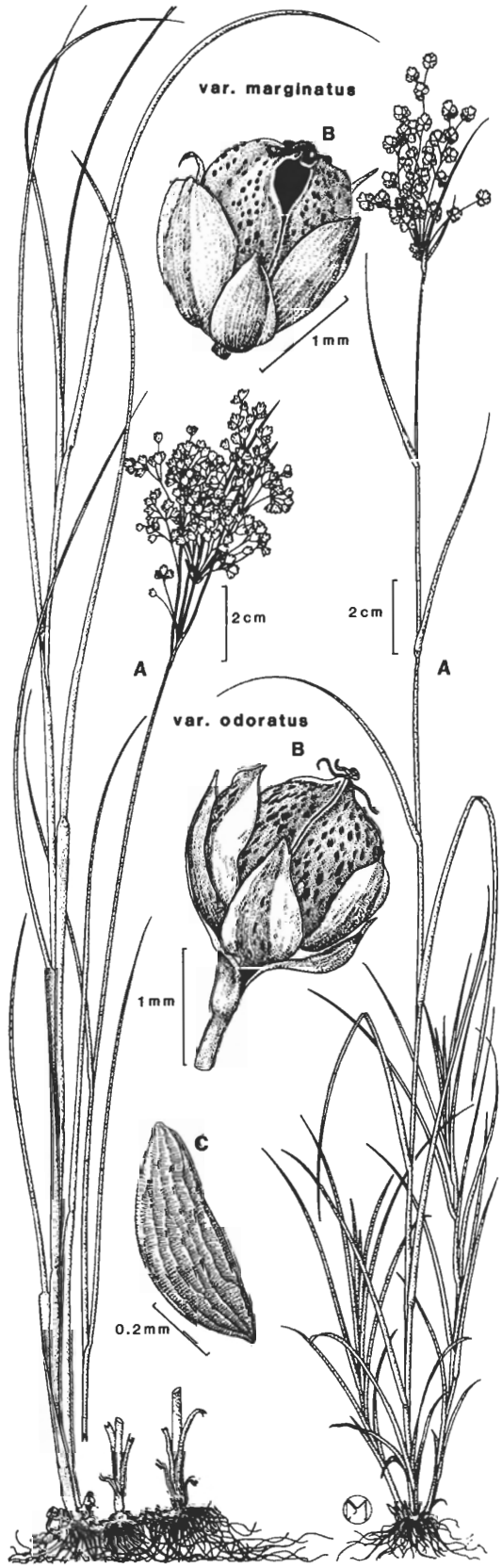
Habit: Erect, rhizomatous, perennial herbs

Flowering: June-July

Fruiting: July-September

General Distribution: Nova Scotia to Minnesota south to Texas and Florida

Description: Flowers **bisexual**; **stigmas** 0.8-1.2 mm long; **style** 0.2-0.3 mm long; **ovary** globose to obovoid; **fruit** a trilocular, brown with red speckles, globose or obovoid capsule, 1.8-2.9 mm long, exserted, apex blunt or rounded; **valves** 1.3-1.7 mm broad; **seeds** fusiform, light brown, 0.5-0.7 mm long, ends short bluntly tailed, tegmen coarsely costate, with punctate transverse lines; **stamens** 3, 1.7-2.1 mm long; **filaments** purplish or white; **anthers** dark purple, 0.2-0.5 times the filament length; **tepals** appressed, green with reddish speckles and reddish-brown bands between midvein and margins, ovate, margins very broad and scarious; **inner tepals** 2.0-3.3 mm long, 1.2-1.4 mm broad, apex rounded, occasionally aristate; **outer tepals** 1.8-3.2 mm long, 0.8-1.0 mm broad, apex aristate, often spreading at the tip; **bracteoles** absent; **glomerules** 2-20 flowered, narrowly hemispherical to spherical, 3-7 mm diameter; **peduncles** erect or ascending, 0.5-2.5 cm long; **adaxial bracts** straminеous with reddish striations, sheathing, 2-6 mm long, apex bifurcate, margin entire; **abaxial bracts** herbaceous, lanceolate, 4-12 mm long, apex long acuminate, margin entire; **rachis** 4-11 mm long; **inflorescence** sympodial, a panicle of 5-200 glomerules, obpyramidal and open, 1.2-8.0 cm long, 1-7 cm broad; **lowest bract** erect to spreading, sheath 7-10 mm long, blade flat, 1-8 cm long, shorter to slightly longer than the inflorescence, apex acuminate; **cauline leaves** 2-5, sheaths open, 1-8 cm long, auricles rounded, scarious, not prolonged or prolonged to 1 mm, blades flat, 2-35 cm long, 1.0-3.5 (-6) mm wide, apex acuminate, dark-pointed; **basal leaves** 2-3, sheaths open, 1.0-9.2 cm long, auricles rounded, scarcely prolonged, blades flat, 2-25 cm long, 1.0-3.5 (-6) mm diameter, apex acuminate, dark-pointed; **cataphylls** absent; **stems** erect, compressed, 2-11 dm to the base of the inflorescence, 1.0-3.5 mm diameter immediately above the basal leaves, bulbous-thickened at the base, cespitose;



rhizomes erect or knotty and horizontal, stramineous, 1.5-5.0 mm diameter; **roots** numerous, up to 0.5 mm in diameter (2n = 38, 40)

Infraspecific Variation: The varieties of *J. marginatus* are frequently treated as distinct species: *J. marginatus* and *J. biflorus*, but intergradation blurs the distinction between them. In the southeastern United States these intermediates are particularly frequent, consequently a recent treatment for the southeastern United States (Godfrey and Wooten, 1979) has considered these taxa to be members of a single, polymorphic species without distinct varieties. In New York, however, the morphological extremes within the group are fairly distinct and recognizable, showing little intergradation; two varieties are recognized here.

KEY TO VARIETIES

1. Glomerules 5-15 per inflorescence, 6-20 flowered; rhizomes not coarse, thin, usually inconspicuous; stamens usually shorter than the outer tepals ..... 18a. *J. marginatus* var. *marginatus*
1. Glomerules 20-200 per inflorescence, 2-5 flowered; rhizomes coarse, thick; stamens usually longer than the outer tepals. ..... 18b. *J. marginatus* var. *odoratus*

14a. *Juncus marginatus* var. *marginatus*

Common Name: Grass-leaved Rush

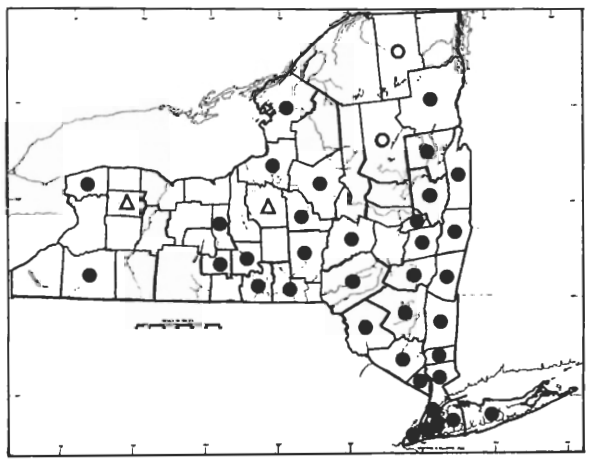
Synonyms: *J. marginatus* var. *vulgaris* Engelm., *J. marginatus* var. *paucicapitatus* Engelm.

Origin: Eastern North America

Habitats: Wet banks, marshes, sandy lake margins

General Distribution: Nova Scotia to Ontario south to Texas and Florida

Ploidy: 2n=38, 40



14b. *Juncus marginatus* var. *odoratus* Torr.

Common Name: Large Grass-leaved Rush

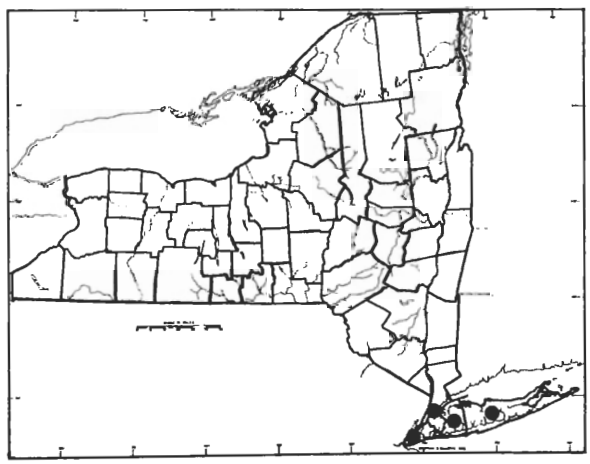
Synonyms: *J. aristulatus* Michx., *J. biflorus* Ell., *J. marginatus* var. *aristulatus* (Michx.) Cov., *J. marginatus* var. *biflorus* (Ell.) Chapm., *J. odoratus* (Torr.) Steud.

Origin: Probably southeastern United States Coastal Plain

Habitats: Moist soil and meadows, near the coast

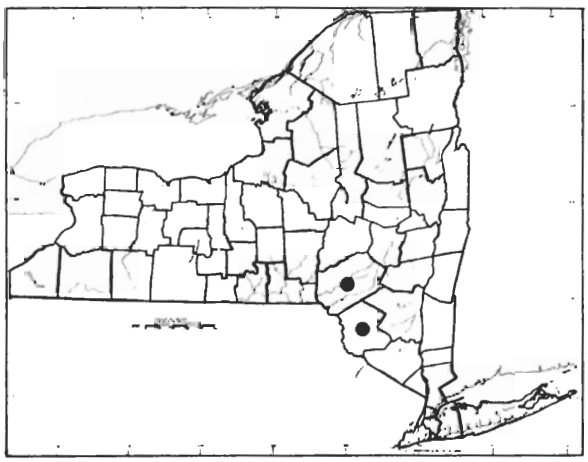
General Distribution: Massachusetts to Michigan and Missouri south to Texas and Florida

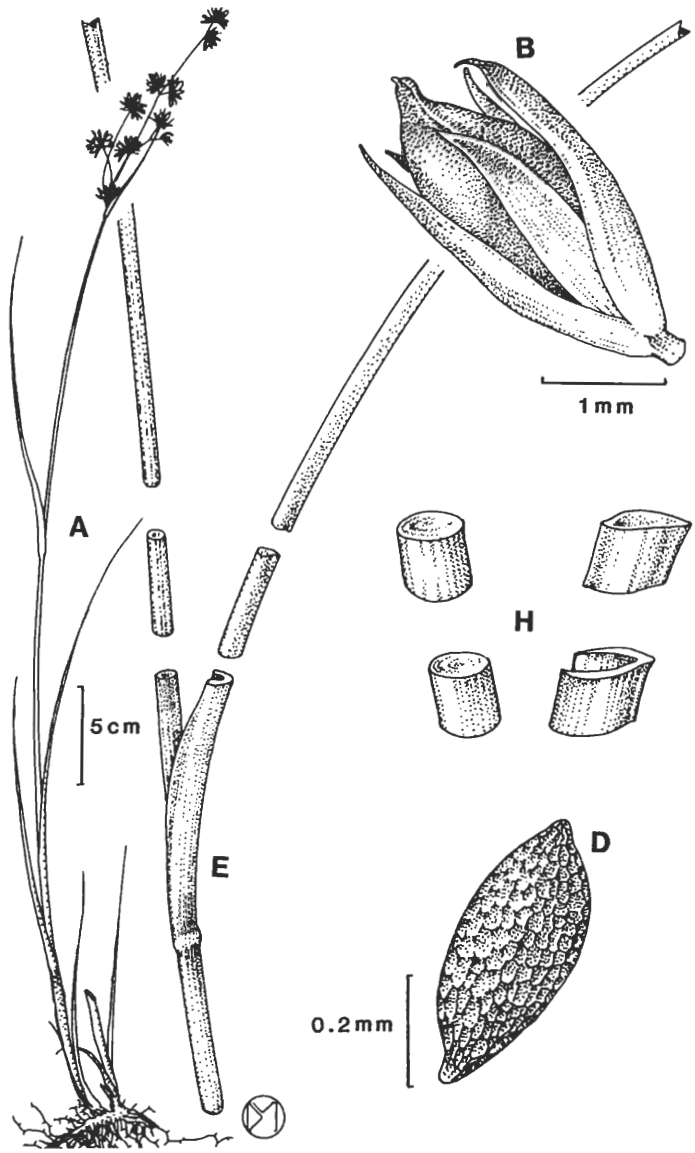
Ploidy: Unknown



E. *Juncus* Subgenus *Ensifolii* (Snogerup) Snogerup

Perennials: rhizomes present; leaves ensiform, imperfectly septate; inflorescence terminal, the flowers glomerulate; bracteoles absent; seeds without tails.





15. *Juncus ensifolius* Wikström

Common Name: Ensiform Rush

Type Description: Wikström, Kongl. Vetensk. Acad. Handl. 2: 274, 1823

Synonym: *Juncus xiphioides* var. *triandrus* Engelm.

Origin: Western North America

Habitats: Wet places, often along streams

Habit: Erect, rhizomatous, perennial, terrestrial and wetland herbs

Flowering: June

Fruiting: July

General Distribution: South Dakota to Alaska south to California and Texas, disjunct in northern Wisconsin and southeastern New York; also introduced into Europe

Rarity Status: This species has only recently been recognized as occurring New York State, where it is known from only two localities. It is ranked G5, S1 by NYNHP.

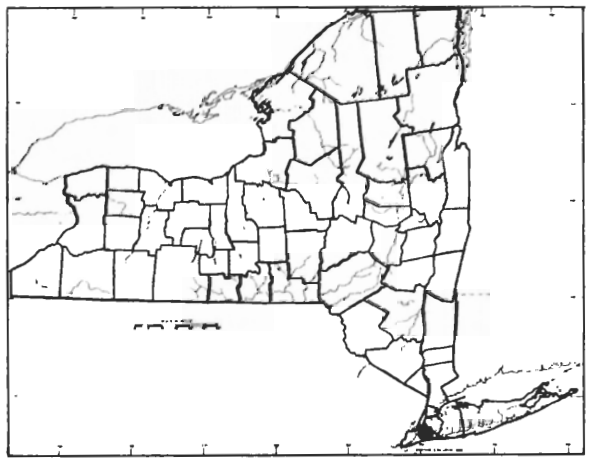
Description: Flowers **bisexual**; **stigmas** 0.5-0.6 mm long; **style** 0.5-0.7 (-1.5) mm long; **ovary** ovoid; **fruit** an imperfectly trilocular, dark brown, elliptic, 3.0-3.5 mm long, equaling the perianth to exserted (included), apex tapering to a short beak; **valves** 0.8-1.0 mm broad; **seeds** ellipsoid, light brown, 0.4-0.6 mm long, ends dark and acute, tegmen reticulate; **stamens** 3 (or 6), 1.3-1.5 mm long; **filaments** white; **anthers** yellow, equaling the filament length; **tepals** appressed, stramineous to reddish-brown, lanceolate, apex acuminate, margin scarious; **inner tepals** 2.2-2.6 (-3.5) mm long, 0.5 mm broad; **outer tepals** 2.7-3.1 (-4.0) mm long, 0.6-0.7 mm broad; **bracteoles** absent; **glomerules** 15-70 flowered, spherical or rarely hemispherical, 8-11 mm diameter; **peduncles** erect or spreading, 1-11 cm long; **adaxial bracts** scarious, sheathing, 2-6 mm long, apex bifurcate, margin entire; **abaxial bracts** scarious, lanceolate, 4-12 mm long, apex long acuminate to aristate, margin entire; **rachis** 4-10 mm long; **inflorescence** sympodial, 1-2 glomerules or a panicle of 3-11 glomerules, open, 4-7 cm long, 3-5 cm broad; **lowest bract** erect, equitant, 1.2-3.9 cm long, shorter than the inflorescence, apex acuminate; **cauline leaves** 4-6, sheaths open, 4-10 cm long, auricles absent, blades equitant (folded along the midrib with the edges connate above the sheath), 4.5-12.1 (-30) cm long, 1.5-4.0 (-6) mm wide, apex long acuminate, dark-pointed; **basal leaves** 1-2, sheaths open, 3.5-6.0 cm long, auricles absent, blades equitant, 6.0-12.5 cm long, 1.5-4.0 (-6) mm wide, apex long acuminate, dark-pointed; **cataphylls** absent; **stems** erect, flattened and narrowly winged, (2-) 4.0-5.5 (-8) dm to the base of the inflorescence, 1.7-

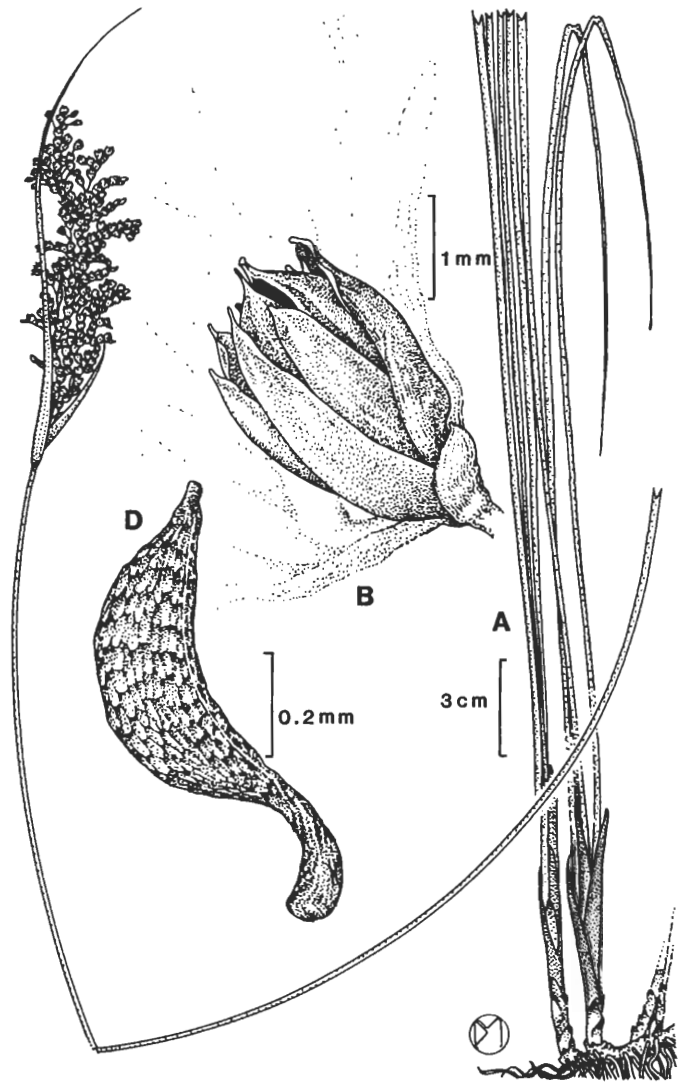
3.5 mm diameter immediately above the basal leaves, scattered or loosely clustered along creeping rhizomes; **rhizomes** horizontal to erect, stramineous, 1.5 mm diameter; **roots** numerous, up to 0.5 mm diameter (2n = 40).

Infraspecific Variation: New York plants are var. *ensifolius*, distinguished from other varieties by their 3 stamens. C. Hitchcock noted, however, that flowers with 3-stamens and with 6-stamens can be found on the same plant, sometimes even in the same head, suggesting that a second variety, *J. ensifolius* var. *montanus* (Engelm.) C. Hitchc. should possibly be lumped with var. *ensifolius*.

F. *Juncus* Subgenus *Juncus*

Perennials; rhizomes present; leaves terete, not septate; inflorescence terminal, the flowers glomerulate; bracteoles absent; seeds with tails.





16. *Juncus maritimus* Lam.

Common Name: Seaside Rush

Type Description: Lamarck, Encycl. 3: 264, 1789

Origin: Mediterranean Region

Habitats: Coastal salt-marshes and saline meadows; the New York population was on coastal sand dunes

Habit: Erect, rhizomatous, halophytic, perennial herbs

Flowering: July-September

Fruiting: September

General Distribution: Europe and north Africa; introduced into North America only in New York from 1863 to 1903, then apparently extirpated

Description: Flowers **bisexual**; **stigmas** 0.5-1.0 mm long; **style** 1.0-1.2 mm long; **ovary** narrowly ovoid; **fruit** a trilocular, stramineous, ovoid to ellipsoid, trigonous capsule, 2.5-3.5 mm long, equaling the perianth or exserted, apex acute to obtuse, mucronate; **valves** 1.0-1.3 mm broad; **seeds** ellipsoid, dark brown, 0.8-1.2 mm long, with long translucent tails about 0.5-1.0 times the length of the body, tegmen coarsely costate; **stamens** 6, 1.4-1.9 mm long; **filaments** dark; **anthers** white, equal to more commonly twice the filament length; **tepals** appressed, stramineous, margins scarious; **inner tepals** narrowly elliptical, 2.3-2.5 mm long, 0.6-0.7 mm broad, apex obtuse; **outer tepals** lanceolate, 2.8-2.9 mm long, 0.9-1.0 mm broad, apex acute, mucronate; **bracteoles** absent; **glomerules** 2-4 flowered, obovoid, 5-7 mm diameter; **peduncles** erect or ascending, 0.5-5.0 cm long; **adaxial bracts** scarious, incurled or sheathing, 2-6 mm long, apex bifurcate, margin entire; **abaxial bracts** herbaceous, lanceolate, 4-15 mm long, apex long acuminate, margin entire; **rachis** 5-10 mm long; **inflorescence** occasionally appearing lateral, sympodial, a panicle of 50-100 glomerules, lax to occasionally congested, 5-19 cm tall, 2-5 cm broad; **lowest bract** erect and occasionally appearing to be a prolongation of the stem, sheath inflated, 2.9-3.5 cm long, blade terete, 7-16 cm long, longer than the inflorescence, apex acuminate; **cauline leaves** absent; **basal leaves** (1-) 2-4, sheaths open, (2-) 7-

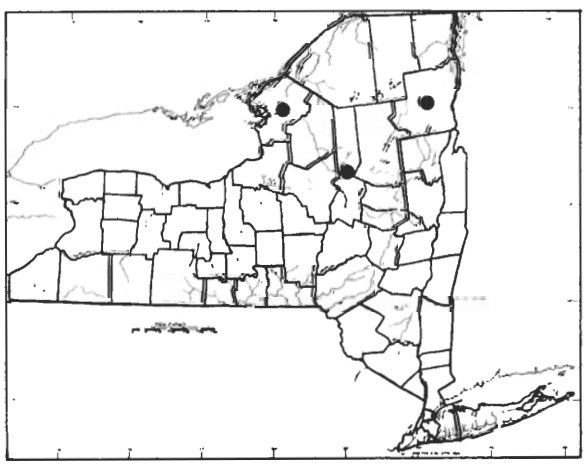
9 cm long, auricles absent, blades terete, 40-60 cm long, 1-2 mm diameter, apex acute and dark-pointed; **cataphylls** 3-5; **stems** erect, terete, 5-6.5 (-10) dm tall to the base of the inflorescence, (1.0-) 2.2-3.2 mm diameter immediately above the basal sheaths, closely set along creeping rhizomes; **rhizomes** horizontal, brown, 4.5-6.0 mm diameter; **roots** few, up to 0.5 mm diameter (2n = 40, 48).

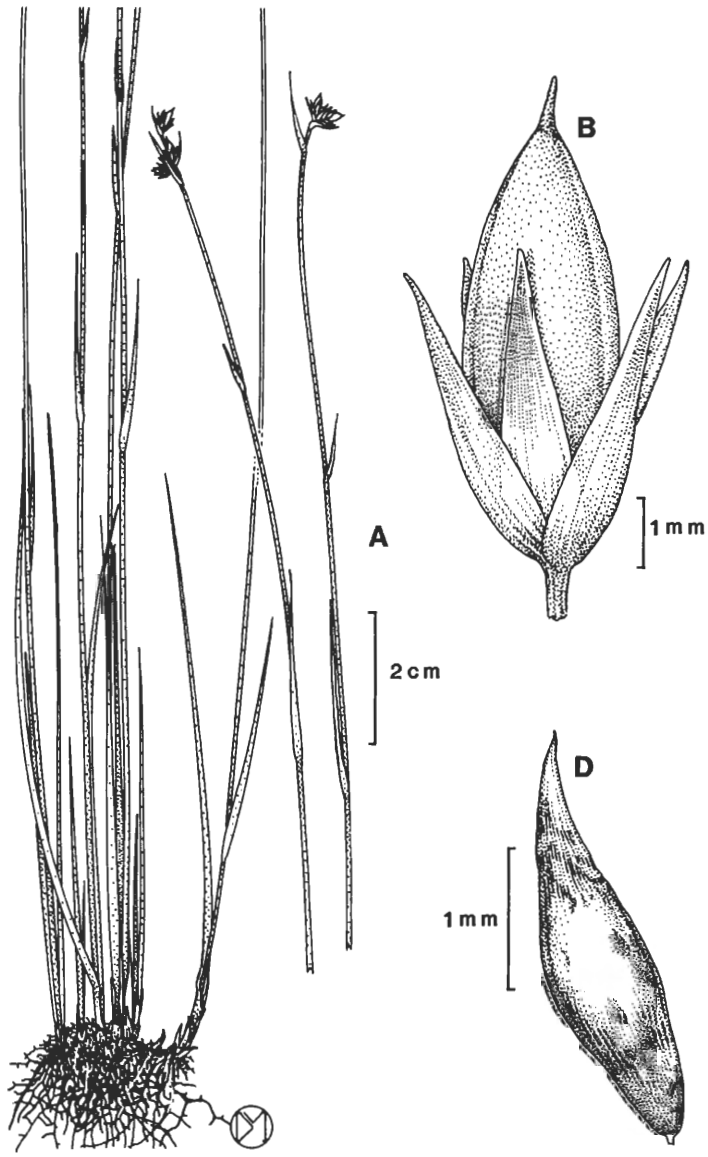
Note: This species was collected North America only in New York in the later part of the nineteenth century; it is presumed extirpated. If any populations are found that are suspected to be this species, the plants should be closely compared with *J. roemerianus* Scheele, which reaches its northern distributional limits in New Jersey.

Importance: *Juncus maritimus* was commonly made into pen-brushes, and it was used to draw hieroglyphics in ancient Egypt.

G. *Juncus* Subgenus *Alpini* Buch.

Perennials; rhizomes present; leaves terete or canaliculate, often transversely septate; inflorescence terminal, the flowers glomerulate; bracteoles absent; seeds tailed.





17. *Juncus stygius* L. var. *americanus* Buch.

Common Name: Moor Rush

Type Description: Linnaeus, Syst. Nat., ed. 10, p. 987, 1759

Synonym: *Juncus stygius* ssp. *americanus* (Buch.) Hultén

Origin: Arctic

Habitats: Wet, mossy peat of bogs and bog pools

Habit: Erect, rhizomatous, perennial herbs

Flowering: August

Fruiting: August

General Distribution: *Juncus stygius sensu lato* is circumboreal; var. *americanus* is North American, ranging from Newfoundland to Alaska south to British Columbia, Minnesota and New York.

Rarity Status: NYNHP rank G4G5, SH. Not seen in the State in the 20th Century.

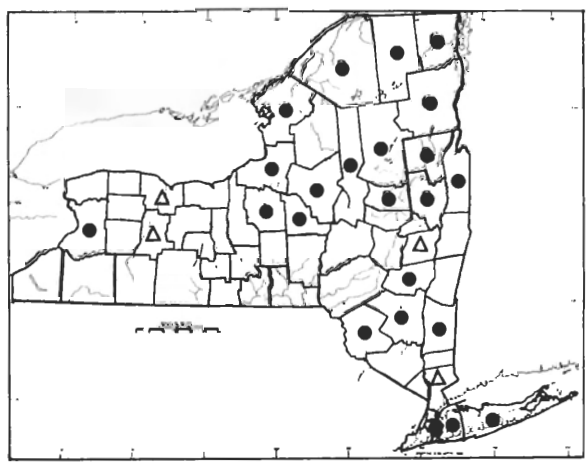
Description: Flowers **bisexual**; **stigmas** 0.2-0.5 mm long; **style** 1.0-1.2 mm long; **ovary** lanceolate; **fruit** an imperfectly trilocular, greenish-brown, ellipsoid, trigonous capsule, 6.0-7.0 mm long, exserted, apex acute, mucronate; **valves** 1.7-2.5 mm broad; **seeds** fusiform, white, 3.0-3.5 mm long, with white tails 2-3 times the body length, tegmen with indistinct, rectangular areolae; **stamens** 6, 3.6-4.0 mm long; **filaments** stramineous, flexuous; **anthers** yellowish-white, 0.2-0.3 times the filament length; **tepals** appressed, 4.5-5.0 mm long, 1.0 mm broad, margins broad and scarious; **inner tepals** whitish to reddish brown, lanceolate to elliptic, apex obtuse to subacute; **outer tepals** stramineous to reddish-brown, lanceolate, apex acuminate; **bracteoles** absent; **glomerules** 1-4 flowered,

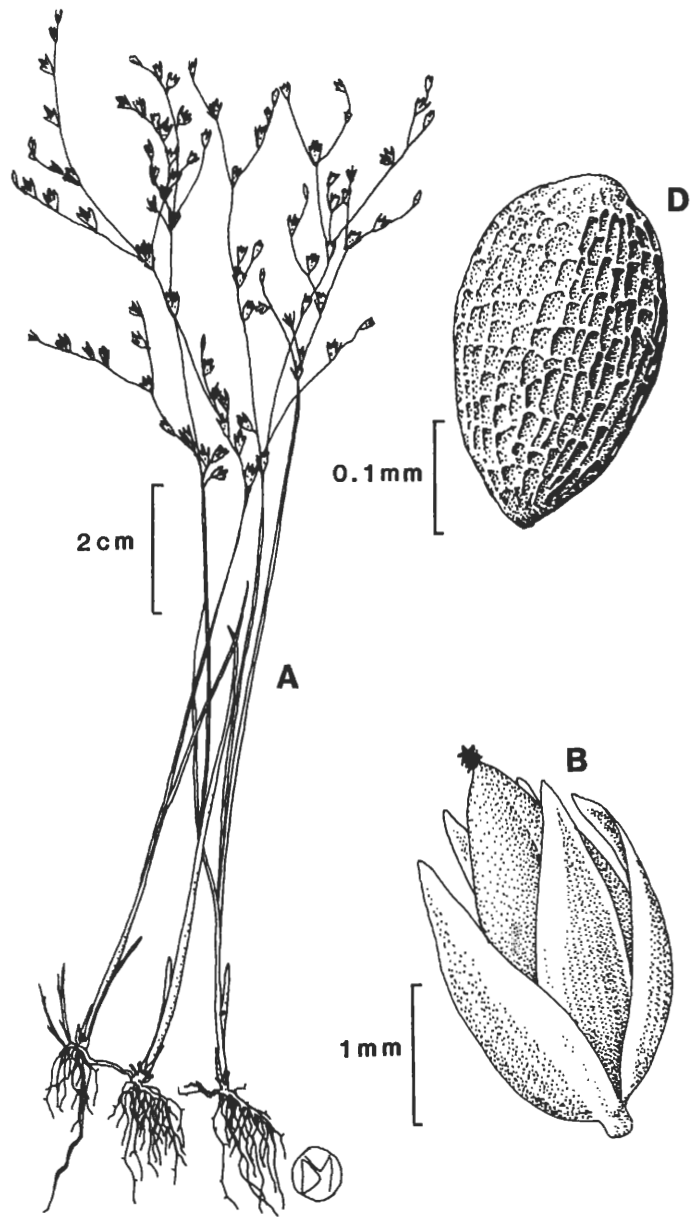
obovoid, 5-10 mm diameter; **peduncles** erect, 0.5-1.0 cm long: **bracts** scarious, ovate, 4.5-5.0 mm long, apex acute to acuminate, margin entire; **rachis** 2-13 mm long; **inflorescence** sympodial, 1-2 glomerules or a compact raceme of 3 glomerules, 0.8-2.0 cm tall, 0.3-1.2 cm broad; **lowest bract** erect, terete, sheath reddish, 0.6-1.4 cm long, blade terete, 4-7 mm long, shorter than the inflorescence, apex a dark blunt point; **cauline leaves** 1-2 (-3), only one leaf above the middle of the stem, sheaths open, 0.1-0.4 cm long, auricles rounded, scarious, not prolonged, blades terete or slightly flattened, papillose near the base, 2.5-7.1 cm long, 0.5-1.0 mm in diameter, apex a blunt, dark point; **basal leaves** 1-2, sheaths open, 2-3 mm long, auricles rounded, slightly prolonged, blades terete or slightly flattened, 10-17 cm long, 1.0-1.5 mm diameter, apex blunt and darkened; **cataphylls** absent; **stems** erect, terete, 2.1-3.3 dm tall to the base of the inflorescence, 0.8-1.0 mm diameter immediately above the basal sheaths, solitary or loosely cespitose, short, slender stolons present; **rhizomes** erect, tan, 0.8-1.0 mm diameter; **roots** few, up to 0.2 mm in diameter.

Infraspecific Variation: North American materials are *J. stygius* var. *americana* Buchenau. This variety differs from the typical European one in that the plants have evenly tapered, large capsules, longer seeds and longer styles.

H. *Juncus* Subgenus *Septati* Buchenau

Perennials (rarely annuals); rhizomes present; leaves terete or subterete, with transverse septa; inflorescence terminal, the flowers glomerulate; bracteoles absent; seeds with or without tails.





18. *Juncus pelocarpus* E. Meyer

Common Name: Brown-fruited Rush

Type Description: E. Meyer, Syn. Luzul. p. 30, 1823

Synonym: *Juncus conradii* Tuck. in Torrey

Origin: Northeastern North America

Habitats: Damp shores, pools and wet sands

Habit: Erect, rhizomatous, aquatic to terrestrial, perennial herbs

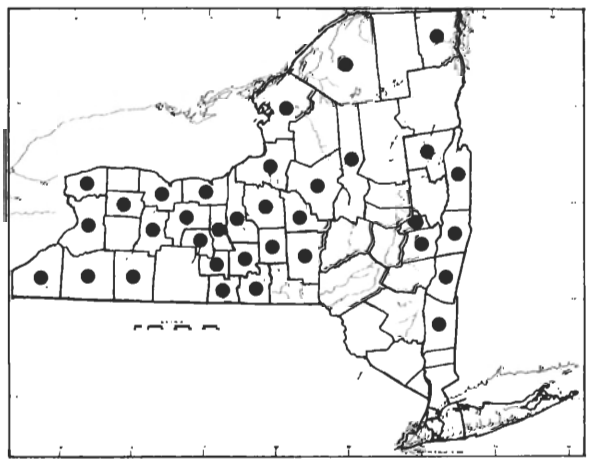
Flowering: July-August

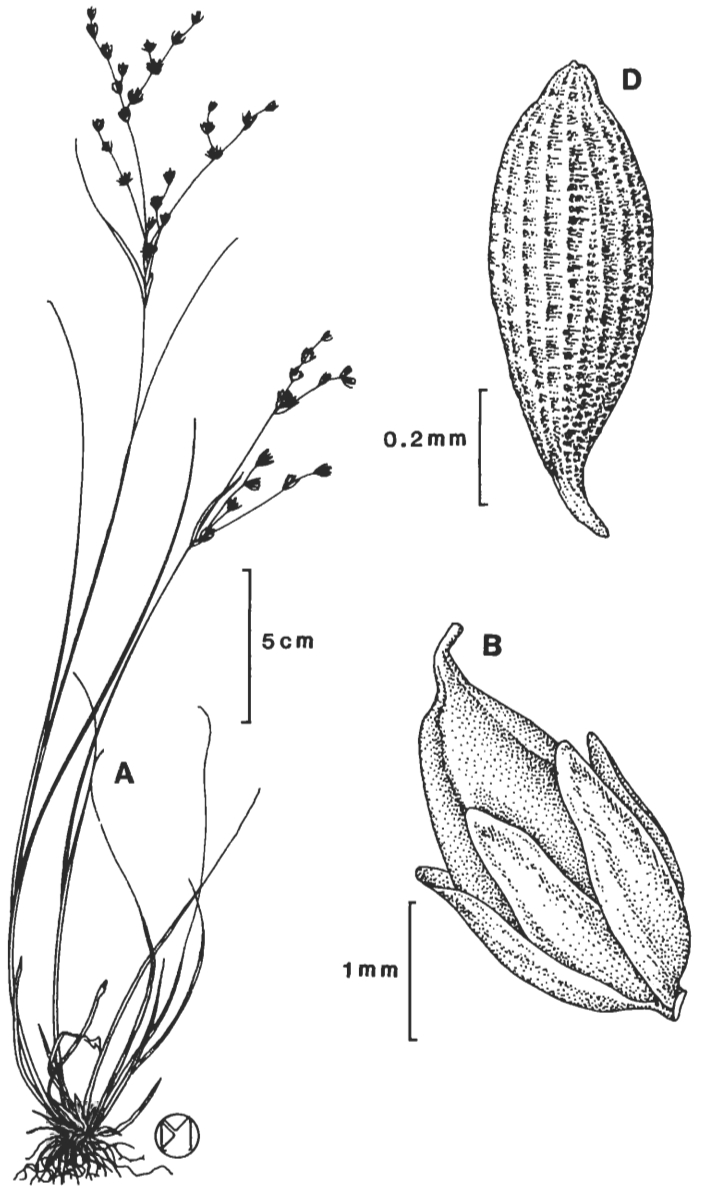
Fruiting: August-October

General Distribution: Newfoundland to Ontario south to Minnesota and Delaware

Description: Flowers **bisexual** (flowers are occasionally replaced by subulate fascicles of leaves); **stigmas** 1.0-1.6 mm long; **style** 0.3-0.5 mm long; **ovary** narrowly ovoid; **fruit** a unilocular, lustrous, dark brown, narrowly ovoid, rostrate capsule, 1.5-3.1 mm long (including the beak), capsule body equaling the perianth to slightly exserted, apex gradually tapering to an exserted beak, beak up to 0.7 mm long; **valves** 0.6-0.9 mm broad; **seeds** ellipsoid, light brown, 0.3-0.5 mm

long, ends dark pointed, tegmen reticulate; **stamens** 6, 1.3-1.9 mm long; **filaments** stramineous; **anthers** yellowish-white, 2-3 times the filament length; **tepals** loosely appressed, dark brown, ovate to lanceolate, apex obtuse to slightly acute, margins scarious; **inner tepals** 1.8-2.8 mm long, 0.7-0.8 mm broad; **outer tepals** 1.6-2.3 mm long, 0.7-0.8 mm broad; **bracteoles** absent; **monochasia** 2-6 flowered, ascending to erect or incurled, 5-30 mm long; **bracts** subtending pedicels, scarious, ovate, 0.7-1.3 mm long, acute to slightly mucronate; **peduncles** 0.2-4.0 cm long; **adaxial bracts** stramineous, often with a reddish midvein, sheathing, 1-6 mm long, apex retuse, margin entire; **abaxial bracts** herbaceous, lanceolate, 3-10 mm long, apex acute, erose, margin entire; **rachis** 1-5 mm long; **inflorescence** sympodial, a dichasium with monochasial branches, broadly ovoid to obpyramidal, (3-) 8-16 cm tall, (1-) 5.5-10 cm broad; **lowest bract** erect, terete, septate, 1.5-4.0 cm long, shorter than the inflorescence, apex acuminate and blackened; **cauline leaves** 1-4, sheaths open, 0.7-3.0 cm long, auricles stramineous, rounded, slight prolonged, blades terete, septate (though often obscurely so), 1.5-11 cm long, 0.5-1.0 mm diameter, apex acuminate and black tipped; **basal leaves** 1-2, sheaths open, 1.5-4.5 cm long, auricles not prolonged, blades terete, septate, 3-12 cm long, 0.5-1.0 mm diameter, apex acuminate; **cataphylls** mucronate; **stems** erect, terete, 0.6-3.4 dm tall to the base of the inflorescence, 0.6-1.4 mm diameter immediately above the basal sheaths, loosely to densely set along slender horizontal rhizomes; **rhizomes** horizontal, tan, 1.0-1.5 mm diameter; **roots** few, up to 0.2 mm in diameter (2n = 40).





19. *Juncus brachycephalus* (Engelm.) Buch.

Common Name: Small-headed Rush

Type Description: Engelmann, Trans. St. Louis Acad. 2: 474, 1868

Synonyms: *J. canadensis* var. *brachycephalus* Engelm., *J. polycephalus* var. *depauperatus* Torr.

Origin: Northeastern North America

Habitats: Calcareous marshes, meadows and wetland shores

Habit: Erect, rhizomatous, perennial herbs

Flowering: May-June

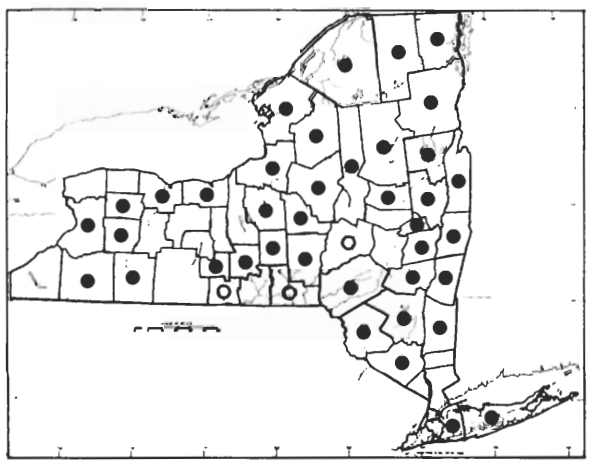
Fruiting: June-August

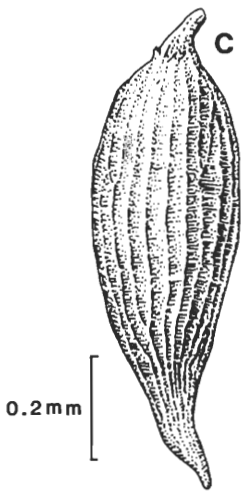
General Distribution: Nova Scotia to Ontario south to Illinois, Ohio and New Jersey

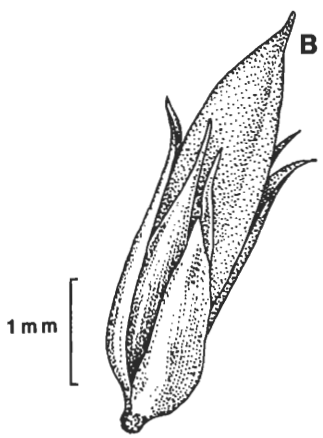
Description: Flowers **bisexual**; **stigmas** 0.6-1.0 mm long; **style** 0.5-0.6 long; **ovary** lanceolate; **fruit** an imperfectly trilocular, light brown, ovoid to prismatic, trigonous capsule, 2.4-3.8 mm long, exserted, apex acute to obtuse, mucronate or slightly beaked; **valves** 0.7-1.2 mm broad; **seeds** fusiform to ellipsoid, light brown, 0.8-1.2 mm long, with short tails ca. 1/5 the body length and a thick raphe along one side, tegmen reticulate with numerous transverse lines; **stamens** 3-6, 1.2-1.5 mm long; **filaments** white; **anthers** white, 0.5 times the filament length; tepals loosely appressed, 3-nerved, green to light brown,

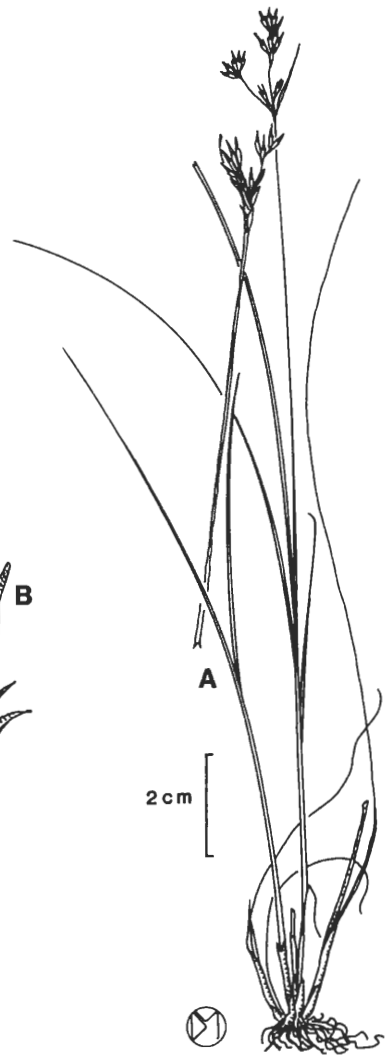
lanceolate, apex obtuse to subacute, margins broad and scarious; **inner tepals** 2.0-2.8 mm long, 0.6-0.8 mm broad; **outer tepals** 1.8-2.5 mm long, 0.5-0.6 mm broad; **bracteoles** absent; **glomerules** (1-) 2-6 flowered, ellipsoid, 2-5 mm diameter; **glomerule bracts** scarious, ovate, 1.0-1.2 mm long, apex obtuse; **peduncles** ascending or spreading to divergent, 1-5 cm long; **adaxial bracts** scarious, sheathing, 2-6 mm long, apex bifurcate, margin entire; **abaxial bracts** herbaceous, lanceolate, 2-13 mm long, apex acuminate to caudate, margin entire; **rachis** 2-4 mm long; **inflorescence** sympodial, a raceme or panicle of 5-80 glomerules, ovoid to obpyramidal and open, 5-25 cm tall, 1-14 cm diameter; **lowest bract** erect, sheath green, 0.1-0.2 mm long, auricle scarious, rounded to truncate, prolonged to 0.5 mm, blades terete, septate, 1-5 cm long, shorter than the inflorescence, tapering to a blunt tip; **cauline leaves** 1-2, sheaths open, 2.5-4.5 mm long, auricles scarious, rounded, prolonged to 1 mm, blades terete, septate, 3-20 cm long, 0.5-2.0 mm diameter, tapering to a blunt tip; **basal leaves** 1-3, sheaths open, 1-4 cm long, auricles scarious, rounded, prolonged 1.0-1.5 mm, blades terete to compressed, septate, 0.2-12 cm long, 0.5-2.0 mm diameter, apex tapering to a blunt tip; **cataphylls** 1-2; **stems** erect, terete, 2-7 dm tall to the base of the inflorescence, 1.2-2.0 mm diameter immediately above the basal sheaths, densely cespitose; **rhizomes** erect to inclined, stramineous, 1.0-1.5 mm diameter; **roots** few to many, up to 0.2 mm in diameter (2n = 80).

Infraspecific Variation: Plants with six stamens have been called *J. brachycephalus* forma *hexandrus* Martin.









20. *Juncus brevicaudatus* (Engelm.) Fern.

Common Name: Narrow-panicled Rush

Type Description: Engelmann, Trans. St. Louis Acad. 2: 474, 1866

Synonyms: *J. acuminatus* of American authors before Engelm. (incl. Torrey) but not Michx., *J. canadensis* var. *brevicaudatus* Engelm., *J. canadensis* var. *coarctatus* Engelm., *J. coarctatus* (Engelm.) Buch.

Origin: Northeastern or northern, central North America

Habitats: Wet soil, marshes and boggy shores

Habit: Erect, densely cespitose, perennial herbs

Flowering: July-August

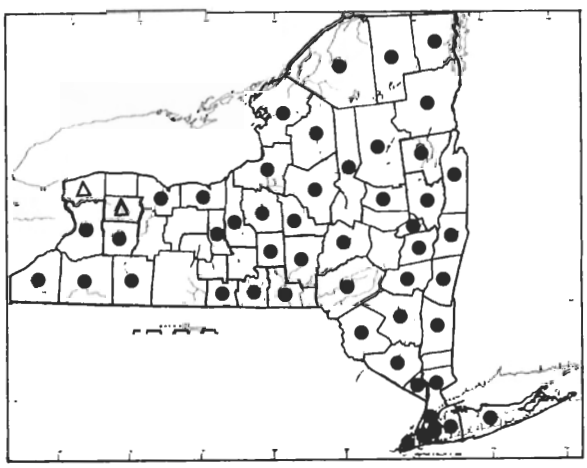
Fruiting: July-October

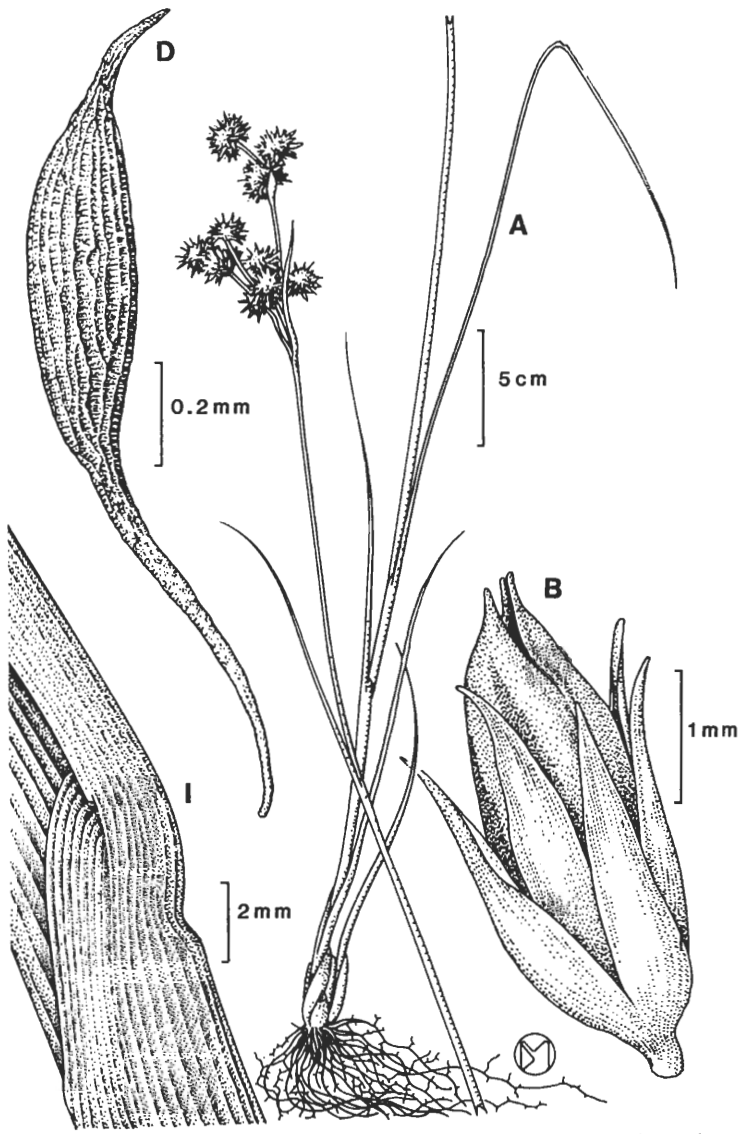
General Distribution: Newfoundland to Manitoba south to Minnesota, Pennsylvania and at higher elevations in North Carolina; also introduced in British Columbia

Description: Flowers **bisexual**; **stigmas** 0.9-1.2 mm long; **style** 0.2-0.3 mm long; **ovary** narrowly ellipsoid; **fruit** an imperfectly trilocular, pale to more commonly dark brown, narrowly ellipsoid to prismatic, trigonous capsule, 3.5-4.8 mm long, exserted, apex acute, mucronate or slightly beaked; **valves** 1.0-1.2 mm broad; **seeds** fusiform, light brown, 0.9-1.2 mm long, with white tails 1/3-1/2 the body length, tegmen reticulate with numerous transverse lines; **stamens** 3, 1.5-2.0 mm long; **fila-**

ments white; **anthers** white, 0.3-0.5 times the filament length; **tepals** 3-nerved, green to light brown often reddish near the apex, lanceolate, margins scarious; **inner tepals** 2.6-3.2 mm long, 0.5-0.6 mm broad, apex acuminate to rarely obtuse; **outer tepals** 2.3-3.0 mm long, 0.6-0.7 mm broad, apex acuminate; **bracteoles** absent; **glomerules** (1-) 2-7 flowered, ellipsoid, 2-6 mm diameter; **glomerule bracts** scarious, ovate, 1.5-2.0 mm long, apex caudate; **peduncles** erect or ascending, 0.5-3.5 cm long; **adaxial bracts** scarious, sheathing, 2-4 mm long, apex acute, margin entire; **abaxial bracts** herbaceous, lanceolate, 3-7 mm long, apex acuminate to caudate, margin entire; **rachis** 3-5 mm long; **inflorescence** sympodial, 2 glomerules or a raceme or panicle of 3-35 glomerules, usually erect and cylindrical, sometimes more open and obovoid, rarely congested, 3-12 cm tall, 1-5 cm broad; **lowest bract** erect, sheath 0.1-0.2 cm long, auricles scarious, rounded, prolonged to 0.5 mm, blade terete, septate, 1.8-7.0 cm long, shorter to longer than the inflorescence, apex tapering to a dark, blunt tip; **cauline leaves** 1-2, sheaths open, 2-3 cm long, auricles scarious, rounded, prolonged to 0.5 mm, blade terete, septate, 2.5-15 cm long, 0.5-2.0 mm diameter, apex tapering to a dark, blunt tip; **basal leaves** 1, sheaths open, 1.3-4.0 cm long, auricles scarious, rounded, prolonged to 0.5 mm, blades terete, septate, 1.5-25 cm long, 0.5-2.0 mm broad, apex tapering to a dark, blunt tip; **cataphylls** 1 or absent; **stems** erect, terete, 1.4-5.5 (-7) dm tall to the base of the inflorescence, 0.5-2.0 mm diameter immediately above the basal sheaths, densely cespitose; **rhizomes** erect, stramineous, 1.0-1.5 mm diameter; **roots** numerous, up to 0.2 mm in diameter (2n = 80).

Taxonomic Note: This species is closely related to *J. canadensis*, differing from it in having short tailed seeds, exserted capsules and an erect inflorescence with few-flowered glomerules.





21. *Juncus canadensis* J. Gay ex La Harpe

Common Name: Canada Rush

Type Description: J. Gay in La Harpe, Essai Monogr. Jonc. p. 46, 1825

Synonyms: *Juncus canadensis* f. *apertus* Fern., *J. canadensis* f. *conglobatus* Fern., *J. canadensis* var. *longicaudatus* Engelm., *J. canadensis* var. *sparsiflorus* Fern., *J. longicaudatus* (Engelm.) Mackz., *J. polycephalus* var. *paradoxus* Torrey

Origin: Eastern North America

Habitats: Acid bogs, brackish and calcareous marshes

Habit: Erect, cespitose, perennial herbs

Flowering: July-August

Fruiting: July-October

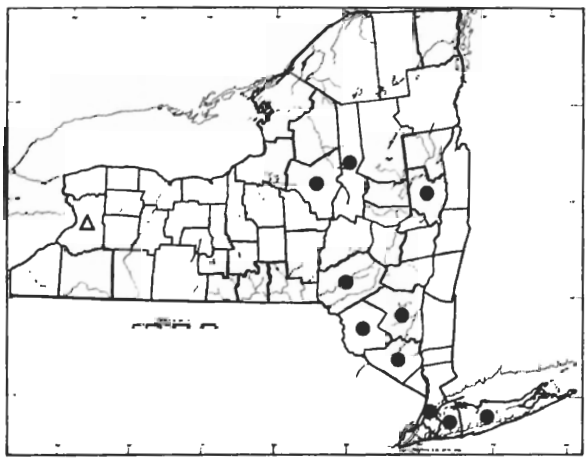
General Distribution: Newfoundland to Minnesota south to Louisiana, Tennessee and Georgia

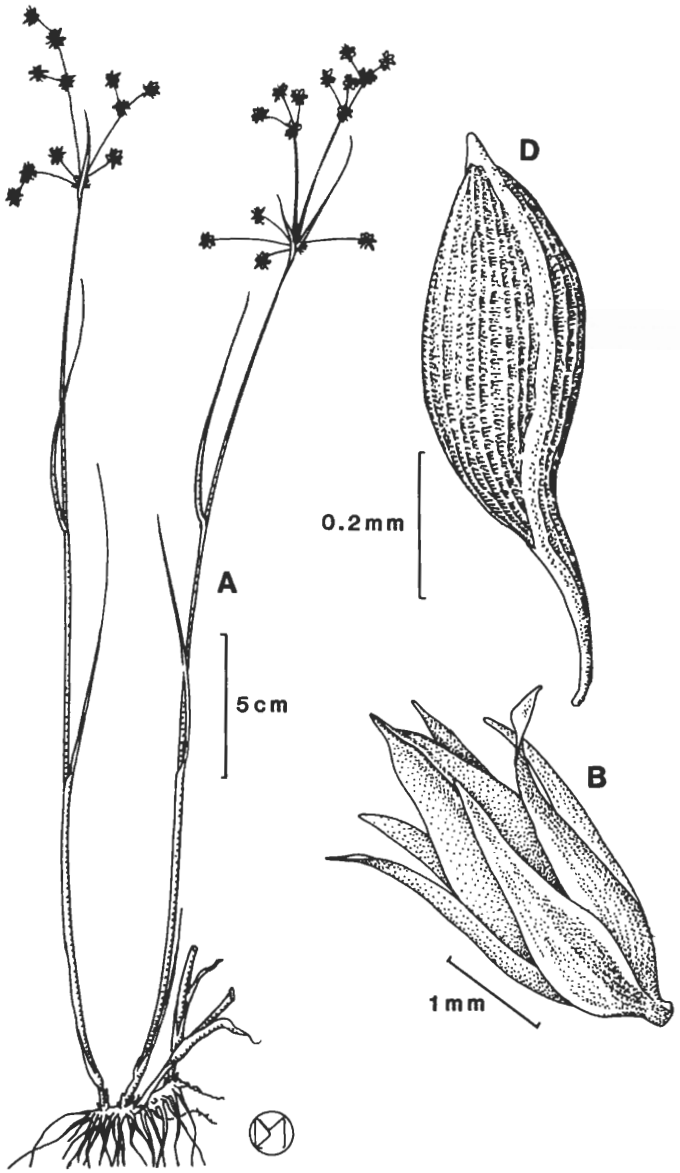
Description: Flowers **bisexual**; **stigmas** 0.5-0.9 mm long; **style** 0.2-0.3 mm long; **ovary** ovoid; **fruit** an imperfectly trilocular, light to dark brown, lanceolate to prismatic, trigonous capsule, 3.3-4.5 mm long, equaling the perianth or exserted, apex rounded, mucronate; **valves** 0.8-0.9 mm broad;

seeds fusiform, light brown, 1.1-1.9 mm long with very long, whitish tails 1.0-1.5 times the body length, tegmen reticulate with numerous transverse lines; **stamens** 3 (rarely 6), 1.5-1.6 mm long; **filaments** whitish; **anthers** white, about half the filament length; **tepals** loosely appressed, rigidly 3-nerved, stramineous, with broad green to reddish-brown bands between the midrib and margin, lanceolate, apex rigidly acuminate (subulate), margins scarious; **inner tepals** 2.9-4.0 mm long, 0.5-0.7 mm broad; **outer tepals** 2.7-3.8 mm long, 0.5-0.7 mm broad; **bracteoles** absent; **glomerules** 5-10 flowered and obpyramidal up to 50 (-90) flowered and spherical, 3-10 mm diameter; **glomerule bracts** scarious, ovate to lanceolate, 2.0-2.5 mm long, apex acuminate; **peduncles** erect or ascending, 1-10 cm long; **adaxial bracts** scarious, sheathing, 2-4 mm long, apex acuminate, margin entire; **abaxial bracts** herbaceous, lanceolate, 3-13 mm long, apex acuminate to caudate, margin entire; **rachis** 8-10 mm long; **inflorescence** sympodial, a raceme or panicle of glomerules, open to congested, 2-20 cm long, 1-10 cm broad; **lowest bract** erect, sheath 0.1-0.3 cm long, auricle scarious, rounded and prolonged 1 mm or less, blade terete, septate, 3-7 cm long, shorter than the inflorescence, apex tapering to a dark blunt tip; **cauline leaves** 2-3, sheaths open, 2.5-8.0 cm long, auricles rounded, scarious, prolonged to 1 mm, blades terete, septate, 7-22 cm long, 1.5-3.0 mm in diameter, apex tapering to a dark acute tip; **basal leaves** 1 (-2), sheaths open, 2-9 cm long, auricles scarious, rounded, prolonged 0.5 mm, blades terete, channeled toward the base, septate, 2-22 cm long, 0.5-3.5 mm diameter, apex tapering to a dark acute tip; **cataphylls** 0-2; **stems** erect, terete, (1.5-) 3-10 (-12) dm tall to the base of the inflorescence, 0.5-4.0 mm diameter immediately above the basal sheaths, cespitose; **rhizomes** erect, stramineous, 1.5-4.0 mm diameter; **roots** few, up to 0.5 mm diameter (2n = 80).

Infraspecific Variation: There is great variation in the flower size, shape of the glomerules and in the size and shape of the inflorescence in *J. canadensis*. Fernald (1945) recognized two varieties and two forms within New York (*J. canadensis* var. *canadensis*, *J. canadensis* var. *sparsiflorus* Fern., *J. canadensis* forma *apertus* Fern., and *J. canadensis* forma *conglobatus* Fern.). *Juncus canadensis* var. *canadensis* is said to have spreading to ascending inflorescence branches or congested inflorescences and the flowers are generally shorter than those in var. *sparsiflorus*, whereas *J. canadensis* var. *sparsiflorus* has stiffly erect branches in the inflorescence and the flowers are generally longer than those of var. *canadensis*. The two forms are segregated under var. *canadensis*; forma *apertus* has turbinate to hemispherical glomerules, while forma *conglomeratus* has irregular, globose glomerules or undefined floral masses in congested inflorescences. These varieties and forms simply serve to dilineate parts of the broad morphological range of variation encountered in *J. canadensis*, and do not appear to represent distinct taxa. The species is treated here as a single polymorphic entity without infraspecific taxa.

Taxonomic Note: *Juncus canadensis*, *J. subcaudatus* and *J. brevicaudatus* are often confused. Indeed, Engelmann first described the latter two species as varieties of *J. canadensis*. They can be convincingly separated from *J. canadensis* only when one has developed a thorough understanding of the range of variation within *J. canadensis*. Their seeds usually have shorter tails than those of typical *J. canadensis*, but in immature specimens this character is often very difficult to assess. *Juncus subcaudatus* has some divergent branches in the inflorescence, but occasionally *J. canadensis* has these too. *Juncus brevicaudatus* also usually has the capsules exserted.





22. *Juncus subcaudatus* (Engelm.) Cov. & S. F. Blake

Common Name: Rush

Type Description: Engelmann, Trans. St. Louis Acad. 2: 474, 1866

Synonym: *Juncus canadensis* var. *subcaudatus* Engelm.

Origin: Eastern North America

Habitats: Mossy woods, bogs and other wet places

Habit: Erect, cespitose, perennial herbs

Flowering: August

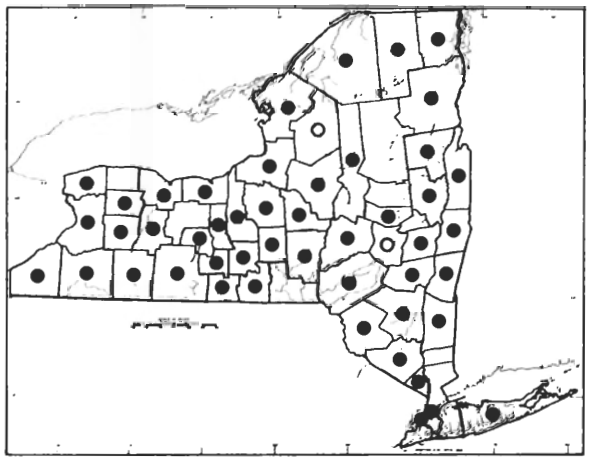
Fruiting: August-October

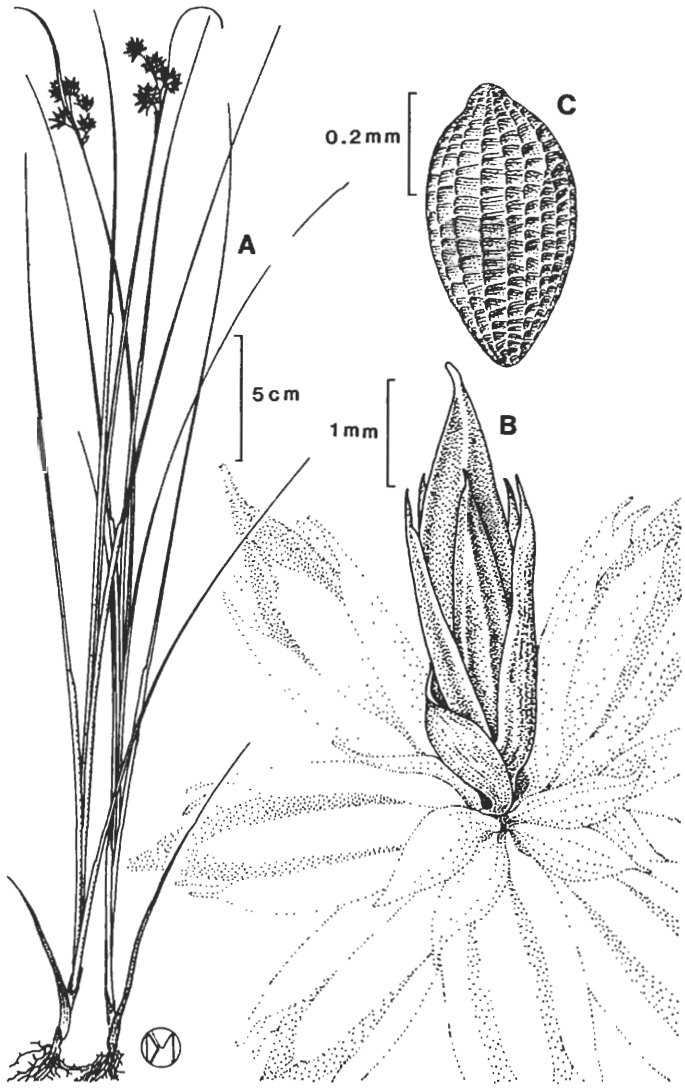
Rarity Status: Listed as Rare by NY State; NYNHP rank G5, S1

General Distribution: Nova Scotia to New York southwest to Missouri, and southeast to Georgia.

Description: Flowers **bisexual**; **stigmas** 0.8-1.0 mm long; **style** 0.2-0.3 mm long; **ovary** ellipsoid; **fruit** an imperfectly trilocular, stramineous, ovoid to prismatic, trigonous capsule, 3.0-3.7 mm long, exserted, apex acute to rounded, mucronate; **valves** 1.0-1.2 mm broad; **seeds** ellipsoid, light brown, 0.7-1.2 mm long, with tails ca. 1/3 the body length and a conspicuous white raphe along one side of the body, tegmen reticulate with numerous transverse lines; **stamens** 3, 1.7-2.0 mm long; **filaments** white; **anthers** white, 0.3 times the filament length; **tepals** loosely appressed, rigid and usually 3-nerved, greenish, becoming light brown, lanceolate, apex acuminate, margins scarious; **inner tepals** 2.1-3.2 mm long, 0.7-1.0 mm broad; **outer tepals** 1.9-3.0 mm long, 0.5-0.7 mm broad; **bracteoles** absent; **glomerules** 5-10 (-20) flowered, obpyramidal to subspherical, 3-9 mm diameter; **glomerule bracts** scarious, ovate, 1.0-1.2 mm long, apex apiculate; **peduncles** spreading-ascending to horizontal, the lower branches divaricate to reflexed, 0.5-7.0 cm long; **adaxial bracts** scarious, sheathing, 2-6 mm long, apex acute or bifurcate, margin entire; **abaxial bracts** herbaceous, lanceolate, 3-27 mm long, apex acuminate to caudate, margin entire; **rachis** 3-4 mm long; **inflorescence** sympodial, a raceme or panicle of 3-35 glomerules, obpyramidal and open, 2-16 cm tall, 0.5-8.0 cm broad; **lowest bract** erect, sheath 0.6-1.0 cm long, auricle scarious, prolonged to 1 mm, blade terete, septate, 1-8 cm long, shorter than the inflorescence, apex tapering to a dark, acute tip; **cauline leaves** 1-3, sheaths open, 1.6-4.2 cm long, auricles rounded, scarious, prolonged to 1 mm, blades terete, septate, 4.5-15 cm long, 1-2 mm in diameter, apex tapering to a dark, acute tip; **basal leaves** 1, sheaths open, 1-3 cm long, auricles rounded, scarious, prolonged to 0.5 mm, blades terete, septate, 0.3-12 cm long, 0.5-1.0 mm diameter, apex tapering to a dark acute point; **cataphylls** 1 or absent, strongly colored; **stems** erect, terete, 1.5-6.0 (-9) dm tall to the base of the inflorescence, 0.7-1.2 mm diameter immediately above the basal sheaths, cespitose; **rhizomes** erect, stramineous, 1 mm diameter; **roots** few, up to 0.2 mm in diameter.

Taxonomic Note: *Juncus subcaudatus* is closely related to *J. canadensis* and was at one time considered a variety of it. It differs from *J. canadensis* in its shorter-tailed seeds, its weaker growth habit (*J. canadensis* is stiffly ascending and usually noticeably stouter), and in its broad inflorescence with branches loosely ascending to divergent.





23. *Juncus nodosus* L.

Common Name: Knotted Rush

Type Description: Linnaeus, Species Pl. ed. 2, 1, p. 466, 1762

Synonyms: *Juncus nodosus* var. *genuinus* Engelm., *J. nodosus* var. *vulgaris* Torrey, *J. paradoxus* E. Mey.

Origin: Northern North America

Habitats: In swamps and on wet banks and shores

Habit: Erect, rhizomatous, terrestrial perennial herbs

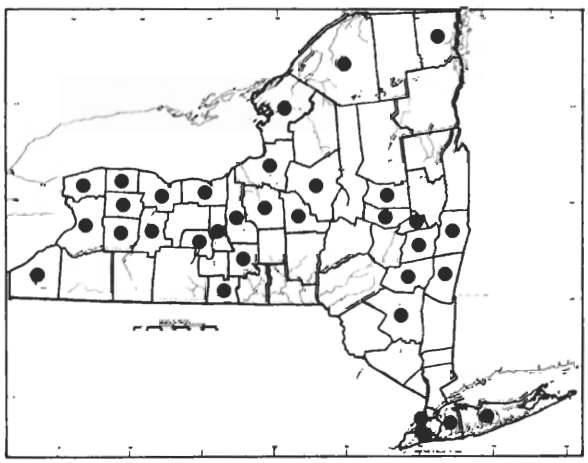
Flowering: June-August

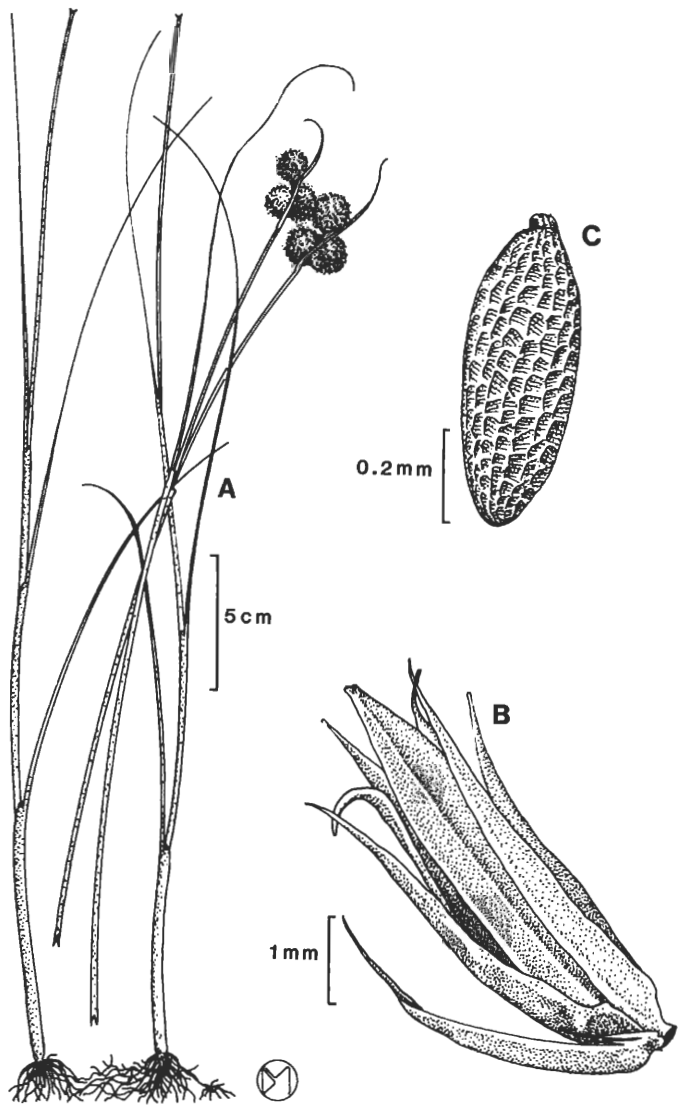
Fruiting: Late June-October

General Distribution: Newfoundland to Alaska south to California, Texas and Virginia

Description: Flowers **bisexual**; **stigmas** 0.5-0.9 mm long; **style** 0.1-0.2 mm long; **ovary** lanceolate; **fruit** a unilocular, brown, lance-subuloid, rostrate capsule, bearing seeds only below the middle, 3.6-4.6 mm long (including the beak), exerted, apex acute to the sometimes curving beak, beak up to 1 mm long; **valves** 0.4-0.7 mm broad, usually coherent at the summit long after dehiscence; **seeds** oblong or ellipsoid, light brown, 0.5 mm long, one or both ends dark pointed, tegmen reticulate with numerous transverse lines; **stamens** 6, 1.2-1.5 mm long; **filaments** white; **anthers** yellowish-white, 0.5-1.0 times the filament length; **tepals** loosely appressed, green to light brown, lanceolate-subulate, 2.4-4.1 mm long, 0.5-0.8 mm broad, apex sharply acuminate, margins narrow and scarious, often reddened near the apex; **bracteoles** absent; **glomerules** 6-20 flowered, spherical, 6-9 (-12) mm diameter; **glomerule bracts** scarious, ovate, 1.2-1.5 mm long, apex acuminate; **peduncles** erect to spreading, 0.3-3.0 (-5) cm long; **adaxial bracts** scarious, sheathing, 4-5 mm long, apex acuminate, margin entire; **abaxial bracts** herbaceous, lanceolate, 5-29 mm long, apex acuminate, margin entire, the lower bracts occasionally leaf-like; **rachis** 3-6 mm long; **inflorescence** sympodial, a raceme or panicle of glomerules or occasionally a single terminal glomerule, cylindric to obovoid, 0.6-6.0 cm long, 0.6-3.5 cm broad; **lowest bract** erect to spreading, sheath 0.5-1.4 cm long, auricles dark yellow, truncate, blade terete, septate, 1-13 cm long, equaling the inflorescence or more commonly much longer, apex acuminate; **cauline leaves** 2-4, sheaths open, 2-7 cm long, auricles rounded, dark yellow, cartilaginous, prolonged 0.5-1.0 mm, blades erect, terete, septate, 6-30 cm long, 0.5-1.0 (-1.5) mm diameter, apex acuminate; **basal leaves** 1, sheaths open, 3-4 cm long, auricles cartilaginous, prolonged 0.5-1.0 mm, blades terete, septate, 3-10 cm long, 1.0-1.5 mm diameter, apex acuminate; **cataphylls** absent; **stems** erect, terete, 1.7-5.5 (-7) dm to the base of the inflorescence, 0.7-2.0 mm diameter immediately above the basal sheath, closely to loosely arising from creeping, thread-like rhizomes; **rhizomes** horizontal, stramineous, 0.2-1.0 mm in diameter, rarely producing tuberous thickenings; **roots** few, up to 0.2 mm in diameter (2n = 40).

Importance: Reported to be good forage, averaging 60-80% grazed by horses and cattle.





24. *Juncus torreyi* Cov.

Common Name: Torrey's Rush

Type Description: Coville, Bull. Torrey Bot. Club 22: 303, 1895

Synonyms: *J. megacephalus* (Torr.) Wood, not M. A. Curtis, *J. nodosus* var. *megacephalus* Torrey

Origin: North America

Habitats: On wet, usually sandy shores, often in shallow water

Habit: Erect, coarsely rhizomatous, perennial herbs

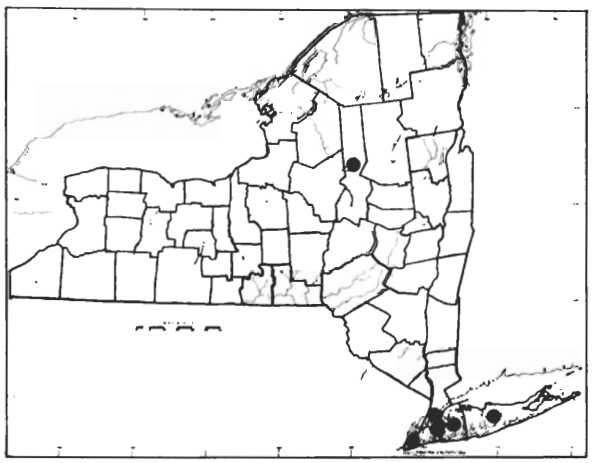
Flowering: July-August

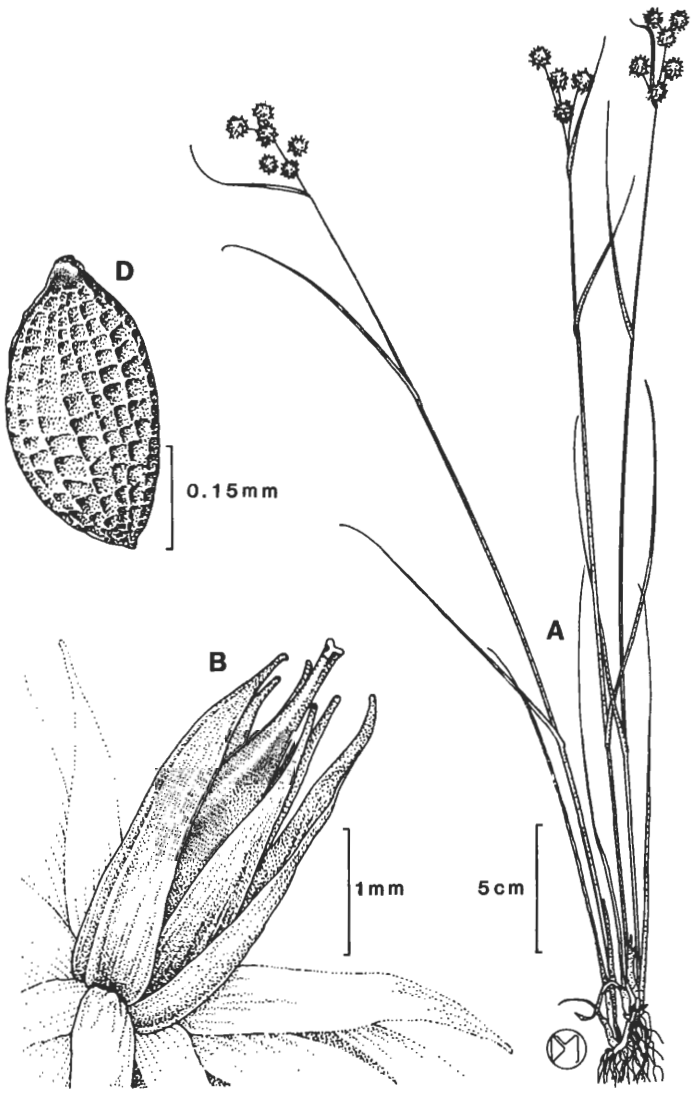
Fruiting: July-October

General Distribution: New York to British Columbia south to California, northern Mexico, Texas and Virginia; adventive along railroads and roadsides in New England and New Jersey.

Description: Flowers **bisexual**; **stigmas** 0.9-1.2 mm long; **style** 0.1-0.2 mm long; **ovary** lanceolate; **fruit** a unilocular, brown, lance-subuloid, rostrate capsule, bearing seeds only below the middle, 4.5-5.7 mm (including the beak), equaling the perianth to slightly exerted, apex tapering to the beak, the beak up to 1 mm long; **valves** 0.3-0.7 mm broad, usually coherent at the summit long after dehiscence; **seeds** oblong to ellipsoid, light brown, 0.4-0.5 mm long, one or both ends dark pointed, tegmen reticulate with numerous transverse lines; **stamens** 6, 1.3-2.0 mm long; **filaments** white; **anthers** yellow, about half the filament length; **tepals** loosely appressed, green to stramineous, lanceolate-subulate, apex sharply acuminate, margin scarious; **inner tepals** (3.0-) 3.5-4.6 mm long, 0.5-0.7 mm broad, **outer tepals** (3.7-) 4.2-6.0 mm long, 0.7-1.0 mm broad; **bracteoles** absent; **glomerules** 25-100 flowered, spherical, 10-14 mm diameter; **glomerule bracts** scarious, ovate, 4-7 mm long, apex aristate; **peduncles** erect to spreading, 0.5-4.0 cm long; **adaxial bracts** scarious and sometimes red-tinged, sheathing, 4-10 mm long, apex bifurcate, each fork acuminate, margin entire; **abaxial bracts** leaf-like, sheath scarious, 2.5-9.0 mm long, auricle prolonged, blade herbaceous, linear, 6.5-11 mm long, apex acuminate, margin entire; **rachis** 10-15 mm long; **inflorescence** sympodial, a raceme or panicle of 3-23 glomerules, congested and often globose, 2.0-5.5 cm tall, 2.0-5.5 cm broad; **lowest bract** erect or spreading, sheath 0.6-1.7 cm long, auricles rounded and prolonged 1 mm, blade terete, not noticeably septate, 4-12 cm long, longer than the inflorescence, apex acuminate; **cauline leaves** 2-5, sheaths open, the lower sheaths sometimes inflated, 3-12 cm long, auricles scarious, prolonged 2.5-4.0 mm, blades terete, septate, 13-30 cm long, 1-3 mm in diameter, apex acuminate; **basal leaves** 1-3, sheaths open, 7-9 cm long, auricles scarious, prolonged 2-4 mm, basal sheath occasionally bladeless, blades terete, septate, 20-30 cm long, 1-2 mm broad, apex acuminate; **cataphylls** absent; **stems** erect, terete, (4-) 5.5-8.0 (-10) dm tall to the base of the inflorescence, 1.5-4.0 mm diameter immediately above the basal sheaths, loosely arising from a creeping rhizome; **rhizomes** horizontal, stramineous to gray, 2-3 mm in diameter, usually with few to numerous tuberous thickenings, 5-6 mm in diameter; **roots** few, up to 0.2 mm in diameter (2n = 40).

Importance: This species is eaten by livestock, but it is less favored than *J. nodosus*.





25. *Juncus scirpoides* Lam.

Common Name: Sedge-rush

Type Description: Lamarck, Encycl. 3: 267, 1789

Synonyms: *J. polycephalus* var. *crassifolius* Torrey, *J. polycephalus* var. *tenuifolius* Michx., *J. scirpoides* var. *genuinus* Buch., *J. scirpoides* var. *meridionalis* Buch.

Origin: Southeastern United States

Habitats: Wet sandy shores, commonest on the Coastal Plain and Piedmont

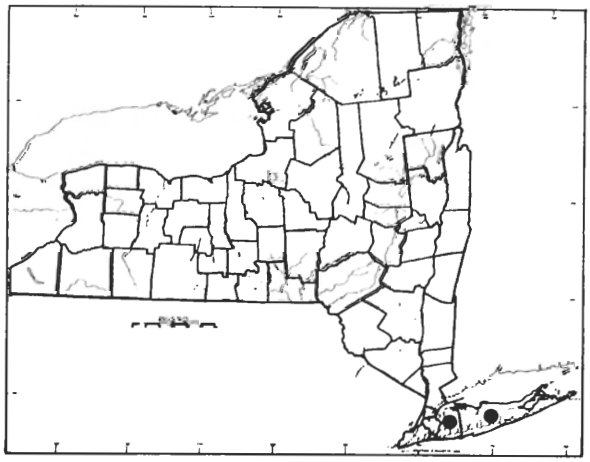
Habit: Erect, coarsely rhizomatous, terrestrial, perennial herbs

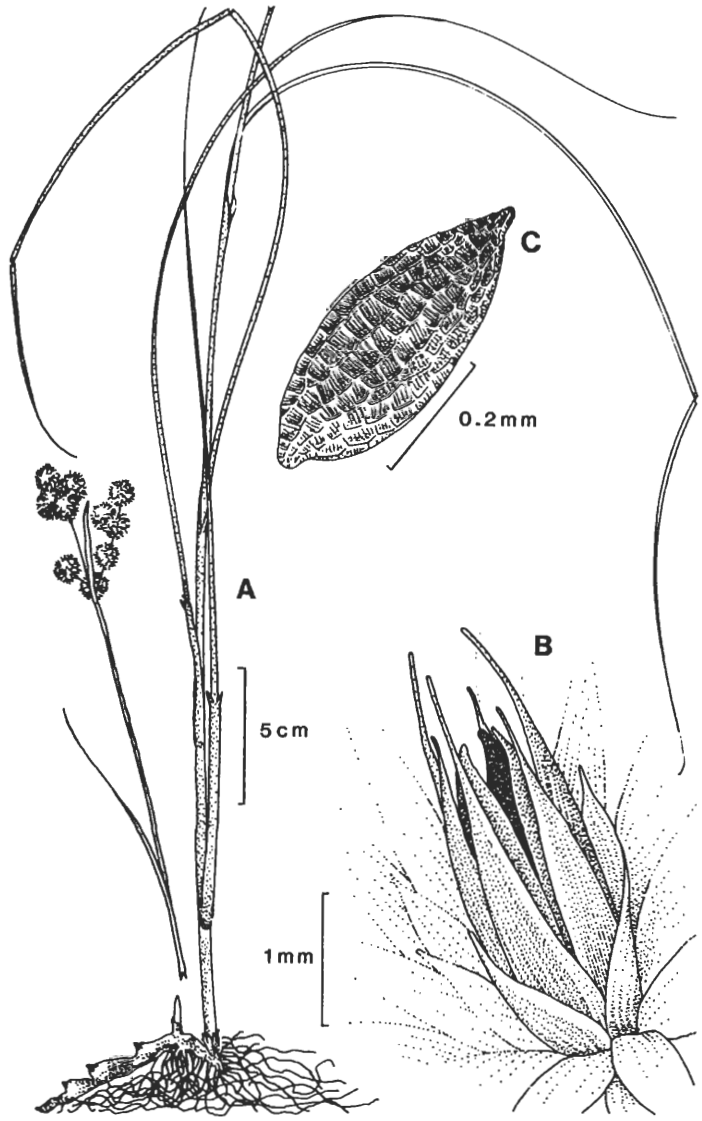
Flowering: July-September

Fruiting: August-October

General Distribution: New York to Michigan, Nebraska, Kansas and Missouri, south to Texas and Florida

Description: Flowers **bisexual**; **stigmas** 0.6-1.0 mm long; **style** 0.2-0.3 mm long; **ovary** lanceolate; **fruit** a unilocular, stramineous to brown, lance-subuloid, trigonous capsule, 2.9-4.0 mm long, exerted, apex tapering to a subulate beak; **valves** 0.5-0.6 mm broad; **seeds** oblong, light brown, 0.4 mm long, ends acute and slightly darkened, tegmen reticulate with numerous transverse lines; **stamens** 3, 2.0-2.3 mm long; **filaments** white; **anthers** yellow, 0.15-0.25 times the filament length; **tepals** loosely appressed, light brown to reddish, lanceolate, apex long acuminate, margins narrow and scarious; **inner tepals** 1.9-2.9 mm long, 0.3-0.5 mm broad; **outer tepals** 2.0-3.1 mm long, 0.4-0.6 mm broad; **bracteoles** absent; **glomerules** 20-60 flowered, spherical, 6-10 mm diameter; **glomerule bracts** stramineous, lanceolate, 1.5-2.5 mm long, apex acuminate; **peduncles** erect or ascending, 1.0-7.5 cm long; **adaxial bracts** scarious, sheathing, 2-7 mm long, apex acuminate, margin entire; **abaxial bracts** stramineous, lanceolate, 3-11 mm long, apex acuminate, margin entire; **rachis** 1-7 mm long; **inflorescence** sympodial, 1-2 glomerules or a raceme or panicle of 2-15 glomerules, open to congested, 3-13 cm tall, 1-5 cm broad; **lowest bract** erect, sheath 6-20 mm long, blade terete, not noticeably septate, 1-6 cm long, shorter than to slightly longer than the inflorescence, apex blunt; **cauline leaves** 2-3, sheaths open, 0.5-5.0 cm long, auricles broadly acute, membranaceous, prolonged 2 mm, blades terete, septate, (0.5-) 1.6-26 cm long, 1-2 mm in diameter, apex blunt; **basal leaves** 0-1, sheaths open, 1.5-5.0 cm long, auricles membranaceous, prolonged 2 mm, blades terete, septate, 2.5-10 cm long, 1-2 mm broad, apex blunt; **cataphylls** 1-2; **stems** erect, terete, 0.8-6.0 dm tall to the base of the inflorescence, 0.5-2.0 mm diameter immediately above the basal sheaths, closely or loosely set along creeping rhizomes; **rhizomes** horizontal, tuberous, 1.5-2.0 cm long and 2.0-4.5 mm in diameter; **roots** few, up to 0.3 mm in diameter (2n = 44).





26. *Juncus brachycarpus* Engelm. in Gray

Common Name: Rush

Type Description: Engelmann in Gray, Man. ed. 5, p. 542, 1867

Origin: Eastern North America

Habitats: Damp clay-rich or peaty soils

Habit: Erect, rhizomatous, perennial herbs

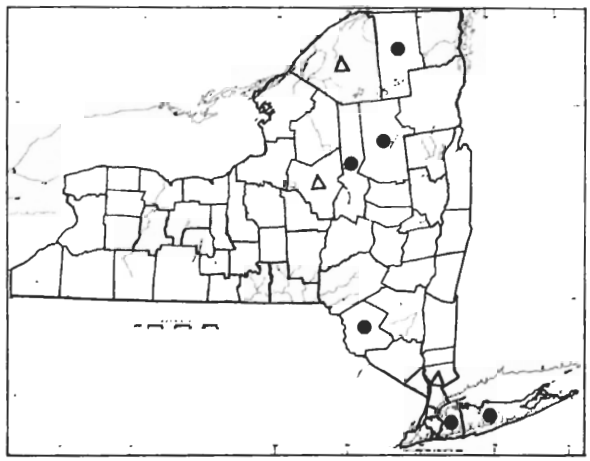
Flowering: May-June

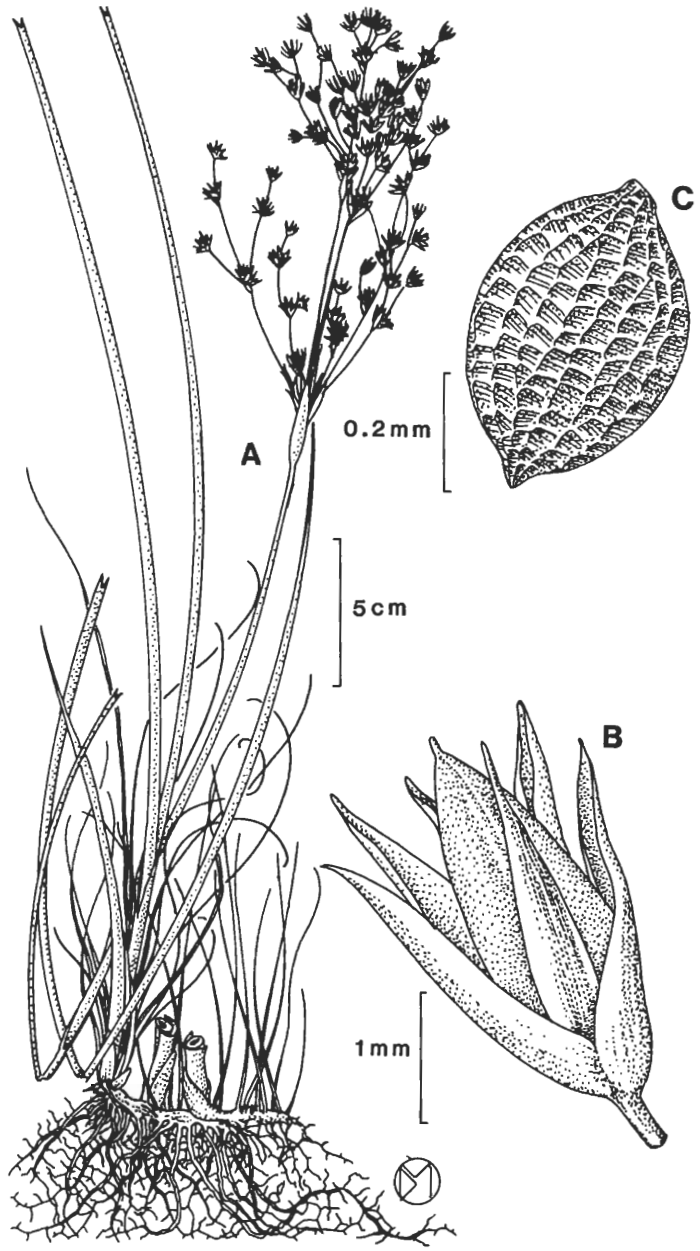
Fruiting: June-August

Rarity Status: NYNHP rank G4G5, SH. Last collected in New York State, in 1943.

General Distribution: Massachusetts to Illinois south to Texas and South Carolina

Description: Flowers **bisexual**; **stigmas** 0.6-0.9 mm long; **style** 0.3-0.5 mm long; **ovary** ovoid; **fruit** a unilocular, brown, obconic or ovoid capsule, 1.8-2.7 mm long, included, the capsule only 1/2-2/3 the length of the perianth, apex abruptly acute, mucronate; **valves** 0.5-0.7 mm broad; **seeds** ellipsoid to oblique-oblong, light brown, 0.3-0.4 mm long, ends acute and darkened on one side, tegmen reticulate with numerous transverse lines; **stamens** 3, 1.2-1.7 mm long; **filaments** white; **anthers** white, 0.25-0.5 times filament length; **tepals** loosely appressed, stramineous, lanceolate-subulate, apex acuminate, margins scarious; **inner tepals** 2.2-3.2 mm long, 0.5-0.6 mm broad; **outer tepals** 3.2-3.8 mm long, 0.5-0.8 mm broad; **bracteoles** absent; **glomerules** 30-100 flowered, spherical, 8-10 mm diameter; **glomerule bracts** scarious, lanceolate, 1.8-2.2 mm long, apex subulate; **peduncles** erect or ascending, 1-4 cm long; **adaxial bracts** scarious, sheathing, 2-5 mm long, apex acute, margin entire; **abaxial bracts** herbaceous, lanceolate, 9-12 mm long, apex acuminate, margin entire; **rachis** 5-10 mm long; **inflorescence** sympodial, 1-2 glomerules or a raceme or panicle of 3-10 (-20) glomerules, open to congested, 1-4 (-10) cm tall, 1-2 (-4) cm broad; **lowest bract** erect, sheath 0.7-1.0 cm long, auricle deltoid, prolonged 1 mm, blade channeled, septate, 1.5-3.0 cm long, shorter than the inflorescence, apex acuminate; **cauline leaves** 2-4, sheaths open, 2.5-6.0 cm long, auricles rounded, scarious, prolonged 0.5-3.0 mm, blades terete, septate, 3-50 cm long, 1-2 mm diameter, apex acute; **basal leaves** 1-2, sheaths open, (1.5-) 4.5-6.0 cm long, auricles scarious, rounded, prolonged 0.5-2.0 mm, blades terete, septate, 4.5-35 cm long, 1-2 mm diameter, apex acuminate; **cataphylls** 1 or usually absent; **stems** erect, terete, (3-) 4.5-8.0 (-9) dm tall to the base of the inflorescence, 0.8-2.0 mm diameter immediately above the basal sheaths, arising from creeping rhizomes; **rhizomes** horizontal, tuberous, white, 2-5 cm long and 3-4 mm broad; **roots** few to many, up to 0.2 mm in diameter (2n = 44).





27. *Juncus militaris* Bigel.

Common Name: Bayonet Rush

Type Description: Bigelow, Fl. Boston. ed. 2, p. 139, 1824

Origin: Northeastern North America

Habitats: Shallow water on sandy, gravelly, or peaty margins of lakes and ponds

Habit: Erect, emergent, rhizomatous, perennial herbs

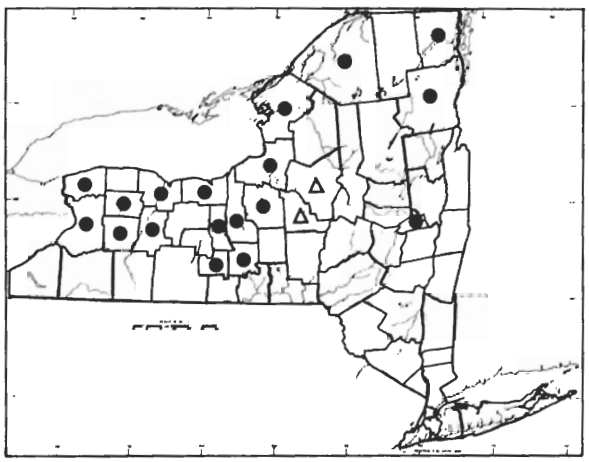
Flowering: June-August

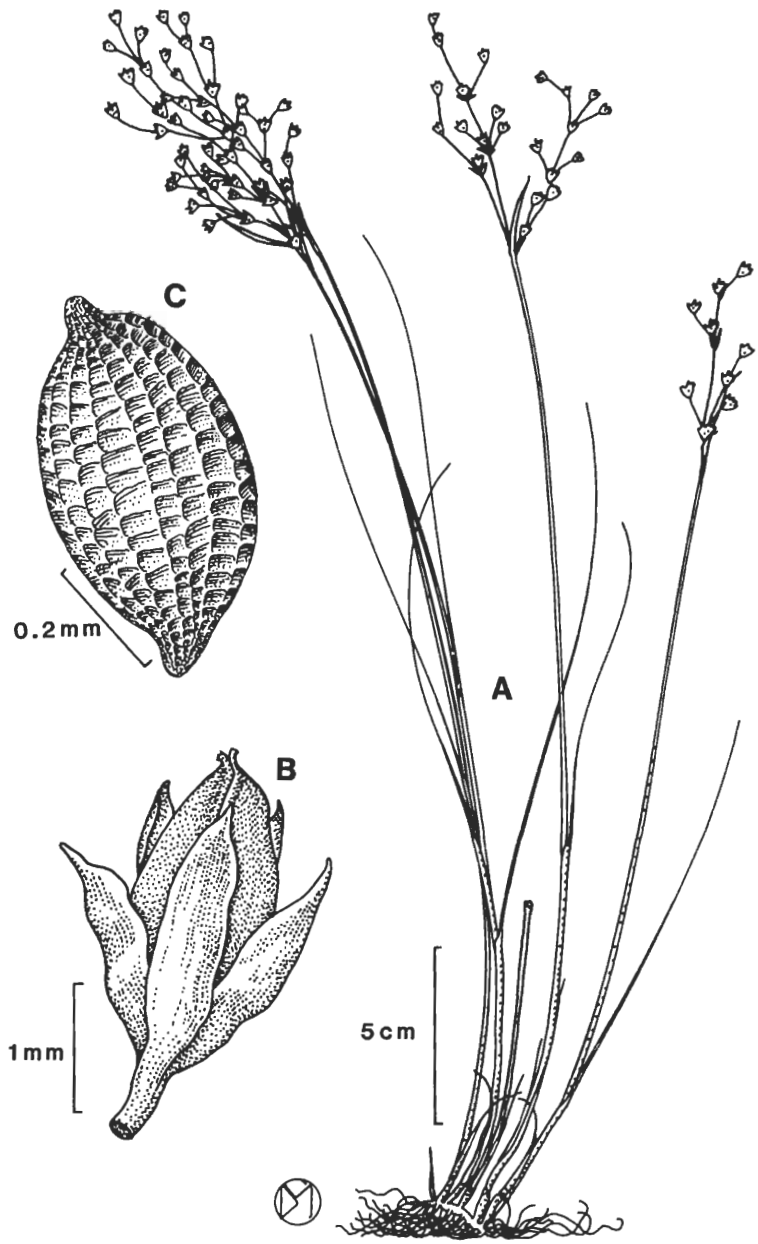
Fruiting: July-October

General Distribution: Newfoundland to Ontario south to Michigan and Maryland

Description: Flowers **bisexual**; **stigmas** 1.0-1.2 mm long; **style** 0.1-0.2 mm long; **ovary** elliptical; **fruit** a unilocular, lustrous, stramineous to brown, narrowly ovoid, trigonous, rostrate capsule, 2.3-3.3 mm long, subequal to the perianth, apex tapering to a conspicuous beak; **valves** 0.4-0.5 mm broad; **seeds** obovoid, dark brown, 0.5-0.6 mm long, one end abruptly short pointed, tegmen reticulate with numerous transverse lines; **stamens** 6, 1.6-2.0 mm long; **filaments** white; **anthers** white, equal the filament length or longer; **tepals** appressed, stramineous or reddish, lanceolate, 2.3-3.2 (-4.0) mm long, 0.7-0.9 mm broad, apex aristate, margins scarious; **bracteoles** absent; **glomerules** (3-) 5-13 flowered, obpyramidal to hemispherical, 3-6 mm in diameter; **glomerule bracts** scarious, ovate, 1.2-1.4 mm long, apex cuspidate; **peduncles** erect or ascending, rarely spreading, 0.5-8.0 cm long; **adaxial bracts** stramineous, sheathing, 2-10 mm long, apex bifurcate or truncate to rounded, margin entire; **abaxial bracts** herbaceous, lanceolate, 4-13 mm long, apex caudate, margin entire to lacerate near the apex; **rachis** 13-18 mm long; **inflorescence** sympodial, a panicle of (20-) 50-100 glomerules, open, obpyramidal, 4-15 cm tall, 3.5-12 cm broad; **lowest bract** an inflated sheath with or without a short blade, sheath stramineous, 1-2 cm long, acute, blade (when present), terete, septate, 2 cm long, shorter than the inflorescence, apex acuminate; **cauline leaves** 2-3 (2 in ours), the upper leaf a bladeless sheath (in ours), the lower (submedian) leaf usually well developed, sheaths open, often inflated, 2.5-5.5 cm long, auricles (on submedial leaves) scarious, rounded, prolonged 0.2 mm, blades terete, septate, 50-70 (-90) cm long, 4-6 mm in diameter, tapering to a blunt apex; **basal leaves** absent; **cataphylls** 1, 4-20 cm long, apex acute with a mucro up to 7 mm long; **submersed leaves** filiform, 30-40 cm long, arising from the rhizomes; **stems** erect, terete, 3-15 dm tall to the base of the inflorescence, 3-6 mm diameter immediately above the basal sheath, arising from creeping rhizomes; **rhizomes** horizontal, stramineous, 2.0-2.5 mm diameter; **roots** numerous, up to 0.5 mm in diameter.

Infraspecific variation: All New York specimens seen have had a single, elongate medial leaf and a sterile sheath above it, and are *J. militaris* forma *militaris* as, contrasted with *J. militaris* f. *submudus* Fern., with the median leaf and bladeless sheaths absent and *J. militaris* f. *bifrons* Fern. with a well developed blade on the second leaf.





28. *Juncus alpinoarticulatus* Chaix in Vill. ssp. *nodulosus* (Wahlb.) Hämet-Ahti

Common Name: Alpine Rush

Type Description: Chaix in Villars, Hist. Pl. Dauph., vol. I, p. 378, 1786

Synonyms: *J. alpinoarticulatus* ssp. *americanus* (Farw.) Hämet-Ahti, *J. alpinoarticulatus* ssp. *fuscescens* (Fern.) Hämet-Ahti, *J. alpinus* Vill., *J. alpinus* var. *americanus* Farw., *J. alpinus* var. *fuscescens* Fern., *J. alpinus* var. *insignis* Buch., *J. alpinus* ssp. *nodulosus* (Wahlb.) Lindman, *J. alpinus* var. *rariflorus* Hartm., *J. nodulosus* Wahlb., *J. rariflorus* Hartm.

Origin: Boreal Northern Hemisphere

Habitats: Wet meadows, sandy and gravelly often calcareous shores

Habit: Erect, rhizomatous, perennial herbs

Flowering: June-September

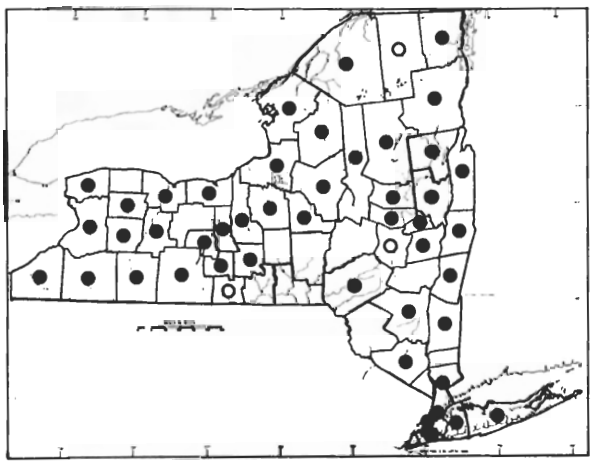
Fruiting: July-October

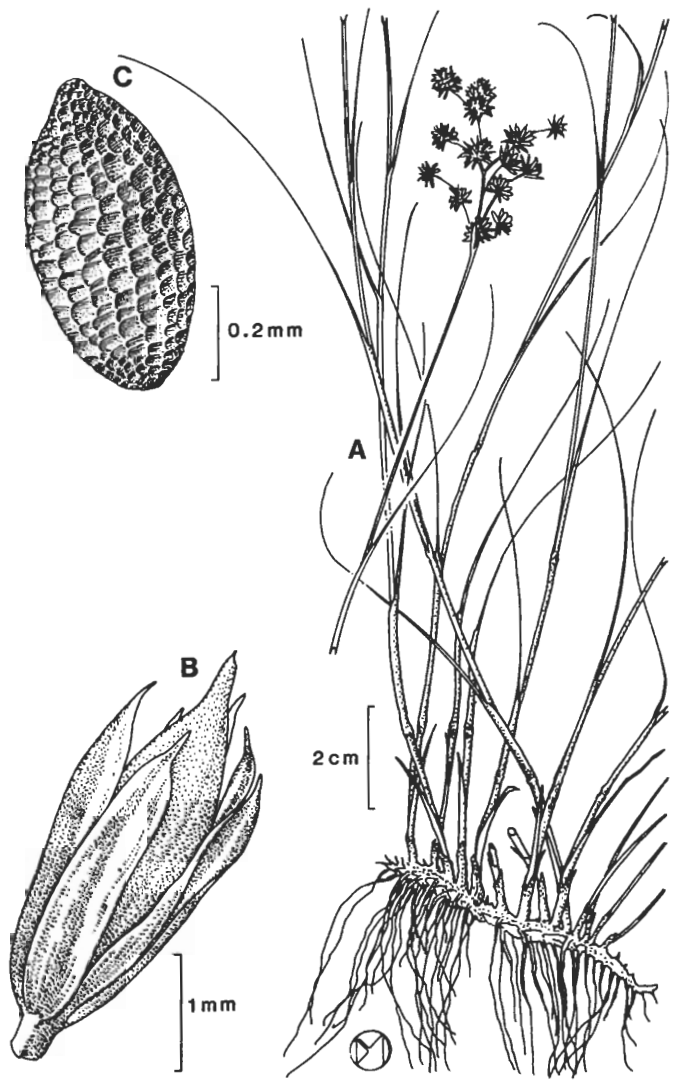
General Distribution: Circumboreal; in North America from Newfoundland to Alaska south to Washington state, New York and New England

Description: Flowers **bisexual**; **stigmas** 0.7-1.0 mm long; **style** 0.2-0.3 mm long; **ovary** oblong to ellipsoid; **fruit** an imperfectly trilocular, lustrous, stramineous to chestnut brown, oblong to oblong-ovoid, trigonous capsule, 2.3-3.2 mm long, equaling the perianth to exserted, apex abruptly tapering to a broadly acute, obtuse or rounded, mucronate tip; **valves** 0.8-1.2 mm broad; **seeds** oblong to ovoid, light brown, 0.5-0.7 mm long, one end dark pointed, tegmen reticulate with numerous transverse lines; **stamens** 6, 1.2-1.4 mm long; **filaments** white; **anthers** white, about half the filament length; **tepals** loosely appressed, greenish to stramineous, lanceolate to oblong, margins scarious; **inner tepals** 1.6-2.2 mm long, 0.5-0.6 mm broad, apex obtuse; **outer tepals** 1.8-2.5 mm long, 0.5-0.8 mm broad, apex obtuse to acute, mucronate; **bracteoles** absent; **pedicels** some flowers with pedicels to 4 mm long, rising out of the glomerules; **glomerules** 2-5 (-10) flowered, obpyramidal, 2-6 mm in diameter; **glomerule bracts** scarious, ovate, 2-2.5 mm long, apex cuspidate; **peduncles** erect or ascending, rarely spreading, 1-8 cm long; **adaxial bracts** scarious, sheathing, 1-5 mm long, apex emarginate, margin entire; **abaxial bracts** herbaceous, lanceolate, 3-23 mm long, apex acuminate, margin entire; **rachis** 3-23 mm long; **inflorescence** a panicle of 5-25 glomerules, usually cylindrical and open, 3-18 cm tall, 1-6 cm broad; **lowest bract** erect, sheath green to brown, 1.2-1.7 cm long, blade terete, septate, 2-6 cm long, shorter than the inflorescence, apex acuminate; **cauline leaves** 1-2 (-5), sheaths open, 1.5-4.0 cm long, auricles scarious, rounded, prolonged less than 0.5 mm, blades terete, somewhat flattened with a basal furrow, septate, 5-12 cm long, 0.5-2.0 mm diameter, apex blunt; **basal leaves** 0-2, sheaths open, apex of sheath acute, blade

(when present) terete, somewhat flattened, septate, 1.5-5.5 cm long, 0.5-1.0 mm diameter, apex blunt; **cataphylls** 1, often pink; **stems** erect, terete, (0.1-) 1.5-3.0 (-5) dm tall to the base of the inflorescence, 0.8-2.0 mm diameter immediately above the basal sheaths, arising along creeping rhizomes; **rhizomes** horizontal, stramineous, 1.5-2.0 mm diameter; **roots** numerous, to 0.2 mm diameter (2n = 40 [2n = 80 from unvouchered specimens probably misidentified]).

Infraspecific Variation and Hybridization: Hämet-Ahti (1980) has demonstrated that the correct name for this taxon is *J. alpinoarticulatus*, not *J. alpinus*. She has demonstrated that *J. alpinus* is an illegitimate, superfluous name, since it is based on the same type (Haller, 1321) as *J. alpinoarticulatus*. *Juncus alpinoarticulatus* hybridizes with, intergrades with, and is purported to be one of the parents of, *J. articulatus* (Riebe, 1978; Zandee, 1981). It is often very difficult to distinguish specimens of these two species. At their extremes these species are distinct, yet there is an area of overlap. In general, *J. alpinoarticulatus* has ascending inflorescence branches, abruptly tapering capsules and obtuse (to acute) inner tepals, whereas *J. articulatus* has spreading inflorescence branches, capsules tapering throughout the upper half and acute to acuminate inner tepals. *Juncus alpinoarticulatus* is the most variable species in the *J. articulatus* complex. Lindquist (1932) revised the taxonomy of *J. alpinus*, recognizing four varieties. Among them he lists *J. alpinus* var. *rariflorus* (= *J. alpinoarticulatus* ssp. *nodulosus*), the only morphological type that occurs in New York. Recently Hämet-Ahti (1986) recognized two subspecies (*J. alpinoarticulatus* ssp. *americanus* and *J. alpinoarticulatus* ssp. *fuscescens*) in North America. She distinguished *J. alpinoarticulatus* ssp. *americanus* from the european subspecies, citing the ratio of capsule to perianth length, yet she did not say what this ratio difference was. She further recognized *J. alpinoarticulatus* ssp. *fuscescens*, stating that "It is not quite clear whether this taxon deserves the subspecific rank (rather than varietal rank under ssp. *americanus*)..." yet she does not discuss how ssp. *fuscescens* differs from ssp. *americanus*. Any distinction between ssp. *americanus* and ssp. *nodulosus* is unknown, and the distinction between ssp. *americanus* and ssp. *fuscescens* is unreliable. In the present treatment, all New York plants are considered to be *J. alpinoarticulatus* ssp. *nodulosus*.





29. *Juncus articulatus* L.

Common Name: Jointed Rush

Type Description: Linnaeus, Species Pl. I, p. 327, 1753

Synonyms: *J. articulatus* var. *stolonifer* (Wohl.) House, *J. articulatus* var. *obtusatus* Engelm. (see taxonomic note), *J. lampocarpus* Ehrh. ex Hoffm.

Origin: Probably Europe

Habitats: Wet ground, in a wide variety of habitats

Habit: Erect, tufted, perennial herbs

Flowering: June

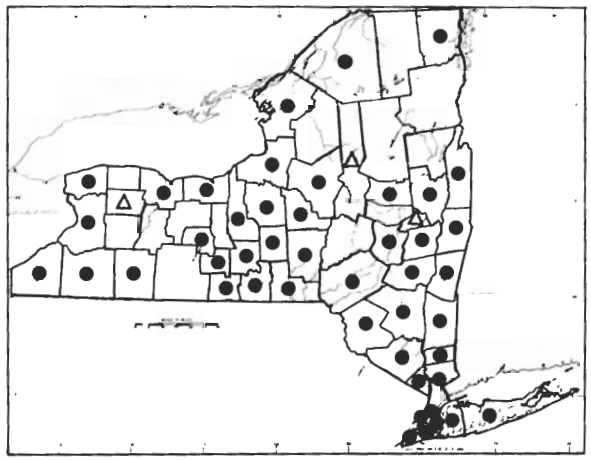
Fruiting: July-September

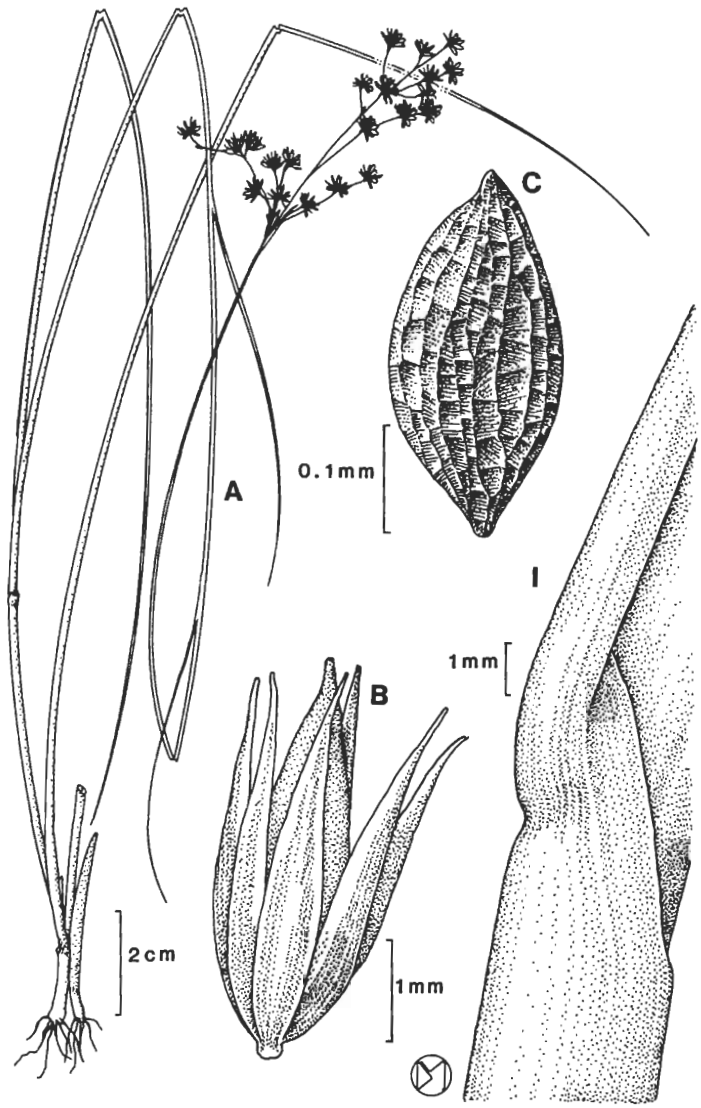
General Distribution: On nearly all continents: in North America from Newfoundland to Alaska south to California and North Carolina

Description: Flowers **bisexual**; **stigmas** 0.8-1.4 mm

long; **style** 0.2-0.3 mm long; **ovary** ellipsoid or ovoid; **fruit** an imperfectly trilocular, lustrous, dark brown, ellipsoid or ovoid capsule, 2.8-4.0 mm long, exserted, apex acute or obtuse, mucronate; **valves** 0.5-1.5 mm broad; **seed** bodies obovoid, light brown, 0.5 mm long, dark pointed at one end, tegmen reticulate; **stamens** 6, 1.1-1.5 mm long; **filaments** white; **anthers** white, about equal to the filament length; **tepals** loosely appressed, green to stramineous, or dark brown with stramineous flecks, ovate to lanceolate, 1.8-2.6 mm long, margins scarious; **inner tepals** 0.6-0.7 mm broad, apex acute to obtuse; **outer tepals** 0.6-0.8 mm broad, acute or acuminate; **bracteoles** absent; **glomerules** 3-10 flowered, obpyramidal to hemispherical, 6-8 mm diameter; **glomerule bracts** ovate, 2.1-2.8 mm long, apex acuminate to cuspidate; **peduncles** erect to reflexed, 0.7-4.0 cm long; **adaxial bracts** stramineous, sheathing, 1-5 mm long, apex truncate, erose, margin entire; **adaxial bracts** herbaceous, lanceolate, 3-12 mm long, apex acuminate, margin entire; **rachis** 5-10 mm long; **inflorescence** sympodial, panicle of 3-30 (-50) glomerules, obpyramidal and open, 3.5-8.0 cm tall, 2.5-8.0 cm broad; **lowest bract** erect, terete, septate, 1.0-3.5 cm **long, shorter than the inflorescence**, apex acuminate; **cauline leaves** (1-) 3-6, sheaths open, 1.2-3.1 mm long, auricles scarious, rounded, prolonged 0.5-1.0 mm, blades terete, somewhat flattened, septate, 3.5-12 cm long, 1.0-2.5 mm diameter, apex acuminate; **basal leaves** 0-2, sheaths open, sheath apex acute, blades (when present) terete, somewhat flattened, septate, 3.5-12 cm long, 1.0-2.5 mm in diameter, apex acuminate; **cataphylls** 1; **stems** erect or sometimes floating and branching at the nodes, terete, 0.5-6.0 (-10) dm tall to the base of the inflorescence, 1-2 mm diameter immediately above the basal sheaths, arising along creeping rhizomes; **rhizomes** horizontal, stramineous, often coralline-tuberous, 1-2 mm diameter; **roots** numerous, up to 3 mm in diameter (2n = 80).

Infraspecific Variation and Hybridization: Studies of hybrids between *J. articulatus* and *J. acutiflorus* (Timm & Clapham, 1940) and between *J. articulatus* and *J. alpinoarticulatus* ssp. *nodulosus* (Riebe, 1978) suggest that *J. articulatus* arose as a hybrid between *J. acutiflorus* and *J. alpinoarticulatus* ssp. *nodulosus* or species closely related to these two. Anatomical data neither support nor deny this contention (Zandee and Haasnoot, 1983). Much of the difficulty in distinguishing *J. articulatus* from *J. alpinoarticulatus* may arise from the parental relationship of *J. alpinoarticulatus* to *J. articulatus*. Three varieties of *J. articulatus* were reported for New York State by House (1924): *J. articulatus* var. *articulatus*, var. *stolonifer* (Wohl.) House, and var. *obtusatus* Engelm. *Juncus articulatus* var. *stolonifer* (Wohl.) House, has creeping stems that root at the nodes and flowers like the typical variety. It is considered here to be a form not worthy of recognition. *Juncus articulatus* var. *obtusatus* was described by Engelmann (1865) as a "form with obtuse 5-flowered green heads in a spreading and often almost level-topped panicle, obtuse, mucronate sepals and obtuse short mucronate capsule..." Specimens with obtuse sepals, obtuse capsules and spreading inflorescences are infrequent in New York, and these are probably best treated as intermediates between *J. alpinoarticulatus* and *J. articulatus*, rather than as a variety of *J. articulatus*, until further study can determine the nature of these variants.





30. *Juncus acuminatus* Michx.

Common Name: Sharp-fruited Rush

Type Description: Michaux, Fl. Bor. Amer. 1: 192, 1803

Synonyms: *J. acuminatus* var. *legitimus* Engelm. in Gray, *J. pallescens* E. Mey., *J. paradoxus* E. Mey., *J. pondii* Wood

Origin: North America

Habitats: Damp soils

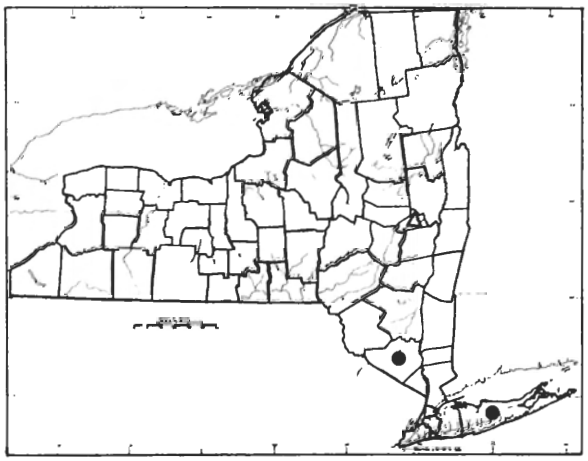
Habit: Erect, cespitose, perennial herbs

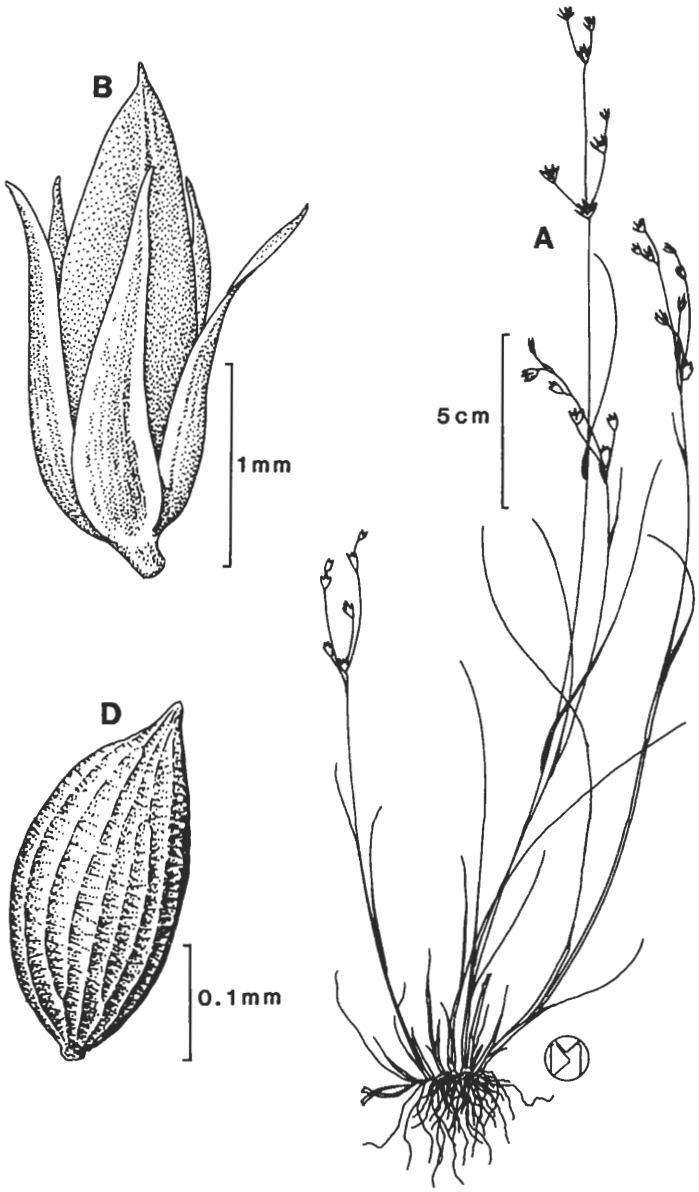
Flowering: June-July

Fruiting: June-September

General Distribution: Nova Scotia to Minnesota and British Columbia, south to Chihuahua and Michoacan (Mexico), Texas and Florida

Description: Flowers **bisexual**; **stigmas** 0.3-0.7 mm long; **style** 0.2-0.3 mm long; **ovary** ellipsoid or ovoid; **fruit** a unilocular, stramineous to light brown, ellipsoid to narrowly ovoid to ovoid-prismatic, trigonous capsule, 2.8-3.5 (-4.0) mm long, equaling the perianth or slightly exserted, apex obtuse, mucronate; **valves** 0.8-1.0 mm broad; **seeds** ellipsoid, light brown, 0.3-0.4 mm long, one end dark pointed, tegmen reticulate with numerous transverse lines; **stamens** 3, 1.3-2.0 mm long; **filaments** white; **anthers** white, about 0.3 times the filament length; **tepals** loosely appressed with the tips spreading, green to stramineous to reddish-brown, lanceolate, 2.6-3.5 (-3.9) mm long, apex sharply acuminate, margins scarious; **inner tepals** 2-3-nerved, 0.4-0.5 mm broad; **outer tepals** unnerved, 0.5-0.8 mm broad; **bracteoles** absent; **glomerules** (2-) 10-20 flowered, hemispherical, (or up to 50 flowered and spherical), 3-9 mm in diameter; **glomerule bracts** scarious, ovate, 2.0-2.5 mm long, apex cuspidate; **peduncles** ascending or spreading, 1-11 cm long; **adaxial bracts** scarious, sheathing, 2-6 mm long, apex truncate or acute, erose or lacerate, margin entire; **abaxial bracts** herbaceous, lanceolate, 3-7 mm long, apex acuminate to caudate, margin entire; **rachis** 5-15 mm long; **inflorescence** sympodial, a raceme or panicle of 5-20 (-50) glomerules, obovoid and open (to congested), 3-15 cm tall, 1-7 cm broad; **lowest bract** erect, sheath green, 0.1-0.3 mm long, auricle membranaceous, rounded, prolonged 0.5 mm, blade terete, obscurely septate, 0.8-4.0 cm long, shorter than the inflorescence, apex acuminate; **cauline leaves** 1-2, sheaths open, 1-7 cm long, auricles scarious, rounded, prolonged 1.0-1.5 mm, blades terete to laterally compressed, septate but occasionally obscurely so, 2-40 cm long, 0.5-2.0 (-3) mm diameter, apex acuminate; **basal leaves** 1-2, sheaths open, 2.0-7.5 mm long, auricles scarious, rounded, prolonged 1.0-1.5 mm, blades terete to strongly compressed, septate, (1-) 7-20 cm long, 0.5-2.0 (-3) mm in diameter, apex acuminate; **cataphylls** 1-2; **stems** erect, terete, 1.4-8.0 (-10) dm tall to the base of the inflorescence, 1-3 mm diameter immediately above the basal sheath, cespitose; **rhizomes** horizontal, dark reddish brown, 1-2 mm diameter; **roots** numerous, to 0.3 mm diameter (2n = 40).





31. *Juncus debilis* Gray

Common Name: Weak Rush

Type Description: A. Gray, Man. ed. 2, p. 481, 1856 (*pro parte*)

Synonyms: *Juncus acuminatus* var. *debilis* (Gray) Engelm. in Gray, *J. radicans* Schlecht.

Origin: Northeastern North America

Habitats: Wet places, along shores and sometimes submerged

Habit: Weakly erect, cespitose, perennial herbs

Flowering: June-July

Fruiting: June-August

Rarity Status: listed as threatened by NY State; NYNHP rank G5 S1

General Distribution: Rhode Island to Missouri, south to Texas and Florida

Description: Flowers **bisexual**; **stigmas** 0.8-1.0 mm long; **style** 0.1-0.2 long; **ovary** ellipsoid or ovoid; **fruit** a unilocular, greenish stramineous to cinnamon brown, narrowly ellipsoid to lanceolate, trigonous capsule, 2.8-3.7 mm long, exserted, apex acute, mucronate; **valves** 0.9-1.0 mm broad; **seeds** ellipsoid, light brown, 0.3-0.4 mm long, one end dark pointed, tegmen reticulate with numerous transverse lines; **stamens** 3, 1.3-1.5 mm long; **filaments** white; **anthers** white, about half the filament length; **tepals** appressed, slightly ribbed, green to cinnamon brown often red near apex, lanceolate, 1.8-2.3 (-2.5) mm long, 0.4-0.5 mm broad, apex sharply acuminate, margins narrow and scarious; **bracteoles** absent; **glomerules** 2-10 flowered, obpyramidal, 2-5 mm diameter; **glomerule bract** ovate, 1.3-1.7 mm long, apex cuspidate, scarious with a reddish midvein; **peduncles** ascending to divaricate, 0.5-5.5 cm long; **adaxial bracts** scarious, sheathing, 1-5 mm long, apex retuse to obcordate, margin entire; **abaxial bracts** herbaceous, lanceolate, 2.2-3.5 mm long, apex acuminate to caudate, margin entire; **rachis** 1-5 mm long; **inflorescence** sympodial, a raceme or panicle of 3-50 glomerules, open, 1.5-7.0 cm tall, 0.5-4.0 cm broad; **lowest bract** erect, sheath green, 0.6-1.0 cm long, auricle scarious, rounded, prolonged 0.5 mm, blades terete, septate, 1-5 (-8) cm long, shorter than to slightly longer than the inflorescence, apex acute; **cauline leaves** 1-3, sheaths open, 1.5-5.5 cm long, auricles scarious, rounded, prolonged 1.0-1.5 mm, blades terete, septate, 3.5-12.5 cm long, 0.5-1.0 mm diameter, apex blunt to acuminate; **basal leaf** 1 (or absent) , sheaths open, 2.0-2.5 cm long, apex truncate and sometimes lacerate, with scarious margins, blades terete, septate, 1-5 cm long, mm diam, apex blunt to acuminate; **cataphylls** 1 or absent; **stems** erect or geniculate at base, terete, 1.0-2.5 dm tall to the base of the inflorescence, 0.5-1.0 mm in diameter immediately above the basal sheaths, cespitose; **rhizomes** erect, stramineous, 1 mm diameter; **roots** numerous, up to 0.4 mm in diameter.

Note: This taxon might be more appropriately treated as a variety of *J. acuminatus*, but, until a definitive study is carried out, the common practice of recognizing it at the species level will be followed.

2. LUZULA

Common Name: Wood Rush

Authority: DeCandolle in Lamarck & DeCandolle, Fl. Fr. ed. 3, vol. 3, p. 158, 1805

A genus of about 80 species worldwide, mostly in cool climates. Many species distinctions in this genus are confused by clines and polyploid complexes. The presence of diffuse centromeres in the chromosomes has resulted in numerous aneuploid and endonuclear polyploid derivatives within the genus without loss of genetic material. *Luzula* species show a great deal of environmental variation in color and size of the flowers, capsules and seeds, the relative lengths of anthers and filaments and the texture of the leaves, to name a few. Such characters often appear to be phenotypic modifications dependent on exposure to sun and humidity, as well as heat and cold regimes. Species of the genus have few uses. They are readily eaten by deer in the tundra (particularly *L. spicata* and *L. parviflora*), and some species have medicinal uses.

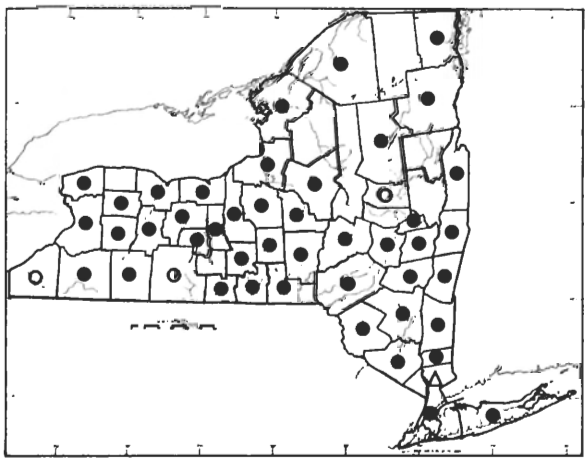
Description: Plants with **bisexual** flowers; **stigmas** 3, filiform, erect and entwined or spreading; **styles** 1, cylindrical or filiform, short; **ovary** 1, superior, tricarpellate, unilocular, with 1 basal **ovule** per carpel, becoming a 3-seeded loculicidal **capsule**; **seed** usually with a large caruncle, the small, straight, broad **embryo** imbedded in starchy **endosperm**; **stamens** 6 or 3, free; **filaments** linear; **anthers** ellipsoid, opening by vertical slits; **perianth** of 6 similar lobes (tepals) in two whorls; **tepals** free, inner and outer whorls usually similar; **flowers** immediately subtended by 2 bracteoles (prophylls); **pedicels** long or short to nearly absent, the flowers commonly clustered into multi-flowered glomerules; **inflorescence** cymose, either an umbelliform, decompound or spike-like cyme, or a cyme of glomerules; **inflorescence bracts** leaf-like; **leaves** flat, usually ciliate with closed or open **sheaths** and tufts of long hairs at the throat (in our species); **stems** erect or spreading; **rhizomes** and **stolons** often present; **root systems** fibrous.

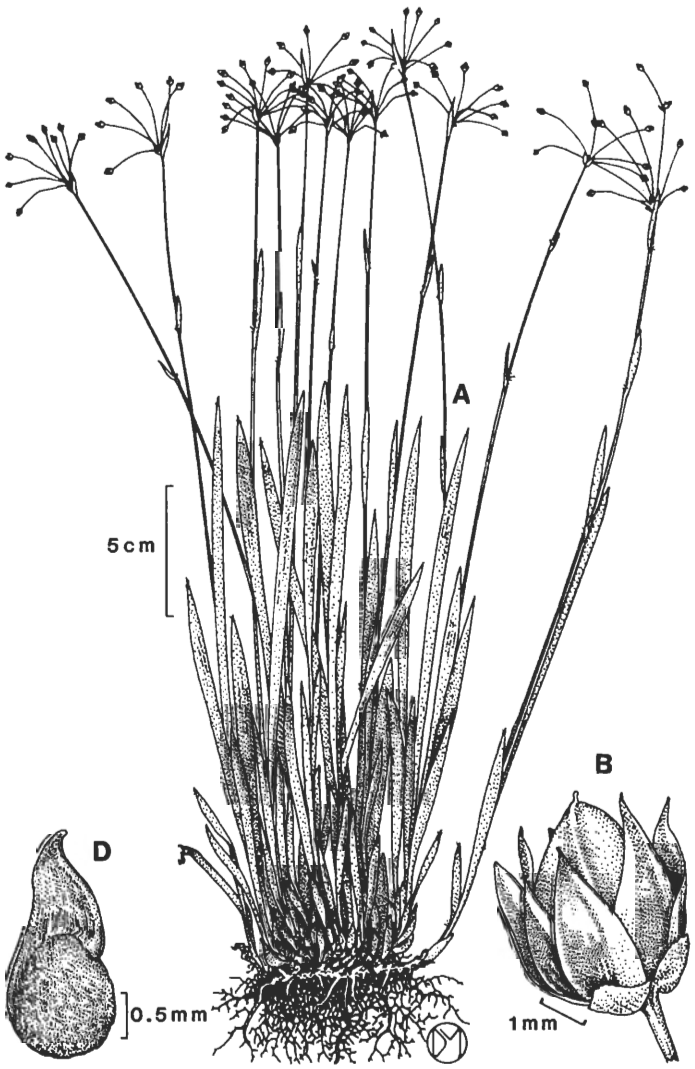
KEY TO SPECIES OF LUZULA

1. Inflorescence a simple (rarely compound), umbelliform cyme; flowers single; seed with a curved caruncle as large as the seed body ..... 1. *L. acuminata*
1. Inflorescence a diffuse, decompound cyme, a spike-like cyme, or a cyme of glomerules; flowers single, clustered or in glomerules; seed either without a caruncle or with a short, straight caruncle ..... (2)
   2. Inflorescence a decompound cyme; flowers single or in few-flowered clusters ..... (3)
   2. Inflorescence a cyme of glomerules or a spike-like cyme; flowers clustered into many-flowered glomerules ..... (4)
3. Inflorescence a flat-topped, decompound cyme; flowers in loose clusters of 3-7; seed with a short, straight caruncle ..... 2. *L. luzuloides*
3. Inflorescence a nodding, decompound cyme; flowers single or rarely in pairs; seed without a caruncle, but with a small tuft of hairs ..... 3. *L. parviflora*
   4. Inflorescence an arching, spike-like cyme; leaves linear and channeled ..... 4. *L. spicata*
   4. Inflorescence an erect cyme of glomerules; leaves linear-lanceolate to lanceolate, flat ..... 5. *L. campestris*

A. *Luzula* Subgenus *Pterodes* (Griseb.) Buchenau

Perennials; flowers borne singly; seed with a long basal appendage.





1. *Luzula acuminata* Raf.

Common Name: Hairy Woodrush

Type Description: Rafinesque, Autik. Bot. p. 193, 1840

Synonyms: *Juncoides pilosum* (L.) Cov. var. *michiganese* Farw., *J. pilosum* (L.) Cov. var. *saltuense* (Fern.) Farw., *J. saltuensis* (Fern.) A. Heller, *Luzula saltuensis* Fern., *L. carolinae* var. *saltuensis* (Fern.) Fern., *L. pilosa* var. *americana* Schultes & Schultes

Origin: Eastern North America

Habitats: In most types of woods, including oak, northern hardwoods and drier areas of wooded swamps

Habit: Erect, stoloniferous and rhizomatous, perennial herbs

Flowering: May-June

Fruiting: June-August

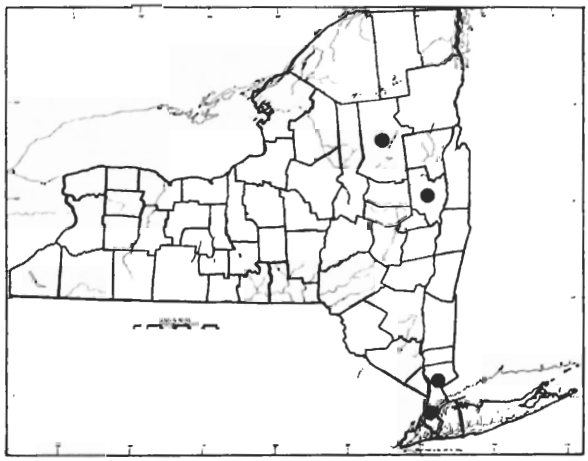
General Distribution: Newfoundland to Manitoba south to Alabama and Georgia

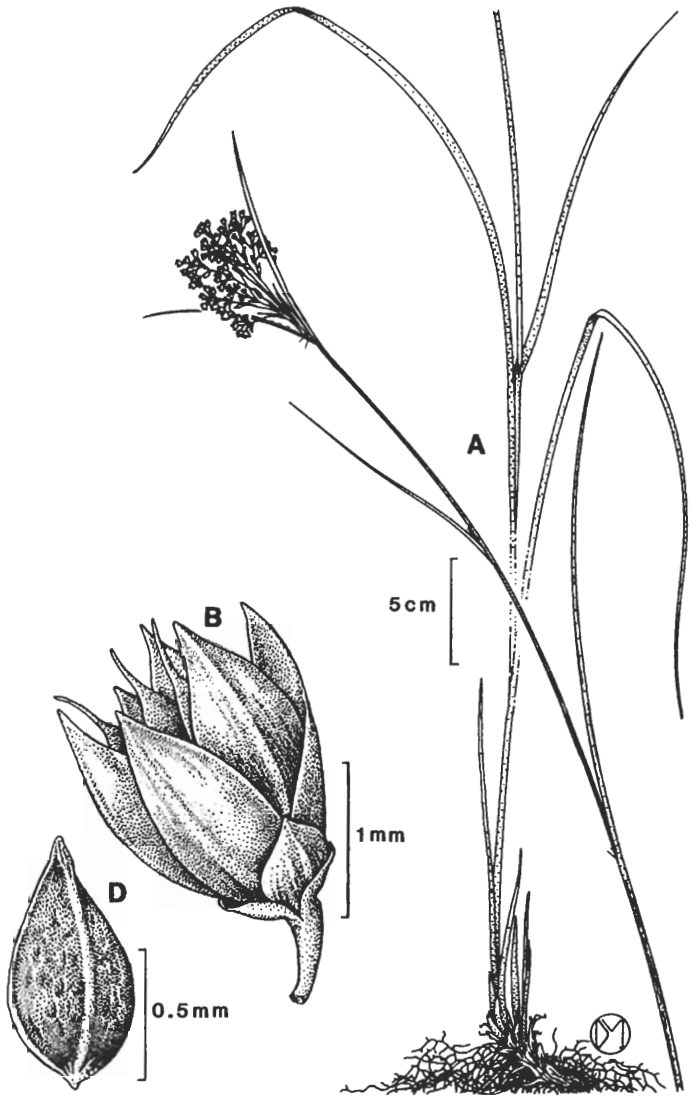
Description: Flowers **bisexual**; **stigmas** 1.7-2.5 mm long; **style** 1.0-1.6 mm long; **ovary** pyriform; **fruit** a unilocular, yellowish-green to stramineous to brown, pyriform to ovoid capsule, 2.7-4.2 mm long, exserted, apex broadly acute, mucronate, **valves** 1.2-2.5 mm broad; **seeds** subglobose, brown or purple, 1.0-1.3 mm long (not including the caruncle), caruncle curved, 0.6-1.0 mm long; **stamens** 6, 1.2-1.7 mm long; **filaments** white; **anthers** yellow, over twice the filament length; **tepals** loosely appressed, stramineous to dark brown, lanceolate, 2.5-3.5 (-4.0) mm long, 0.8-1.3 mm broad, apex acuminate to cuspidate, margins scarious; **bracteoles** scarious, broadly ovate, 0.9-1.9 mm long, apex truncate to acute; **pedicels** 1-5 cm long, rarely branched from immediately below the flower; **adaxial bracts** brown or scarious with brown flecks, sheathing, 2.5-5.0 mm long, apex truncate, erose, margin entire (rarely ciliate); **abaxial bracts** herbaceous, lanceolate, 3-10 mm long, apex acuminate, margin ciliate; **rachis** 2-6 mm long; **inflorescence** sympodial, an umbelliform raceme, irregularly spherical in shape and open, 2-6 cm tall, 3-6 cm broad; **lowest bract** erect, flat, green, 1-3 cm long, shorter than the inflorescence, apex tapering to a blunt, callus tip, margin ciliate; **cauline leaves** (1) 2-4, sheaths closed, 0.1-0.3 cm long, auricle absent, copious cilia present at the mouth of the sheath, blades linear, 1.5-6.0 cm long, 2-4 (-5) mm broad, apex tapering to a blunt callus tip, margin ciliate or entire; **basal leaves** 2-5, without sheaths, blades flat, 8-32 cm long, 3-12 mm wide, apex tapering to a blunt callus-tip, margin ciliate; **stems** erect, terete, (1-) 2-4 dm tall to the base of the inflorescence, 1.0-1.5 mm diameter at the base, arising from creeping rhizomes and stolons; **stolons** to 6 cm long, 1-2 mm in diameter; **rhizomes** horizontal, 1-2 mm in diameter; **roots** numerous, up to 0.2 mm in diameter (2n = 18, 48; all chromosomes CL-type).

Infraspecific Variation: Plants from south of our range with highly branched inflorescences have been referred to *Luzula acuminata* var. *carolinae* (S. Wats.) Fern. All New York specimens are referable to *Luzula acuminata* var. *acuminata*, based on their simple or only slightly branched inflorescences.

B. *Luzula* Subgenus *Anthelata* (Griseb.) Buchenau

Perennial or annuals; flowers borne singly, in pairs or sometimes in larger groups; seeds with a short to inconspicuous basal appendage, or appendage absent.





2. *Luzula luzuloides* (Lam.) Dandy & Wilmott

Common Name: Forest Woodrush

Type Description: Lamarck, Encycl. 3: 272, 1789

Synonyms: *Juncus luzuloides* Lam., *J. nemorosus* Poll., *Juncoides nemorosum* (Poll.) Cov., *Luzula nemorosa* (Poll.) E. Mey.

Origin: Europe

Habitats: Woods and Meadows; in New York it is often found in fields and lawns

Habit: Erect, stoloniferous and rhizomatous, terrestrial, perennial herbs

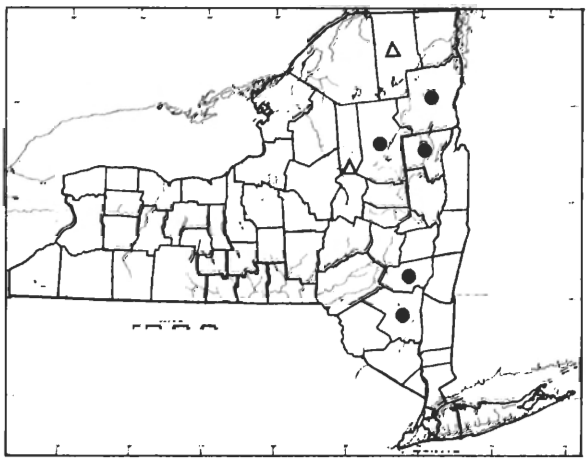
Flowering: June

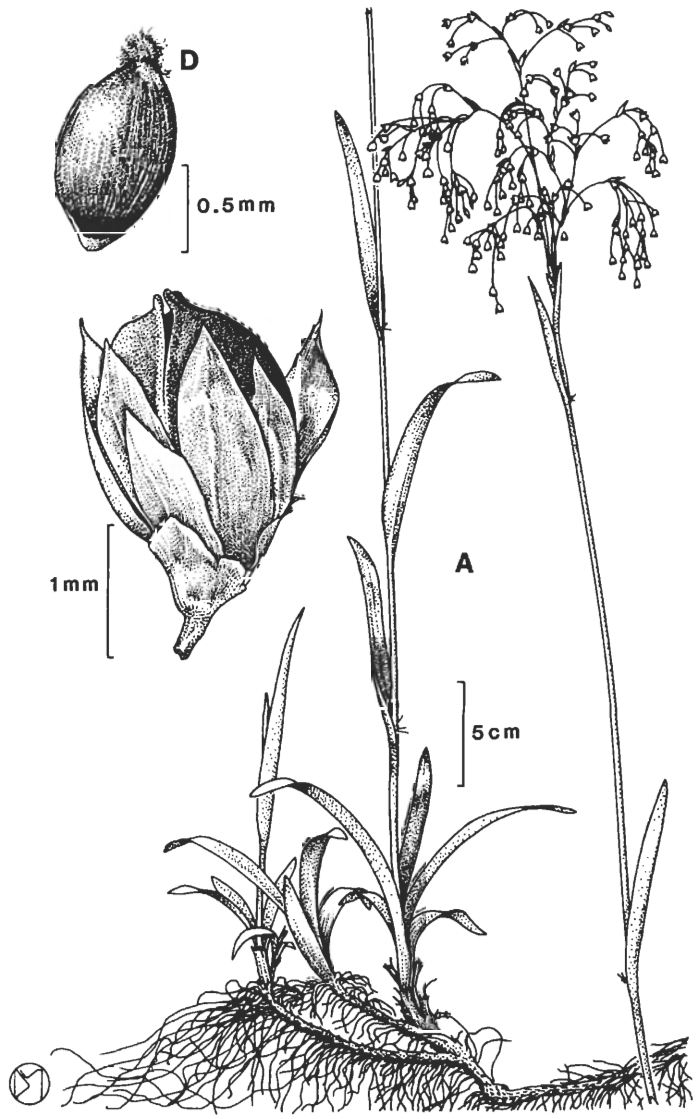
Fruiting: June

General Distribution: Eurasian; introduced into North America and now found from Nova Scotia to Minnesota south to eastern Pennsylvania and southern New England

Description: Plants bisexual; **stigmas** 0.9-1.2 mm long; **style** 1.0-1.4 mm long; **ovary** ovoid; **fruit** a unilocular, reddish-brown, ellipsoid, rostrate capsule, 1.5-1.8 mm long (not including the long apicula), included, apex apiculate, apicula 0.4-0.6 mm long; **valves** 0.9-1.0 mm broad; **seeds** oblong, dark brown or purple, 0.7-1.0 mm long, with a pale, pronounced raphe on one side of the seed, caruncle straight, 0.1-0.2 mm long; **stamens** 6, 1.5-1.9 mm long; **filaments** white; **anthers** reddish-brown, 2-3 times the filament length; **tepals** appressed, yellow-white to stramineous, lanceolate, apex acuminate, margins scarious; **inner tepals** 2.2-2.3 mm long, 0.7-0.8 mm broad; **outer tepals** 1.7-2.1 mm long, 0.6-1.0 mm broad; **bracteoles** scarious, broadly ovate, 1.2-1.5 mm long, apex acute; **pedicels** 0-1.0 mm long, the flowers commonly in loose clusters of 2-10; **peduncles** spreading or ascending 0.1-7.0 cm long; **adaxial bracts** stramineous with brown flecks, sheathing, 1-5 mm long, apex acute or truncate, lacerate and ciliate, margin entire; **abaxial bracts** herbaceous, linear to lanceolate, 2-24 mm long, apex long acuminate, margin ciliate; **rachis** 1-2 mm long; **inflorescence** sympodial, a decompound dichasium, obpyramidal to broadly ovoid, 3.5-7.0 cm tall, 5-7 cm broad; **lowest bract** erect, flat, green, linear, (4.5-) 9-12 cm long, longer than the inflorescence, apex long acuminate, margin ciliate; **cauline leaves** 3-4, sheaths closed, 0.3-0.5 cm long, auricles absent, copious cilia present at the mouth of the sheath, blades linear, 10-25 cm long, 2-4 mm wide, apex long acuminate, margin ciliate; **basal leaves** 5-8, sheaths closed, 4.0-4.5 cm long, auricles absent, copious cilia at the mouth of the sheath, sheaths occasionally absent, blades flat, 1.0-3.5 cm long, 3-6 mm, apex long-acuminate, margin ciliate; **stems** erect, terete, 4.5-7.0 dm tall to the base of the inflorescence, 1.5-2.0 mm diameter immediately above the basal sheaths, arising from creeping rhizomes and stolons; **stolons** 1.0-1.5 mm diameter; **rhizomes** horizontal, 1.0-1.5 mm diameter; **roots** numerous, up to 0.2 mm in diameter (2n = 12, 24).

Infraspecific Variation: All New York materials are of ssp. *luzuloides*, with whitish perianth segments and lax inflorescences. *Luzula luzuloides* ssp. *curpina* (Rochel ex Ascherson & Graebner) Chrtek & Krísa, also from Europe, has a more condensed inflorescence and perianth segments suffused with red.





3. *Luzula parviflora* (Ehrh.) Desv.
var. *melanocarpa* (Michx.) A. Gray

Common Name: Small-flowered Woodrush

Type Description: Ehrhart, Beitr. vol. 6, p. 139, 1791

Synonyms: *Juncoides parviflorum* var. *melanocarpum* Howell, *Juncus melanocarpus* Michx., *Luzula melanocarpa* (Michx.) Desv., *L. melanocarpa* var. *pallida* Hook., *L. parviflora* ssp. *melanocarpa* (Michx.) Hämet-Ahti, *L. spadicea* var. *melanocarpa* E. Mey.

Origin: Eastern North America

Habitats: Cool, montane woods (in New York State)

Habit: A stoloniferous and rhizomatous, perennial herb

Flowering: June-July

Fruiting: June-August

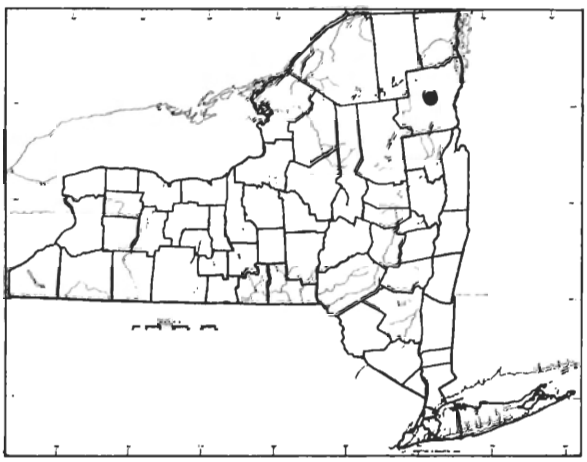
General Distribution: Labrador to Saskatchewan south to Minnesota, New York and New England

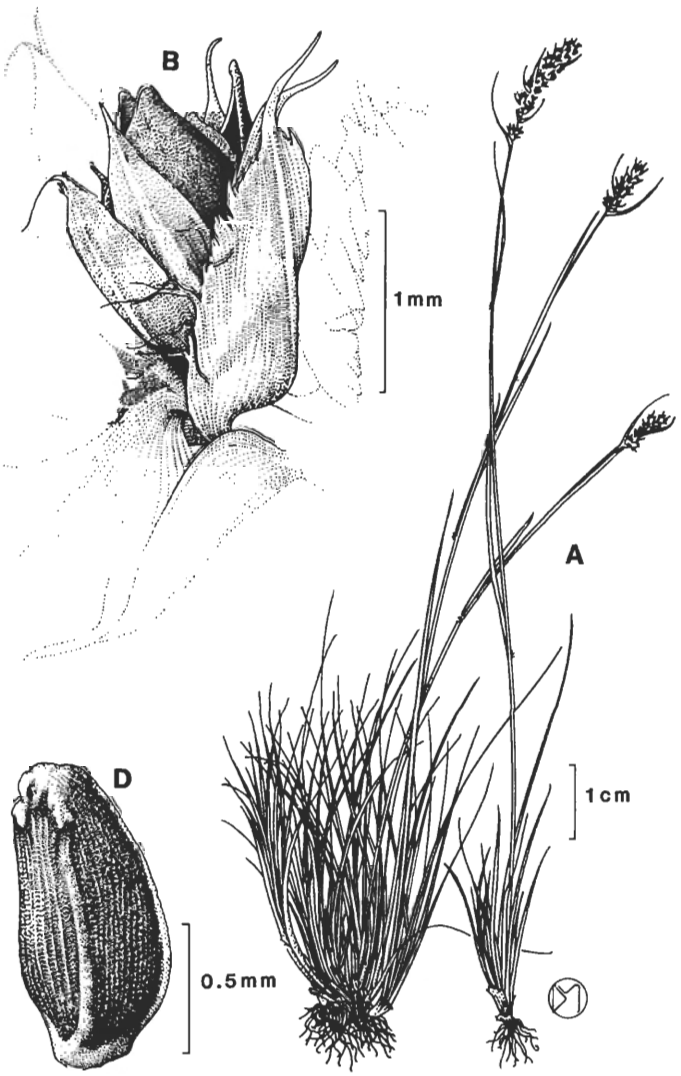
Description: Flowers **bisexual**; **stigmas** 0.5-1.3 mm long; **style** 0.5-0.8 mm long; **ovary** ovoid; **fruit** a unilocular, stramineous to red-brown or black, ellipsoid capsule, 1.6-2.2 mm long, exserted, apex acute, mucronate; **valves** 0.8-1.2 mm broad; **seeds** ellipsoid, dark brown, 1.1-1.4 mm long, caruncle a tuft of hairs at the placental end; **stamens** 6, 0.8-1.2 mm long; **filaments** white; **anthers** white, equaling the filament length; **tepals** loosely appressed, brown or pale brown, lanceolate, 1.6-2.0 mm long, 0.5-0.7 mm broad, apex acute, margins scarious; **bracteoles** translucent brown, ovate, 0.9-1.2 mm long, apex acute to acuminate, minutely lacerate; **pedicels** 0-9 mm long; **peduncles** loosely spreading or reflexed, 0.1-15 cm long; **adaxial bracts** brown to stramineous, sheathing, 1-15 mm long, apex truncate, erose and scarious, margin entire; **abaxial bracts** herbaceous, linear to lanceolate, 2-17 mm long, apex long acuminate, margin ciliate; **rachis** 15-30 mm long; **inflorescence** sympodial, a diffuse decompound dichasium, 6-12 cm tall, 3-10 cm broad, flowers borne on the branches singly or in pairs; **lowest bract** erect, flat, green, linear, 1-4 cm long, shorter than the inflorescence, apex acuminate, margin ciliate; **cauline leaves** 4-6, sheaths closed, 2.0-4.7 cm long, auricles absent, copious cilia present at the mouth of the sheath, blades broadly lanceolate to linear, 3-12 cm long and 8-10 mm wide, apex acuminate, margin ciliate; **basal leaves** 4-8, sheaths absent, blades lanceolate, flat, 6-29 cm long, 4-12 mm broad, apex acuminate, margin ciliate; **stems** erect, terete, 4-10 dm tall to the base of the inflorescence, 1.5-2.0 mm in diameter immediately above the basal leaves, arising from creeping rhizomes and stolons; **stolons** to 4 cm long, 1-2 mm in diameter; **rhizomes** horizontal, 1-2 mm diam; **roots** numerous, up to 0.2 mm in diameter (2n = 24).

Infraspecific Variation: A number of varieties of this species have been named, but New York specimens are all var. *melanocarpa*, based on their rather diffuse inflorescences and the often dark capsules.

C. *Luzula* Subgenus *Luzula*

Perennial; flowers glomerulate; seeds with conspicuous basal appendage.





4. *Luzula spicata* (L.) DC. ex Lam. & DC.

Common Name: Spiked Woodrush

Type Description: Linnaeus, Species Pl. 1, p. 329, 1753

Synonyms: *Juncus spicatus* L., *Juncoides spicatum* Kuntze, *Luzula obtusata* Steud.

Origin: Northern Hemisphere, possibly the Arctic Zone

Habitats: Alpine cliffs and talus slopes (NY); alpine meadows, gravels, peaty openings elsewhere

Habit: Erect, cespitose, perennial herbs

Flowering: June

Fruiting: June-July

General Distribution: Arctic-circumboreal: in North America from Greenland and Newfoundland to the Canadian arctic and Alaska, south to California and New Mexico, Colorado, northern New York and northern New England

Rarity Status: This species is known in New York State from only two adjacent sites in the high Adirondacks. It has an NYNHP rank of G5, S1.

Description: Flowers **bisexual**; **stigmas** 0.9-1.0 mm long; **style** 0.3-0.4 mm long; **ovary** globose; **fruit** a unilocular, straminous to dark red-brown, globose capsule, 1.4-1.6 mm long, exserted, apex acute; **valves** 0.9-1.1 mm broad; **seeds** ellipsoid, brown, 1.1-1.2 mm long, caruncle 0.2 mm long; **stamens** 6, 0.6-0.8 mm long; **filaments** yellow; **anthers** yellow, 3 times the filament length; **tepals** loosely appressed, brown, ovate, 1.6-2.0 mm long, 0.6-0.8 mm broad, apex long acuminate with a delicate bristle tip, margins scarious; **bracteoles** scarious, ovate, 1.2-2.0 mm long, apex acute or truncate; **glomerules** 5-9 flowered, irregularly shaped, 4-6 mm diameter; **peduncles** up to 10 mm long, but glomerules usually sessile; **bracts** scarious with brown flecks, lanceolate, 1.5-2.5 mm long, apex acuminate, margin ciliate; **rachis** 1-3 mm long; **inflorescence** sympodial, a spike-like raceme of glomerules, cylindrical and congested, 1.0-3.5 cm tall, 0.4-0.5 mm broad; **lowest bract** flexuous, flat to involute, green, linear, 1.5-3.0 cm long, shorter than or equaling the inflorescence, apex long acuminate, margin ciliate; **cauline leaves** 1-3, sheaths closed, 0.1-0.4 cm long, auricles absent, copious cilia present at the mouth of the sheath, blades linear, channeled, 4-8 cm long, 0.5-1.0 mm wide, apex acuminate, margin ciliate; **basal leaves** numerous, sheaths absent, blades channeled, 5-20 cm long, 0.5-1.5 mm wide, apex acuminate, margin ciliate; **stems** erect, terete, 2.0-3.5 dm tall up to the base of the inflorescence, 0.6-1.0 mm diameter immediately above the basal leaves, cespitose; **rhizomes** erect-ascending, 1-2 mm diameter; **roots** numerous, up to 0.2 mm in diameter (2n = 12, 14, 18, 24, 36).

5. *Luzula campestris* (L.) DC. in Lam. & DC.
Common Name: Common Woodrush

Type Description: Linnaeus, Species Pl. I, p. 329 *(pro parte)*

Synonyms: *Juncoides campestris* Kuntze, *Juncus campestris* L.

Origin: Uncertain: Native to North America, Eurasia and North Africa

Habitats: In a wide variety of sites, including most types of woodlands, swamps, bogs, fields and open ground, often occurring with *L. acuminata*

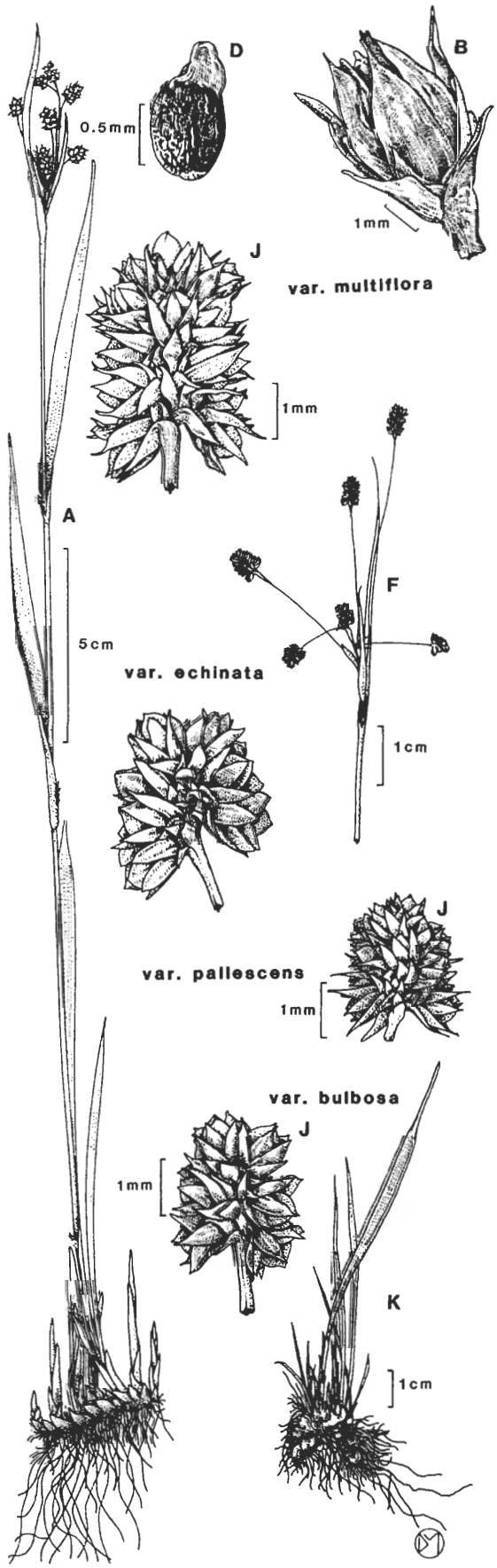
Habit: Erect, cespitose or rhizomatous, perennial herbs

Flowering: May

Fruiting: May-July

General Distribution: Circumboreal; common in the northern and cool-temperate regions; in North America, from the arctic south to Florida, Texas and Nevada

Description: Flowers **bisexual**; **stigmas** 0.8-1.3 mm long; **style** (0.3-) 0.5-0.8 mm long; **ovary** ovoid; **fruit** a unilocular, stramineous to reddish brown, obovoid to ellipsoid capsule, 1.9-2.3 mm long, included to exserted, apex rounded, mucronate; **valves** 1.3-1.5 mm broad; **seeds** ellipsoid, dark brown, 0.6-0.9 mm long (not including the caruncle), caruncle straight or curved, 0.4-0.6 mm long; **stamens** 6, 0.9-1.7 mm long; **filaments** white; **anthers** yellow, 2-3 times the filament length; **tepals** loosely appressed or with the tips spreading, stramineous to brown, lanceolate, 1.8-3.0 mm long, 0.6-1.3 mm broad, apex aristate, margin scarious; **bracteoles** scarious, deltoid, 1.0-1.8 mm long, apex aristate; **glomerules** 5-12 flowered, cylindrical to spherical, 4-9 mm diameter; **peduncles** erect to reflexed, 0.1-10 cm long; **adaxial bracts** stramineous, sheathing, 3-4 mm long, apex truncate, margin lacerate and hyaline; **abaxial bracts** herbaceous, linear-lanceolate, 3-19 mm long, apex long acuminate, margin lacerate or entire; **rachis** 9-15 mm long; **inflorescence** sympodial, a raceme of 3-10 glomerules, ovoid, obovoid, or globose, 1.5-6.0 cm tall, 1-5 cm broad; **lowest bract** erect or ascending, flat, green, linear, 2-4 cm long, shorter than the inflorescence, apex callus-tipped, margin ciliate; **cauline leaves** 1-2, sheaths closed, 0.1-0.4 cm long, auricles absent, copious cilia present at the mouth of the sheath, blades linear-lanceolate, 3-10 cm long, 2-5 mm wide, apex blunt, callus tipped, margin ciliate or entire; **basal leaves** numerous, sheaths absent, blades linear-lanceolate, flat, 5-25 cm long, 2-6 mm wide, apex blunt, callus tipped, margin ciliate; **stems** erect, terete, 1-5 dm tall to the base of the inflorescence, 0.5-1.0 mm in diameter immediately above the basal leaves, arising from creeping rhizomes and stolons; **stolons** up to 1 cm long, 1-2 mm wide (or



absent); **rhizomes** horizontal, 2-4 mm in diameter, occasionally forming **bulbils**; **roots** numerous, up to 0.2 mm in diameter (2n = 12, 18?, 24, 36).

Infraspecific Variation: *Luzula campestris sensu lato* comprises an exceedingly difficult complex. The presence of diffuse centromeres, complicated by high levels of polyploidy and environmentally induced variation in this complex, have made the task of sorting out morphologically distinct entities very demanding. In Eastern North America the complex is represented by three native diploid taxa: *L. campestris* var. *bulbosa* Wood, *L. campestris* var. *echinata* (Small) Fern. & Wieg. and *L. campestris* var. *pallescens* Wahl, one native, multi-level polyploid series, *L. campestris* var. *multiflora* (Retz.) Celak, and one rarely introduced diploid taxon, *L. campestris* var. *campestris* which occurs outside New York. Members of the polyploid series may exhibit traits of all four diploids, making clear morphological distinctions impossible. The following key is intended to be only a guide to the varieties of *L. campestris*, since there are so many intermediate forms that a definitive key is not feasible. When trying to place a varietal name on a plant, it is wise to consider all the diagnostic characters and weigh the evidence before assigning a trinomial.

KEY TO VARIETIES

1. Peduncles (at least some of them) divergent or reflexed; glomerules subspherical..... 5a. *L. campestris* var. *echinata*
1. Peduncles nearly all erect or ascending; glomerules ovoid to cylindric..... (2)
   2. Plants with white, coralline tubers; glomerules (in New York plants) less than 5 mm broad; plants not cespitose..... .....5b. *L. campestris* var. *bulbosa*
   2. Plants without white, coralline tubers; glomerules 4-9 mm broad; plants cespitose .....(3)
3. Tepals 1.8-2.0 mm long; mature glomerules 4-5 mm broad .....5c. *L. campestris* var. *pallescens*
3. Tepals 2.5-4.5 mm long; mature glomerules 6-9 mm broad.....5d. *L. campestris* var. *multiflora*

5a. *L. campestris* var. *echinata* (Small) Fern. & Wieg.

Synonyms: *Juncoides campestris* var. *echinatus* (Small) Cov. & S. F. Blake, *J. echinatum* Small, *J. intermedium* var. *echinatum* (Small) House, *Luzula echinata* (Small) F. J. Hermann

Origin: Eastern United States

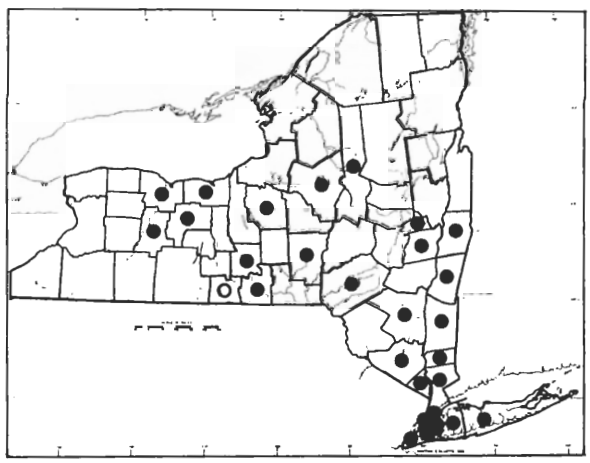
Habitats: Woods, fields and clearings

Habit: Erect, loosely cespitose, perennial herbs

General Distribution: Massachusetts to southrn Illinois south to Alabama and Georgia

Ploidy: 2n = 12; all AL-type chromosomes

Note: As here recognized, this variety includes var. *mesochorea*, a poorly defined taxon described under *L. echinata* by F. J. Hermann.



5b. *L. campestris* var. *bulbosa* A. Wood

Synonyms: *Juncoides bulbosum* (Wood) Small, *J. campestre* var. *bulbosum* (Wood) Cov. & S. F. Blake, *Luzula bulbosa* (Wood) Rydb., *L. multiflora* var. *bulbosa* (Wood) F. J. Hermann

Origin: Southeastern United States Coastal Plain

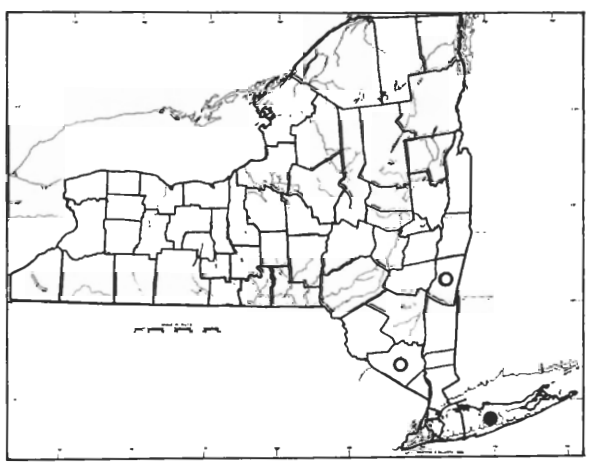
Habitats: Dry, sandy woods and fields.

Habit: Erect, rhizomatous, bulb-forming, perennial herbs

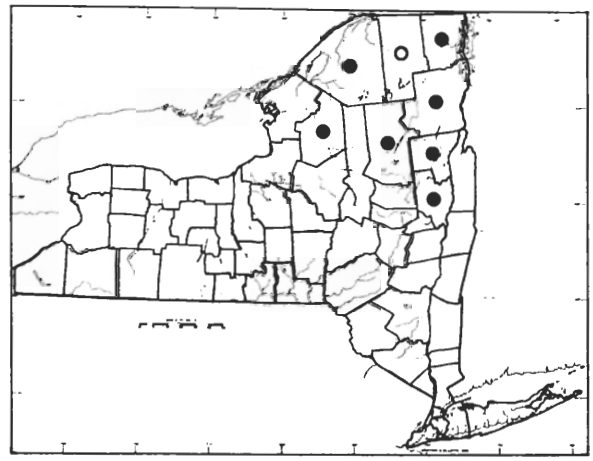
General Distribution: Massachusetts to eastern Kansas south to east Texas and Florida

Ploidy: 2n = 12; all AL-type chromosomes

Variation: A widespread variety with narrow glomerules in the Northeast, but with larger glomerules further south and west.



5c. *L. campestris* var. *pallescens* (Wahl.) Wahl.



Synonyms: *Luzula pallescens* Wahl., *L. sudetica* var. *pallescens* (Wahl.) Aschers., *L. campestris* var. *pallescens* (Wahl.) Bess.

Origin: Northern Eurasia

Habitats: Woods

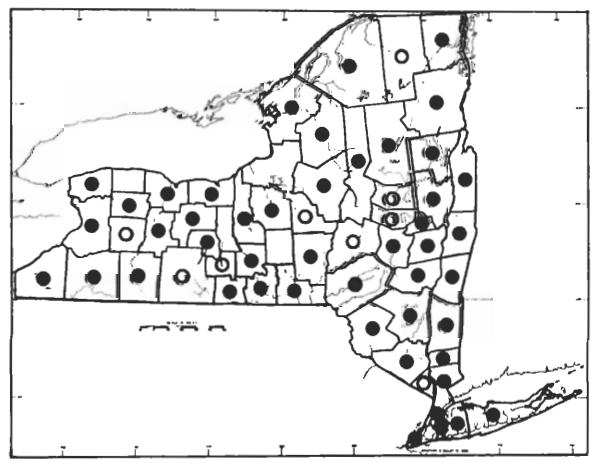
Habit: Erect, cespitose, perennial herbs

General Distribution: Introduced from Newfoundland to Saskatchewan south to northerrn New York and central Vermont: Eurasia

Ploidy: 2n= 12, 12-18, 36

Variation: This variety may be confused at times with *L. bulbosa*, since they both usually have short perianths and narrow glomerules.

5d. *L. campestris* var. *multiflora* (Retz.) Celak



Synonyms: *Juncoides intermedius* (Thuill.) Rydb., *Juncus intermedius* Thuill., *J. liniger* T. Purton, *J. multiflorus* Retz., *J. nemorsus* Host., *Luzula campestris* ssp. *multiflora* (Retz.) Buch., *L. erecta* Desv., *L. intermedia* var. *multiflora* Spenner, *L. multiflora* (Retz.) Lej., *L. multiflora* var. *frigida* Buch., *L. multiflora* ssp. *frigida* (Buch.) Krecz.

Origin: A hexaploid derivative of several taxa

Habitats: Found in a variety of habitats, including woods, swamps, fields and clearings

Habit: Erect, cespitose, perennial herbs

General Distribution: Newfoundland to Alaska south to California

Ploidy: 2n = 12, 18, 24, 28, 36, 48 for North American materials; all AL-type chromosomes

Variation: The most widespread and variable variety of this species found in New York, this taxon is probably of polyphyletic origin, having arisen on more than one occasion when two diploid taxa hybridized.

Importance: The rhizome of *Luzula campestris* is used as a diuretic in India.

EXCLUDED TAXA

Juncus diffusissimus Buckley, reported by McVaugh (1958, p. 95-96). The specimens on which this report was based were apparently at MO, but no specimens matching this species (or annotated as such by McVaugh) have been seen at MO. The report is probably based on records of *J. debilis*, with which there is some nomenclatural confusion.

Juncus vaseyi Engelm. is reported from Jefferson Co., valley of the Black River by Fernald (1904, p.41), yet no specimens from New York are known at GH or elsewhere. It may have been based on specimens of *J. greenei*, though this seems unlikely for Fernald.

Juncus coriaceus Mackz., has been reported for New York State, but the specimen on which the report was based (*Bicknell, 447*) is *J. dichotomus*.

APPENDIX 1

FUNGI ASSOCIATED WITH PLANT SPECIES IN THIS TREATMENT
by Steven E. Clemants

To be included in this list, a fungus must occur on a host species covered in this treatment, somewhere in the United States or Canada. Abbreviations of state names indicate citations only. A double asterisk (**) indicates that a NY specimen with host information has been seen. A single asterisk (*) indicates that the fungus occurs in New York, and is known to associate (elsewhere) with a host treated here.

MASTIGOMYCOTINA
CHYTRIDIALES

Physoderma sp., on leaves of *J. pelocarpus* (Mich.)

ASCOMYCOTINA
CLAVICIPITALES

Epichlotyphina (Pers. ex Fr.) Tul., on *J. effusus* (N.H.)

PHYLLACHORALES

Phyllachora junci (Alb. & Schw.: Fr.) Fuckel [=*Endodothella junci* (Fr.) Theiss. & Syd.], stem spot on *J. effusus* (Ga., Ohio), *J. tenuis* (Ga., N.Y., Wisc.), and *Juncus* sp. (Iowa, N.S., Oreg.) [common fungus on dead stems and leaves of *J. effusus* and *J. effusus* var. *conglomeratus* in Britain]

Phyllachora therophila (Desm.) Arx & E. Müller, on *J. effusus* (N.S.) [on *J. effusus* and *J. inflexus* in Britain]

DOTHIDEALES

Didymella juncina (Berk. & Rav.) Sacc. [=*Sphaeria juncina* Berk. & Rav.], on stems of *Juncus* sp. (S.C.)

Dothidella junci (Fr.) Sacc., on *J. effusus*** and *J. tenuis***

Monascostroma innumerosa (Desm.) V. Hoehnel, on *Juncus* sp. (Nova Scotia)

Mycosphaerella lineolata (Roberge in Desm.) Schröt., on overwintered leaves of *Juncus* sp. (Canadian East Arctic)

Mycosphaerella muhlenbergiae (Ell.) Wehm., on *Juncus* sp. (Wash.)

Mycosphaerella recutita (Fr.) Johanson, on dead stems of *J. effusus***

Mycosphaerella tassiana (De Not.) Johanson [=*Sphaerella tassiana* De Not.], on *Juncus* sp. (Wash.), and *Luzula* sp. (B.C.)

Mycosphaerella tulasnei (Jacz.) Lindau, on *J. arcticus* (s.l.) (Calif.)

PLEOSPORALES

Clathrospora bakeri Wehm., on *Juncus* sp. (Colo.)

Clathrospora juncicola (Ellis & Everh.) Wehm., on stems of *J. arcticus* (s.l.) (Colo.)

Clathrospora pentamera (P. Karst.) Berl., on *J. arcticus* (s.l.) (B.C.)

Comoclathris permunda (Cooke) E. Müller, on *Luzula spicata* (B.C.)

Gaeumannomyces graminis (Sacc.) von Arx & Oliv. [= *Ophiobolus graminis* Sacc.], "Take-all", on *Luzula parviflora* (Wash.)

Leptosphaeria albopunctata (Westend.) Sacc., on *J. maritimus* [probably *J. roemerianus*] (Miss.)

Leptosphaeria marina Ellis & Everh., on stems of *J. maritimus* [probably *J. roemerianus*] (N.C.)

Leptosphaeria neomaritima Gessner & Kohlm., on stems of *J. maritimus* [probably *J. roemerianus*] (N.C.)

Massarina gloeospora (Berk. & Curtis) Barr [= *Metaspheria defodiens* (Ellis) Sacc.], on dead stems of *J. effusus*, *J. canadensis***, *J. dichotomus*** and *Juncus* sp. (N.J., N.Y.)

Ophiobolus junci J. Miller & Burton, on stems of *J. effusus* (Ga.)

Paraphaeosphaeria michotii (Westend.) O. Erilsson ex Shoemaker & O. Eriksson [=*Leptosphaeria michotii* (Westend.) Sacc.], on *J. arcticus* ssp. *littoralis***, on dead fallen stems of *J. effusus* var. *solutus***, and on *J. tenuis* (Okla.) [on *J. inflexus* in Britain]

Phaeosphaeria caricinella (P. Karst.) O. Eriksson [=*Leptosphaeria caricinella* P. Karst.], on overwintered herbage of *J. arcticus* (s.l.) (Calif.)

Pleospora herbarum (Pers.: Fr.) Rabenh. var. *herbarum* [=*P. discors* (Mont.) Ces. & De Not.], on *Luzula campestris* (B.C.)

Pyrenophora trichostoma (Fr.) Fuckel, on *J. arcticus* (s.l.) (Calif.)

LEOTIALES

Cistella fugiens (Buckn.) Matheis, on dead stems of *J. effusus***

Crocicreas melanosporum (Rea) S. Carp., on petioles and peduncles, on overwintering stems of *J. arcticus* (s.l.) (Calif., Colo., Utah)

Lachnum diminutum (Roberge & Desm.) Rehm, on dead stems of *J. effusus***

Lachnum luteodiscum (Pk.) Haines [= *L. albidoroseus* (Rehm) Nannf.], on *J. effusus***

Loramyces juncicola Weston, on *J. militaris* (Mass. R.I.)

Microscypha sp., on *J. effusus***

Mollisia palustris (Roberge ex Desm.) P. Karst., on dead stems of *J. effusus*** [on rotting stems of *J. effusus* and *J. inflexus* in Britain]

Nimbomollisia stictoidea (Cooke & Ell.) Nannf., on stems of *Juncus* sp. (N.J.)

Niptera guestphalica (Rehm) Dennis [=*Beloniopsis guestphalicum* (Rehm) Nannf.], on *J. effusus* (Ga.)

HYSTERIALES

Glyphium elatum (Grev.) Zogg, on *J. arcticus* (s.l.) (Calif.)

BASIDIOMYCOTINA
USTILAGINALES

Cintractia junci (Schw.) Trelease, inflorescence smut on *J. acuminatus*** (Miss.), *J. bufonius* (Nev., Pa.), *J. dudleyi*** (Ontario, Wisc.), *J. effusus* (N.J.), *J. greenei* (Wisc.), *J. tenuis*** (N.S. to Wisc. and Iowa south to Texas, Va., and Colo.), and *Juncus* sp.** (Conn., Iowa, Miss., N.C., Pa., Wisc.)

Cintractia luzulae (Sacc.) Clint., inflorescence smut on *Luzula campestris* (Ind.)

Entorrhiza casparyana (Magnus) Lagerh., smut, on *J. articulatus* (B.C.)

Tolyposporium junci (Schröt.) Woron., inflorescence smut on *J. bufonius* (Oreg., Wash.) and *Juncus* sp. (Oreg.)

Urocystis junci Lagerh., stem smut on *J. arcticus* (Nev., Wyom.)

Ustilago luzulae Sacc., on *Luzula campestris* (Ind.), and *L. campestris* var. *echinata* (Ill.)

Ustilago vuijckii Oudem. & Beijer, smut on *Luzula parviflora* (Alberta., B.C., Wash.)

UREDINALES

Puccinia obscura Schröt., rust (II, III) on *Luzula acuminata*** (Ont., N.S.), *L. campestris*** (N.S. to Kans. and Wisc., Alas. south to Sask., Idaho, and Calif.), *L. parviflora* (B.C. south to Idaho and Calif.), and on *Luzula* sp. (Iowa, N.Y., Wisc., and Wash. to Calif.)

Uromyces junci (Desm.) Tul., rust (II, III) on *J. arcticus* (s.l.) (in the west from Man. to Wash. south to Calif. and in the east from Kans., Mich., Pa., P.E.I.), *J. dudleyi* (Man.), *J. effusus* (Fla., Mass.), *J. filiformis* (Sask.), *J. tenuis* (Kans.), *J. torreyi* (Neb., Wash, Wisc.), and *Juncus* sp. (Calif., Idaho, Nev., N.C., S.C.)

Uromyces junci-effusi Syd., rust (II, III) on *J. arcticus* (N.S., Wyom.), *J. brevicaudatus***, *J. effusus*** (N.S. to Ont. south to Fla., Ala., Mo., and Wash.), *J. ensifolius* (Idaho, Wash., Oreg., Mont.), *J. filiformis* (N.S.), *J. tenuis***, and *Juncus* sp.** (Ariz., Mont. to Calif. and Wash.)

Uromyces silphii Arth., rust (II, III) on *J. acuminatus* (Idaho, Alaska), *J. arcticus* ssp. *littoralis* (Wisc.), *J. dichotomus* (Del., Fla., Ga., N.J., Tenn.), *J. dudleyi*** (Colo., Conn., Ind., Mich., Neb., Ont., Oreg., Pa., Tenn., Wash.), *J. effusus* (Fla., Ont.), *J. greenei* (Conn.), *J. marginatus* (Neb.), *J. tenuis*** (N.S. and P.E.I. to Wash. south to Calif., Ariz., Tex. and N.C.)

APHYLLOPHORALES

Flagelloscypha sp., on dead stems of *J. effusus***

AGARICALES

Melanotus caricicola (C. Orton) Guzman, on *J. effusus* (Ont.), and on *Juncus* sp.

DEUTEROMYCOTINA
HYPHOMYCETES

Arthrinium cuspidatum (Cooke & Harkn.) Tranz. [= *A. bicorne* Rostr.], sooty patches on dead stems, on dead stems of *J. arcticus* (Calif.), on *Juncus* sp. (Oreg., Wash.) [on leaves of *J. gerardii* in Britain]

Cercospora junci MacGarvie & O'Rourke, on *J. brachycephalus* (Wisc.)., on leaves of *J. brevicaudatus* (Wisc.), on leaves of *J. greenei* (Wisc.), on *J. tenuis* (Wisc.) [on dead leaves of *J. effusus* in Britain]

Cercospora juncina Sacc., on *J. canadensis* (Ont.)

Epicoccum purpurascens Ehrenb., on stems of *J. effusus***

Fusarium sp., on dead *J. effusus* stems**

Helminthosporium palousense Sprague, on *J. ensifolius* (Wash.)

Heterosporium sp., on *J. arcticus* (Wash.)

Ramularia junci Peck [=? *Cercospora junci* J. Davis], leaf spot on living leaves of *J. marginatus***

SPHAEROPSIDALES

Ascochyta luzulicola Sprague, on dried foliage of *Luzula parviflora* (Alaska)

Coniothyrium junci Ellis & Everh., on dead scapes of *J. arcticus* (s.l.) (Oreg.)

Dinemasporium state of *Phomatospora dinemasporium* Webster, on dead stems of *J. effusus***

Discella tenuispora Cooke & Harkn., on stems of *J. arcticus* (s.l.) (Oreg.?), and on stems of *Juncus* sp. (Calif.)

Leptostroma juncacearum Sacc., on *Juncus* sp. (Idaho, Wash.) [on *J. effusus* and *J. conglomeratus* in Britain]

Melanconium juncinum (Cooke & Harkn.) Powell, on stems of *J. arcticus* (s.l.) (Utah)

Phoma junci Preuss, on stems of *Juncus* sp. (N.C., Va.)

Placosphaeria junci Bubák, on *J. tenuis* (Wash.)

Septoria chanousiana Ferr., on *Luzula campestris* (Idaho, Oreg., Wash.), *L. parviflora* (Alaska), *L. spicata* (Oreg., Wash.), and *Luzula* sp. (Mont.)

Septoria minuta Schröt., on *Luzula campestris* (Alaska, Wisc.)

Sphaerellopsis filum (Fr.) Sutton, on *Juncus* leaves (Southeastern U.S.)

Stagonospora caricinella Brun., on dried basal leaves of *J. bufonius* (Alaska)

APPENDIX II

A LIST OF SOME INSECTS ASSOCIATED WITH PLANT SPECIES IN THIS TREATMENT.

by Steven E. Clemants

HEMIPTERA

Pentatomidae

Podops (Amaurochrous) cinctipes Say., common on cattails, in saltmeadows, and on *J. gerardii* and doubtless other rushes

Rhytidolomia senilis (Say), near beach in rushes and grasses Tingidae

Lopus decolor (Fall.), ovipositing in the stem of *J. dudleyi*, on *J. dudleyi* and other species

Miridae

Mimoceps insignis Uhl., on sedges (*Juncus* sp.?)

HOMOPTERA

Cicadellidae

Helochara communis Fitch, on *Juncus* sp.

Chermidae

Livida maculipennis Fitch, creating infertile, deformed, inflorescences, the floral organs being produced as a moderately dense cluster of slender, linear bracts, this gall has been seen on several species in the subgenus *Septati* including *J. brevicaudatus* and *J. canadensis*

Aphidae

Geoica squamosa C. Hart, on roots of *Juncus* sp.

Macrosiphum granaria Kirby, on *J. tenuis*

Prociphilus erigeronensis (C. Thomas), on *J. effusus*

Rhopalosiphum nymphaeae (Linnaeus), on *J. effusus*

Brachycaudus (Saltusaphis?) insessa Walker, on *J. militaris* (not reported from NY)

Sipha glyceriae (Kaltenbach), on *Juncus* sp.

Thripsaphis cyperi F. Walker, on rushes (not reported from NY)

Schizaphia (Toxoptera?) graminum (Rondani), on *J. tenuis*

COLEOPTERA

Chrysomelidae

Donacia pusilla Say, on rushes and on *Carex stricta*

LEPIDOPTERA

Coleophoridae

Coleophora sp., case bearer on capsules of *J. dichotomus*, *J. effusus* and *J. tenuis*

Coleophora biforis Braun, on *Luzula campestris*. (not reported from NY)

Coleophora caespititiella Zell., on seeds of *Juncus* sp. [on *J. effusus*, *J. conglomeratus*, *J. gerardii*, *J. articulatus*, and *J. inflexus* in Britain]

Coleophora concolorella Cham., on seeds of *Juncus* sp.

Coleophora cratipennella Clem., on seeds of *Juncus* sp.

Coleophora fagicorticella Cham., on seeds of *Juncus* sp.

Coleophora quadrilineella Cham., on seeds of *Juncus* sp. (not reported from NY)

Tortricidae

Bactra furfurana (Haworth), larva on *Juncus* and *Scirpus* [mines stems of *J. conglomeratus* in Britain]

Bactra verutana Zeller, larva normally boring in *Juncus* sp. (not reported from NY)

Satyridae

Oeneis jutta (Hubner), feeding on *J. articulatus* (not reported from NY)

DIPTERA

Cecidomyiidae

Cecidomyia sp., forming deformed fruit on *Juncus*

Procystiphora coloradensis Felt, infesting leaf sheath of *Juncus* sp.

Procystiphora junci Felt, infesting leaf sheath of *Juncus* sp.

Agromyzidae

Phytobia capitata (Zetterstedt), almost certainly on *Juncus* spp. though no larvae have been found

Phytobia longipennis (Loew), larvae forming leaf and stem mines on various *Juncus* sp.

Phytobia luctuosa (Meigen), larvae forming yellowish leaf mines, pupating in leaf blade, frass deposited in single lump, on *Juncus* sp.

HYMENOPTERA

Formicidae

Aphaenogaster tennesseensis (Mayr), in the laboratory they carry seeds of *Luzula acuminata* to their nest and chew on them

Aphaenogaster rudis (Emery), in the laboratory they carry the seeds of *Luzula campestris* to their nests and chew on them (not reported from New York); shown to remove diaspores of *Luzula campestris* var. *echinata*

Formica fusca L., in the laboratory they carry seeds of *Luzula acuminata* to their nests and chew on them

Lasius alienus (Foerster), shown to remove dispores of *Luzula campestris* var. *echinata*

Tenthredinidae

Eutomostethus luteiventris (Klug): the larva bores in sterile shoots of *Juncus* until the last instar when it emerges and feeds externally (not reported from NY)

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INDEX TO LATIN NAMES

Note: Boldface indicates a name used in this treatment for a species known to occur in New York State.

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